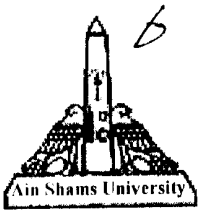

Institute of Postgraduate Childhood Studies
Medical Studies Department

Evaluation of Psychosocial Adjustment in Nutritional obesity of Primary School Children

Thesis
Submitted for the fulfillment of PhD in
Medical Childhood Studies

By

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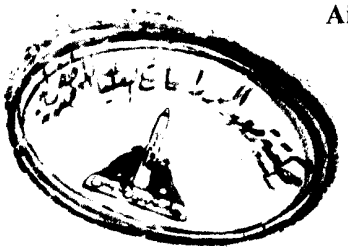

2010

بسم اللة الرحمن الرحيم

قَالَ رَبِّ اشْرَحْ لِي صَدْرِي (25) وَيَسِّرْ لِي أَمْرِي (26)
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DEDICATION

TO

My Mother, for all support, kindness and unlimited care she gave me. From her; I understood the meaning of persistence

TO

My sweetest heart Mariam and my beloved Mohammed; for being so tolerant. To them I dedicate my whole life wishing them a bright future.

Contents

Abstract

Background: Researchers, physicians, and parents have become increasingly concerned about both the short and long-term health and psychosocial consequences of childhood and adolescent obesity.

Aim: The aim of this study is to explore the relationship between nutritional obesity and psychosocial adjustment, self esteem, and perceptions of appearance in a clinical and sample of obese and over weight children.

Design: case control study

Patients and Methods: Target population were school-aged children aging from (9-11) years to guard against hormonal changes of puberty. The study was done on 104 patients; (54 obese, 50 overweight) compared to 50 nonobese children in the same school according to BMI percentile (WHO) standards. **Nutritional status** was assessed through measurements of weight, height, arm circumference, Waist and hip circumferences. **Familial Background,** of the children was recorded. **Dietary Intake** of children was recorded for every child by the use of the 24-hours recall method. **Cognitive Abilities**. **Psychosocial Behaviour** and **Academic School Achievement** of children were assessed using standardized methods.

Results:

There was significant difference between obese, overweight and nonobese children regarding anthropometric parameters weight/age, height/age, waist/hip and circumferences. Obese and overweight children had lower IQ scores than their peers with no significant difference in scores of memory and classification abilities. The obese

and overweight children showed Psychosocial problems in comparison to their peers in the form of depression, anxiety low self-esteem and ADHD. The study reported a high prevalence of teasing among obese and over weight group in relation to nomobese .The obese and overweight children showed more consumption of calories, fat and carbohydrates than their peers.

Conclusion:

Obesity affects psychosocial adjustment of children raising the importance of early detection and prevention of obesity in the form of nutritional and health education

Key words:

Obesity – Schoolchildren – Psychosocial – Cognition – Depression – Academic Performance – Body image.

LIST OF ABBREVIATONS

ACDI	Arabic Children's Depression Inventory
ADHD	Attention Deficit Hyperactivity Disorder
ANOVA	One way analysis of variants
BI	Body Image
BMI	Body Mass Index
BMR	Basal Metabolic Rate
BP	Blood Pressure
CHD	Chronic Heart Disease
CNS	Central Nervous System
CVD	Cardiovascular Disease
DM	Diabetes Mellitus
DXA	Dual-Energy X Ray Absorptiometery
GSHS	Global School Health Survey
HAM	%Height for age of median
HB	Hemoglobin
Ht	Height
IDDM	Insulin Dependent Diabetes Mellitus
IQ	Intelligent Quotient
PSC	Pediatric Symptom Checklist
RDA	Recommended Daily Allowances
SD	Standard Deviation
SF	Skin folds
TV	Television
Vs	Versus
WAM	Weight for age of median
WHM	Weight for height of median
WHO	World Health Organization
WHR	Waist for hip ratio
Wt	Weight

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INTRODUCTION

Obesity is a global nutritional concern, which is increasing at alarming rate throughout the world ***(Styne, 2001; Popkin, 2006).***

Regionally, in Egypt and Middle Eastern crescent including North Africa countries, obesity is recognized as a major public health problem ***(Sarhan, 1982)***. Obesity occurs when energy intake chronically exceeds energy expenditure ***(Raine et al., 2001).*** It leads to large number of debilitating and life threatening disorders ***(Alyling et al., 2001).***

In children, BMI above the age and sex specific 85th percentile can be defined as overweight and those above 95th percentile as obese ***(Who standards ,2007).***

Obesity is a complex multifactorial disease, which is independently related to cultural, economic and social parameters ***(La Rasa et al., 2003).***

Obesity is defined as a chronic physical illness by the World Health Organization ***(WHO)***. However, most obese adult patients often find it difficult to accept their overweight as an illness. Nevertheless, many obese persons suffer from psychosocial problems; including self-deprivation, low self-esteem, and loneliness. In fact, just their social stigmatization as 'voracious persons' leads easily to isolation and loneliness. As such many chronic obese patients appear to seek paradoxically comfort in excessive eating, this may lead to a permanently unhealthy lifestyle (eating too much and exercising too little). So, the circle has been closed: concern, shame and guilt related to low self-esteem in many obese persons is finally related to excessive overeating ***(Doak, & Visscher, 2006).***

Seidell, (1999) has sounded the alarm concerning the worldwide epidemic growth in obesity. The prevalence of obesity body mass index (BMI > 30) amounts to 5-10% among adults. In most countries the prevalence of over-weight (BMI > 25) is about two or three times as large. Even though comparison of prevalence data in children and adolescents around the world is difficult (lack of standardization), prevalence of childhood obesity has been steadily increasing too over the past several decades. Using a conservative estimate of overweight (>95th percentile), data from the 1976-1980 National Health and Nutrition Examination still showed prevalence of around 7.6% in children (aged 6-11 years) and 5.7% in adolescents (aged 12-17 years); a decade later these percentages have increased to 14% in children and 12% in adolescents, respectively ***(Stradmeijer,1999; Neumark et al., 2000).***

The increase in the prevalence of obesity among Children and adolescents demonstrate the need of universal as well as selective preventive interventions. Childhood obesity is a strong predictor for adulthood obesity. Targeting high-risk individuals and high-risk periods of life should be encouraged ***(Wing, 1996).*** Because, obesity is not readily amenable to treatment, especially with adults, prevention should be given high priority in public health ***(Mackenzie et al., 2000).***

Psychological-theoretical approaches have primarily been tested in clinical/empirical research with obese adults ***(Stradmeijer, 1998),*** since, overweight and excess of body fat can be detected from a very early age and professional attention should be more directed to children.

Various psychological theories, such as emotional eating, externally-oriented eating, and restrained eating offer some explanation for the resistance to change of unhealthy eating habits and lifestyle

(Braet, et al., 1993) However, these theories fall short of a satisfactory explanation of the causality of these phenomena. Unhealthy eating habits, insufficient exercise, and a generally unhealthy lifestyle, mostly present already at an early age, are particularly fatal for individuals with a physical predisposition for obesity. An extremely economical engine (their remarkably low energy expenditure) physically handicaps them, and this is doubtfully complicated by extremely excessive energy consumption ***(Braet, et al., 1997)***.

Hazards of childhood obesity include cardiovascular increase, cancer, diabetes, orthopedic disorders and leads to dyslipidemia and hypertension in adult age ***(Crespo et al., 2001).***

The possibility of preventing adult obesity by taking action in infancy and childhood is must ***(Law, 2002).***

Aim of Work

The aim of this study was to explore the relationship between nutritional obesity and psychosocial adjustment, self esteem, and perceptions of appearance in a sample of prepubescent school children. Dietary intake, dietary patterns and health risks behaviours would also be studied in relation to obesity of children.

DEFINITION OF OBESITY

Obesity is a global nutritional concern which is increasing at alarming rate throughout the world ***(Mendez M & Popkin B, 2004).*** It is defined as a condition of excess fat that results when excess energy has been accumulated, and is associated with a large number of debilitating and life-threatening disorders ***(Ayling et al., 2001; Reilly et al., 2005)***. It occurs when energy intake chronically exceeds energy expenditure ***(Raine et al., 2001; Ellie &Sharon; 2008)***. In other words, it is an abnormal growth of the adipose tissue due to an enlargement of the fat cell size, an increase in the fat cell number or combination of both. Any increase in body weight over the target weight is considered an overweight ***(Stevens et al., 1998). Parizkova and Hills, (2001)*** refer to obesity as a condition characterized by an increased level of adiposity and a corresponding increase in body weight, which must be evaluated according to the standard values for the individual age and gender categories (***Phillippas & Clifford, 2005).***

Obesity in children has been defined as a weight for height above the 90th percentile on the standardized growth charts or weight in excess of 120 percent of the median weight for a given height (***Rosenthal et al, 1994)***.

We must put in our consideration that obesity is not equivalent to overweight, obesity denotes excess body fat, whereas overweight might be related to fat or other tissue in excess with relation to height ***(Troiano &Flegat, 1999; Styne, 2001; McCharty et al., 2006)***.

Overweight is a weight greater than "standard" weight for age and does not specify body composition, obesity is an excess of body fat.

Some children may be overweight because of increased muscle and bone (Lean body mass) ***(Rosenthal et al., 1994)***. A variety of measurements can be made in children to determine the degree of overweight and the proportion and distribution of body fat ***(Reilly, 2005)***.

Nancy and Craig, (1997) defines superobesity as a weight for height above the 95th percentile and weight in excess of 140 percent of the median weight for a given height. The heights and weights of both parents and any siblings are also important elements of children's assessment.

While several accepted classifications and definitions exist for degrees of obesity, the most widely accepted is the World Health Organization ***(WHO)*** criteria based on BMI. Under these convention adults, grade 1 overweight (commonly and simply called overweight) is a BMI of 25-29.9 kg/m^2. Grade 2 overweight commonly called obesity) is a BMI of 30-39.9 kg/m^2. Grade 3 overweight (commonly called severe or morbid obesity) is a BMI rather than or equal to 40 kg/m^2.

The surgical literature often uses a different classification order to recognize particularly severe obesity. In this setting, a BMI greater than 40 kg/m^2 is described as severe obesity, a BMI of 40 kg/m^2 is termed morbid obesity, and a BMI greater than 50 kg/m termed super obese ***(Troiano &Flegat, 1999; Styne, 2001;Ritchi and Connel,2007)***.

There are many methods used to define the obesity and overweight:

1) **Weight percentile:** is useless as this term does not take in consideration the height of the child which modifies the appropriateness of weight.

2) **Height-weight method:** is an important but does not differentiate between increased muscles compared with increased adipose tissue.

3) **Body mass index (BMI): BMI-for-age/sex**

The definition of BMI is weight in kilograms divided by height in meters squared.

$BMI = weight\ (kg) / height\ (m)^2$

(Nowicka, 2005)

At present, BMI is probably the best choice among available measures. BMI can be easily assessed at low cost, and has a strong association with body fatness and health risks.

BMI better reflect the amount of body fat composed with the amount of muscle or bone and is used for the proxy for measurement of body fatness in adults in absence of laboratory and radiographic determination ***(Sabin and Shield, 2008).***

BMI has a good specificity as it exclude subjects not overweight, but has poor sensitivity as it misses some who are obese, and provide a higher value than would be accurate in stunted children suggesting better nutritional status than actually the case ***(Nowicka, 2005)..***

Although BMI has been used to evaluate overweight and obesity in adults for many years, it has only recently been recommended for screening children and adolescents ***(Eisenman, 2005).***

The advantages of using BMI-for-age are that it can be used continuously from age 2 years through adulthood and thus allowing significant changes in growth patterns to be recognized and addressed

before children become severity overweight. It also facilitates anticipatory guidance for children and adolescents at risk of overweight or for those who are underweight ***(Nowicka, 2005).***

However, the controversies of using BMI-for-age are that BMI is used differently to define overweight in children and adolescents than it is in adults also BMI changes substantially as children get older, and girls and boys differ in body adiposity as they mature. Thus for this group, BMI is age and gender specific. BMI is plotted on a chart of the appropriate sex, relative to the child's age ***(Clarke et al., 1986, McCarthy al., 2006)***.

Overweight in pediatric age group has been recognized as an important early risk factor for subsequent adult morbidity and mortality, including adverse affects in cardiovascular health ***(Johnson et al., 1975)*** the endocrine system, ***(Shinha et al., 2002)*** and mental health ***(Davison et al., 2001;Hassan et al., 2008)***.

The American academy of pediatric ***(AAP)*** policy statement specifically addressed the need for early recognition of excessive weight gain relative to linear growth in pediatric ambulatory care settings. An important strategy for meeting this goal includes yearly assessment of body mass index (BMI).

Childhood obesity may be seen as a marker for high risk dietary and physical inactivity practices. Recent increase in the prevalence of overweight and obesity among children are not limited to one age, gender, or ethnic subgroup. ***(Doak, & Visscher, 2006)***.

PREVALENCE OF OBESITY

The rate of prevalence of obesity in children is on the increase ***(Phillippas& Clifford 2005).*** The prevalence varies in different populations ***(Parizkova and Hills, 2001; Nathan and Moran; 2008))***.

An improved understanding of the factors promoting of protecting against the development of obesity is important for effective public health and clinical interventions. There is a strong familial association with obesity, a major part of this association being via a shared genetic predisposition. However, the increased prevalence of obesity in recent decades in genetically stable populations highlights the central role of environmental trends in the development of the obesity epidemic ***(Nestle, 2006).***

Obesity has a strong association with socioeconomic status (SES), with higher prevalence levels among children in lower SES strata westernized countries. Early infant feeding is important; with breast-feeding having a small but protecting effect against the development of later overweight ***(Baur, 2005)***.

Other early factors predicting excess weight gain in childhood include rapid catch-up growth by age 2 years and an earlier adiposity rebound. The association between television viewing and obesity in childhood and adolescence has been demonstrated in both cross-sectional and longitudinal studies. Several possible mechanisms may explain this association, including: increased exposure of children to food marketing; increased snacking of energy-dense foods, displacement of time spent in more physical activities and reinforcement of sedentary behaviours **(Wang, 2004)**.

The increased prevalence of obesity in recent decade resulted at least in part, from changes in dietary intake, such as increase in the consumption of energy-dense, micronutrient poor founds on in sugar-sweetened drinks. Consumption of soft drink because is associated with increased weight gain in adolescents in the U.S. ***(Baur, 2005).***

The prevalence of obese children in USA has been increase dramatically, especially among non-Hispanic blacks and Mexican-American adolescents (***Keller & Lemberg, 2003; Vickers et al., 2007***), while it was lowest in Honduras and Haiti. The US National Health and Nutrition Examination Survey ***(NHANES III 1988-1994)*** reported that 34% of US adult population was obese. This was an increase from 25% during the previous study done 10 years before. In children, 22% of the pediatric, population aged 6-17 years in all ethnic groups were found to be overweight (BMI > the 85%), and increase from 15% 10 years before, and 10.9% were found to be obese (BMI > the 90%) ***(Ayling et al., 2001; Styne, 2001.)***

Vickers et al., (2007) recorded that obesity in children has been raised by over 40%in the last 16 years. ***Teeth et al., (2008)*** recorded that 14% of American children between the ages of 6 and 11, and 12% of adolescents between the age of 12 and 17 are over weight.

In Canada, the prevalence of overweight and obesity for adult population (20 to 64 years of age) have increased from 40% and 9.7% 1970 – 1972, to 50.7 and 14.9% in 1998, respectively ***(Kazmarz. YK, 2002)***. ***Ball & McCarger (2003)*** found that the prevalence of childhood obesity has become increasing over the past 2 decades.

Regionally, in Egypt and the Middle East; obesity is recognized as a major public health problem ***(Sarhan, 1982)***. At least one third of Arabs are obese (BMI > 90) ***(Al-Mahroose & Al-Roomi, 1999)***.

Childhood obesity frequently tracks into adulthood and is linked with increased morbidity and mortality independently of adult obesity ***(American Obesity Association, 2006).***

Obesity in childhood is associated with adverse outcomes such as hypertension dyslipidemia, chronic inflammation, hyperinsulinemia orthopedic problems as well as substantiate psychological consequences obese are stereotyped as unhealthy, socially and academically unsuccessful and lazy behavioural problems in particular are commonly associated with obesity (***Mackay et al., 2000;Strauss, 2005***.; ***Myoclinic 2007)***.

Data from other large scale epidemiological studies such as the Bogalusa Heart Study, the National Heart, Lung, and Blood Institute (NHLBI) ,the National Growth and Health study (NGHS), and the Child and adolescent trial for cardiovascular health (CATCH) provide additional information on prevalence rate of overweight and obesity in different areas in the world ***(Dwye et al., 2000)*** for example:

A) The Eastern Mediterranean Region:

Musaiger, (2004) reported that the status of overweight has reached an alarming level in the Eastern Mediterranean Region. A prevalence of 3%-9% overweight and obesity has been recorded among preschool children, while that among school children was 12%-25%. A marked increase in obesity generally has been noted among adolescents, ranging from 15% to 45%. In adulthood, women showed a higher prevalence of obesity (35%-75%) than men (30%-60%). Several factors such as change in dietary habits, socioeconomic factors, inactivity and multiparity (among women) determine obesity in this Region. There is an urgent need for national programmes to prevent and control obesity in the countries of this region.

B) EGYPT:

Jackson et al., (2003) compare the relationship between body weight and body images in a convenience sample or rural and urban girls by using the Centers of Disease Control ***(CDC)*** and prevention reference standards and found 35% of the girls were > or = 85^{th} percentile, while 13% were > or = 95^{th} percentile. Overweight was more prevalent in urban than rural girls and in those with higher socioeconomic status than in lower socio-economic status girls. Girls' perceptions of how their mothers viewed their bodies different from how the girls viewed their own bodies.

From a policy point of view, these data underscore the need to consider not only the health risks associated with overweight and its distribution on the body, but also the weight and body image of the

target audience in the design of clinical and public health intervention programs worldwide ***(Elmasry et al., 2007).***

C) Saudi Arabia:

Al-Almaie, (2005) reported higher prevalence of obesity in male than female students (19.3% versus 11.8%) while a higher proportion of female students than males were overweight (17.2% versus 10.2%).

Al-Rukban, (2003) reported the prevalence of overweight was 13.8% and obesity was 20.5%. .Family history (odds ratio, 2.49; 95% confidence interval, 1.72-3.61) and lack of physical activity (odds ratio, 1.63; 95% confidence interval, 1.01-2.62) were associated with adolescent obesity and 20% of overweight participants did not think they were overweight.

D) United Arab Emirates (UAE):

Malik et al., (2005) reported the prevalence of diabetes and impaired fasting glycaemia (IFG) and associated conditions such as obesity and hypertension, in the multi-ethnic, adult population of the United Arab Emirates in 1999-2000.Crude prevalence of diabetes was 20%. It was higher in UAE citizens (25%) than in expatriates (13-19% depending on country of origin).Obesity was common in all ethnic groups. Approximately three-quarters of all subjects were either obese (BMI > or = 30) or overweight (BMI 25-29). Presence of diabetes was associated with increasing waist-hip ratio (WHR), age and with systolic blood pressure and ethnicity. Co-morbidity with glucose intolerance occurred with obesity in 8% and with hypertension in 5%. Three-quarters of all subjects had one or more of these conditions. Diabetes, obesity and hypertension are extremely prevalent in the

adult population of the UAE. Prompt action is required to solve the major public health crisis due to the long-term complications of diabetes in the near future.

E) Bahraini:

Al-Sendi et al., (2003) determined a much higher prevalence rate of obesity in the Bahraini adolescent population than was previously reported, especially among girls. The overall prevalence of obesity among Bahraini boys and girls was high, especially in girls. The prevalence of obesity was 21% in males and 35% in females.

F) Qatari:

Bener, (2006) determined the prevalence of underweight, overweight and obesity, as measured by body-mass index, in a representative sample of adolescents aged 12 to 17 years in the State of Qatar.

The prevalence of overweight and obesity was 28.6% and 7.9%, respectively, among adolescent boys and 18.9% and 4.7% among girls. The prevalence of obesity was highest at 12 years of age among boys (11.7%) and at 13 years among girls (6.4%).

G) Kuwaiti:

Al-Isa, (2004) assessed the levels of overweight and obesity among Kuwaiti intermediate school adolescents aged 10-14y.

The overall prevalence of overweight and obesity among males was 34.7%. The overall prevalence of overweight and obesity among females was 33.1%,.There was no consistent rise or decline in overweight and obesity in both genders with respect to age. However,

the overall prevalence of overweight was lower in males than in females but obesity was higher in males than in females.

H) Iran:

Sotoudeh et al., (2005) determined the prevalence of overweight, overall and central obesity in female adolescents and women and their parity possible association with marital status, occupation, literacy, parity, daily meal and snack consumption. Overweight and obesity was very common in adult females; thus prevention of overweight and obesity through a healthy diet and increased physical activity should now be an important priority area.

Abdul-Ghani et al., (2005) reported that women of Arab origin are at higher risk of developing obesity and type 2 diabetes compared to men. Obesity in women seems to be associated with higher diabetes risk as well as earlier appearance of the disease. Therefore, they will have the disease for longer and, consequently, will be at higher risk for complications.

I) China:

Ji CY et al., (2004) reported Dynamic analysis on the prevalence of obesity and overweight among school-age children and adolescents in the previous 15 years in China and revealed that the prevalence of obesity in Chinese children and adolescents was considered to be still relatively low. However, the rapid increasing of both obesity and overweight in both urban and rural areas would arouse special attention.

RISK FACTORS OF OBESITY

There are several important risk factors of pediatric obesity. These include parental fatness, social factors, birth weight, timing or the rate of maturation, sedentary lifestyle, dietary habits rich in fat and sugar and other behavioural and psychological factors. Sedentary lifestyle is a well-known predictor. Two decades ago it was shown that time spent in front of the TV increases the risk of obesity ***(Dietz et al., 1986)***. Parental neglect is also documented as a risk of obesity in young adulthood. Intake of sugar-containing dinks increases the risk of obesity ***(Ludwig et al., 2001; Dopheide, 2006)***.

1. Familial factors:

Studies done on obese families reported high level of dietary intake and low level of physical activity ***(Krahnstoever et al., 2002).***

Data indicate that a child has an 80% probability of being obese when both parents are obese 40% probability when one parent is obese and 7% probability when neither parent is obese. ***(Kendall & Serrano, 2006)***

Obese mothers tend to have much larger placenta and bear children who may weight about 10% more than children of lean mothers ***(Jam Cs, 1986).***

Generally, children who are obese have parents who are obese, and an obese child generally has obese siblings. Others suggest that children of obese parents become fatter with increasing age than children of lean parents ***(Paige, 1986; U.S. Obesity Trends, 2006)***

Dietz, (1986) has enumerated some variables within the family environment that appear to be the most important determinants of childhood obesity as; parental obesity.parental age and birth order.

2. Social Factor:

The prevalence of obesity was inversely proportional to family size. Obesity is most prevalent among single children. In addition, younger children are at greater risk of obesity than older children. Education and socioeconomic class were related directly to the prevalence of obesity ***(Phillippas & Clifford, 2005).*** Each of these effects remained significant after controlling for other variables ***(Dietz, 1986)***.

Each of these effects remained significant after controlling for other variables ***(Dietz, 1986).***

Among children and adolescents, the effects of socioeconomic class and education consistently affect the prevalence of obesity. Both levels of education and income are directly related to obesity in black and white children of both sexes. Women provide a notable exception: upper class women are leaner than those in lower socioeconomic categories ***(Dietz, 1986)***.

Single child, single parent are associated with obesity in young children. The prevalence of large families amongst the older children suggests that it is only in later childhood that these children become obese ***(Poskitt, 1986; Popkin, 2006)***.

We can only speculate why family structure and social class have these predisposing effects. Is the quality of food, rather than its energy quantity, more relevant to the disposition of energy in the body? Do the emotional conflicts between parents and children and the presence or

absence of harmony between siblings actually consume and divert energy away from deposition as fat? Or are single children and children of single parents more likely to consume more sweets and other junk foods from grand parents or friends? ***(Popkin, 2006)***.

The psychosomatic motives such as depression, anger, lack of affection, unsteady sex life, and other social pressure and family troubles can make the parents more susceptible to resort to food as a drug, under such circumstances, the children tend to acquire their parents habits ***(Phillippas & Clifford, 2005).*** They too become inclined to consume excessive quantities of hypercaloric food stuffs, sweets particularly. On the other hand, such food stuffs are given to children by their parents-frequently as a reward and as a mean of gaining affection. The more obese the child, the better she or he will serve as indicator of poor psychomatic. ***(Stice & Marti, 2006).***

3. Psychological Factors:

Many investigators have proposed that various aspects of personality disturbance can cause obesity. Psychoanalytic theories have assumed that over-eating has a powerful compulsive, motivating features to it that override normal hunger-satiety mechanisms. In particular, over-eating is seen as maladaptive coping responses to depression and anxiety ***(Sclochower and Kaplan, 1980; Doak & Visscher, 2006).***

Emotional and psychological factors can cause compensatory overeating in children as in adults ***(Simic, 1980)***. Emotional, physical or social values are essential for a child growth and development. Being deprived of any one of these, may bring on obesity. Also, the child who is socially isolated may resort to over-eating as a solution to this (***Doak & Visscher, 2006***)

4. Life style:

Insufficient physical activity was the risk factor for higher Body Mass Index for adolescent boys and girls ***(WHO, 2006).***Studies of children or adolescents examined the interrelations among physical activity and intra-abdominal fat (IAF), and increased risk of disease .In an intervention study in obese girls aged 7-10 years; strength training (3 times/week for 5 months)had no effect on IAF despite increases in body weight ,total body fat and subcutaneous abdominal fat (SAF) ***(Treuth et al., 1998)***.In another study in 7-11 years old obese children there was no significant change in IAF but a significant loss of SAF after a 4 months aerobic training programs ,whereas there were significant increases in both IAF and SAF that received no exercise intervention. Thus, both strength and aerobic exercise appear to show the time –related increase in IAF in obese children ***(Goran and Gower, 1999).*** Recently, ***Salenes et al., (2007)*** reported that after control for whole body fat, greater physical activity is only associated with lower IAF,not SAF,in 8 years old children at risk of obesity

The prevalence of obesity is lowest among children watching 1 or fewer hours of television a day and highest among those watching 4 or more hours of television a day ***(Carlos, 2001).***These are strong evidence that television causes childhood obesity ***(Robinson, 1999).***Television watching, inactivity and food intake were considered as risk factors for obesity in children ***(Maffeis, 2000; Kendall & Serrano, 2006;Media and Childhood Obesity,2008)***

ETIOLOGY OF OBESITY

Obesity is a complex multifactorial disease which is independently related to cultural, economic and social parameters ***(La Rasa et al., 2003)*** Genetic, behavioral and environmental causes also have a role ***(Warden et al., 1994; Lobstein and Baur, 2004).***

Bray (1989) has mentioned 4 main etiologic causes for obesity, Nutritional imbalance, Neuro-endocrinal, Genetic, Iatrogenic causes.

1. Nutritional obesity:

Energy balance is the balance between the calories taken in and the calories expended minus the calories stored in tissues of body ***(Elliot and Lewis, 1983)***. During the development of obesity energy balance is positive (energy intake exceeds expenditure) and excess calories are stored as body fat.

Many explanations for the positive energy balance in obese children were considered first, they eat more than their normal-weight peers, second, they exercise less. Third, they have low energy expenditures ***(Perez and Salas, 2001; Phillippas& Clifford, 2005).***

The appetite is controlled by two discrete areas in hypothalamus:

a) Feeding center: in the ventro-lateral nucleus of hypothalamus (VLNH).

b) Satiety center: in the ventro-medial nucleus of hypothalamus (VMNH).

The cerebral cortex receives positive signals from the feeding center that stimulate eating the satiety center modulates this process by sending inhibitory impulses to the feeding center ***(Olefsky, 1987;American Obesity Association, 2006)***..

The regulation of eating behavior is incompletely understood, several regulatory processes may influence the eating behavior:

a) Cholecystokinin urocortin and neuropeptide Y:

These peptides have been shown to influence food intake. The cholescystoknins (CCKs) are a family of gut and brain peptides that exert pleiotropic effects. Exogenous (CCK) reduces food intake. The response to endogenous (CCK) can be amplified by the use of a (CCK) peptidase inhibitor. ***(Wurtman, 1986)***.

b) Plasma glucose and/or insulin:

The satiety center may be activated by the increases in plasma glucose and/or insulin that follow a meal. VMNH contains insulin receptors and is insulin sensitive ***(Olefsky, 1987)***.

c) Meal:

Induced gastric distension is another possible process. It stimulates the satiety center ***(Olefsky, 1987***; ***Willett, 1990)***.

d) Adrenergic influence:

B-adrenergic stimulation inhibits eating behavior through stimulation of the satiety center. This explains the anorexiant effect of amphetamines ***(Olefsky, 1987)***.

The cerebral cortex plays a role in control of eating behavior through psychological, social and genetic influences In many obese subjects, these influences are overriding and respond to external signals such as the time of the day, social setting and smell or taste of food to greater extent than do subjects of normal weight ***(Olefsky, 1987)***.

Over-feeding may be of importance in the onset of childhood obesity, ***(Romieu et al., 1988).Poskitt, (1986)*** related obesity in to infant feeding practices as over feeding with the unmodified cow's milk formulas and to early introduction of non-milk foods. Some of the studies suggested that the weight gain of breast fed infants was less rapid than that of formula fed infants ***(Arenz et al., 2006)***.

One must consider the possibility that differences in dietary intake do not consistently serve to maintain obesity, other energy-balance variables, namely physical activity, or metabolic rate ***(Roberts et al., 1988),*** may be more important: in the maintenance of obesity. However, it is very important to distinguish between the mechanisms responsible for the onset of obesity versus, the mechanisms responsible for the maintenance of obesity ***(Klesges and Hanson, 1987)***. It may be, for example, that dietary factors are more important in the onset of obesity whereas physical activity and or metabolic factors play more of the role in the maintenance of obesity ***(Perez and Salas, 2001)***.

Because change in dietary intake is a better predictor of weight loss than are changes in physical activity and resting metabolic rate. ***(Barnestuble and Klesges, 1986)***, change in dietary intake may be equally important in the onset of obesity (***Baecke et al., 1993; Nestle, 2006)***.

Obesity results from a positive energy Balance and is favoured by both genetic and environmental factors. ***(Lefebvre, 2001).*** These factors may influence energy balance by an excessive caloric intake, a deficit in energy expenditure, or both. Nevertheless, abnormal eating behaviour does not seem to be the unique cause of obesity. Many obese subjects, in fact, have a tendency to gain weight with no real excess of food intake ***(Maffeis et al., 1991; Barbara et al., 1994, Scolova, 2003)***.

The frequency of eating changes the metabolism of glucose and the concentration of cholesterol. When normal volunteers ate several small meals a day, they had lower concentrations of cholesterol than when the same total intake was eaten in a few large meals ***(Young et al., 1972)***. This reduction of cholesterol with frequent ingestion of small meals has been confirmed many times. Glucose tolerance curves also are improved when eating three or more meals a day compared with one or two large meals ***(Bray, 1989***; ***Hu, & Willett, 2002, American Obesity Association, 2006).***

The relationship of the frequency of eating to the development of human obesity remains an unsettled question. It has been observed clinically that obese individuals frequently eat fewer meals than normal weight people ***(Olson, 2000).***

Energy expenditure varies among people, independent of body size and composition, and persons with a low metabolic rate seem to be at higher risk of gaining weight ***(Zulro et al., 1990; Perez and Salas, 2001***).

The energy cost of maintaining the homeostasis of the integrated system of the body at rest is the basal metabolic rate (BMR), The BMR is measured early in the morning shortly after awakening when the subject is bodily and mentally at rest in a thermo-neutral environment. 12-18

hours after a meal. The largest compartment of energy expenditure is resting metabolic rate (BMR), for the average 70 kg male, the cost of the BMR is approximately 1500 Kcal/d and comprises 60-75% of the total daily energy expenditure ***(Elliot and Lewis, 1983; Obarzanek et al 2001)***.

Several factors may influence the BMR. These may include, age, sex, the antecedent nutritional state, thyroid function, autonomic nervous system activity, and other, as yet unidentified factors ***(Elliot and Lewis, 1983; Sarah et al., 2004)***.

The major determinant of BMR is the fat-free mass (FFM) ***(Bogardus et al., 1986)***. The most striking difference between the energy expenditure of lean and obese groups of individuals is that the obese group has a higher resting metabolic rate. To some extent, this is explained by the higher lean body mass in obese subjects ***(Garrow, 1983)***. Lean tissue has a greater metabolic rate than fat ***(Ravussin et al., 1982 ;Sarah et al., 2004)***.

Zulro et al., (1990), suggested that differences in resting muscle metabolism account for part of the variance in metabolic rate among individuals and may play a role in the pathogenesis of obesity. Resting muscle metabolism is positively associated with the differences in resting energy expenditure observed among people and represents a major ***Perez&Salas et al., 2001)*** determinant of the inter-individual variation in energy expenditure. Obesity is a multifactorial syndrome in which a deficit in resting metabolic rate has been shown to play significant role ***(Ravussin et al., 1988)***. Consequently, people with lower resting muscle metabolism might in fact be at higher risk for sustaining positive energy balance and therefore gaining weight ***(Chagnon et al., 2000; Salens et al., 2007)***.

Twenty-four hour energy expenditure values, adjusted for differences in fat-free body mass, fat mass, age and sex, were also found to aggregate in families ***(Ravussin et al., 1988)***. ***Ravussin and Bogardus, (1989)***; ***Kendall & Serrano, (2006)*** suggested a genetic determinant of the rate of energy expenditure.

Ravussin et al., (1988) and ***Sarah et al., (2004)*** have shown in prospective studies that a low rate of energy expenditure is a predictor of body weight gain.

2. Neuro-endocrinal causes of obesity:

a) Hypothalamic lesions:

Hypothalamic obesity is a rare syndrome in human ***(Bray, 1984)***. It is produced in human beings by trauma, and inflammatory disease involving the ventro-medial hypothalamus. It occurs as a complication for children surviving brain tumors ***(Bray, 1989)***.

This results in hyperphagia and obesity. The increased secretion of insulin associated with the change in hypothalamic function may be one pathogenic link in its development ***(Bray, 1989; Lusting et al., 2003)***.

The connection between the ventro-medial hypothalamus and the secretion of insulin appears to be through both the vagus and the sympathetic nerves. Injury to the ventro-medial hypothalamus leads to increased activity of the vagus nerve and the decrease in firing rate of sympathetic nerves and this will lead to increase secretion of insulin ***(Bray, 1989)***.

b) Endocrinal causes:

i. Cushing syndrome:

Obesity: Patients may have increased adipose tissue in the face (moon Face), upper back at the base of neck (buffalo hump), and above the clavicles (supraclavicular fat pads).Central obesity with increased adipose tissue in the mediastinum and peritoneum; increased waist-to-hip ratio greater than 1 in men and 0.8 in women; and, upon CT scan of The abdomen, increased visceral fat is evident. ***(Eddy et al., 1973; Mostyn et al., 2004)***.

Skin: Facial plethora may be present, especially over the cheeks. Violaceous striae, usually more than 1cm in width, is observed most commonly over the abdomen, buttocks, lower back, upper thighs, upper arms, and breasts ***(Reilly, 2005)***..

Ecchymoses may be present, Patients may have telanglectias and purpura, cutaneous atrophy with exposure of subcutaneous vasculature tissue and tenting, of skin may be evident, Hirsutism and male pattern balding may be present in women.

Patients may have increased **languo facial hair**, Steroid acne, consisting of papular or pustular lesions over the face, chest, and back, may be present. Acanthosis nigricans, which is associated with insulin resistance and hyperinsulinism, may be present. The most common sites are axilla and areas of frequent rubbing, such as over elbows, around the neck, and under the breasts ***(Reilly, 2005)***.

Cardiovascular/renal: Hypertension may be present, Volume expansion may occur, with edema from sodium and water retention.

Atherosclerotic heart disease is caused by lipid abnormalities, while diabetes mellitus and hypertension are caused by Cushing syndrome ***(Finding et al., 1994; Reilly, 2005)***.

Gastroenterologic: Peptic ulceration may occur with or without symptoms, particularly at risk are patients given high doses of glucocorticoids (rare in endogenous hyporcortisolism) ***(Yanovski et al., 1994)***.

ii. **Pituitary Tumours**:

It may occur from anterior pituitary tumors, which can interfere with proper thyroid-releasing hormone (TRH) and thyroid-stimulating hormone (TSH) function. Galactorrhea may occur when anterior pituitary tumors compress the pituitary stalk, leading to elevated prolactin levels ***(Flack et al., 1992)***.Other pituitary function may be interrupted without obvious clinical findings. Possibilities include polyuria and nocturnal enuresis from Diabetes Insipidus .Menstrual irregularities, amenorrhea, and infertility may occur due to inhibition of pulsatile secretion of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) which likely is due lo interruption of luteinizing hormone-releasing hormone (LNRH) pulse generation, low testosterone levels in men may lead to decreased testicular volume from inhibition of LNRH and LH/FSH function. Low estrogen levels in women may result from inhibition of LNRH and LH/FSH function. Increased synthesis of high-density lipoprotein (HDL), low-density lipoprotein (LDL), and triglycerides may occur, with severe hypercortisolism and hypokalemic metabolic alkalosis may occur ***(Findling et al., 1994)***.Skeletal/muscular; proximal muscle weakness may be evident. Osteoporosis may lead to incident fractures and kyphosis, height loss, and axial skeletal bone pain. A vascular

necrosis of the hip also is possible from glucocorticoid excess Neuropsychological; patients may experience, emotional liability, fatigue, and depression. Visual-field defects, often bitemporal, and blurred vision may occur in individuals with large ACTH-producing pituitary tumors that impinge on the optic chiasma. Adrenal crisis: Patients with cushingoid features may present to the emergency department in adrenal crisis. This may occur in patients on steroids who stop taking their glucorticoids or neglect due to increase their steroids during an acute illness. It also may occur in patients who have recently undergone resection of an ACTH-producing or cortisol-producing tumor ***(Tyrrell et al., 1986)***.Physical findings that occur in a patient in adrenal crisis include hypotension, abdominal pain, vomiting, and mental confusion (secondary to low serum sodium or hypotension). Other findings include hypoglycemia, hyperkalemia., hyponatremia, and metabolic acidosis ***(Flack et al., 1992,Reilly ,2005)***.

iii. Hypothyroidism.

The following are symptoms of hypothyroidism: fatigue loss of energy, lethargy, weight gain, decreased appetite, cold intolerance, dry skin, hair loss, sleepiness, muscle pain, joint pain, weakness in the extremities, depression, emotional liability, mental impairment, forgetfulness, impaired memory, inability to concentrate, constipation, menstrual disturbances, impaired fertility, decreased perspiration, parasethesia and blurred vision. decreased hearing and hoarseness ***(Roberts et al., 2004;Task Force. 2004)***.Additional signs specific to different causes of hypothyroidism, such as diffuse or nodular goiter or pituitary tumour, can occur ***(Helfand, 2004;Surks et al., 2004)***.

iv. **Pancreatic Tumors:**

Insulinoma → hypoglycemia, hyperphagia, obesity. Insulinomas are characterized clinically by the Whipple triad which occurred in 75% of 67 insulinoma patients as reported by ***(Rougier et al., 2000)***:

- Episodic hypoglycemia ***(Waickus et al.. 1999)***.
- Central nervous system (CNS) dysfunction temporally related to hypoglycemia (confusion, anxiety, stupor, convulsions, coma) ***(Rougier et al., 2000)***.
- Dramatic reversal of CNS abnormalities by glucose administration.

v. Stein Leventhal syndrome:

Polycystic ovaries, hairsutism and amenorrhea, onset often at puberty.

Patients present with various symptoms, including the following; menstrual disorders (80%), oligomenorrhea (71.4%), amenorrhea (28.6%), Infertility (74%): accounts for 30% of overall infertility, recurrent pregnancy losses (common), obesity (49%) acne vulgaris, asymptomatic ***(Clayton et al., 2005)***.

There is a frequently concern by parents and physician that a child has a diagnosable endocrine disease as the cause of obesity. But this occurrence is rare but the effect of obesity on endocrine function and the effects of endocrine function on body weight should be considered ***(Sarah et al., 2004).***

3. Genetic obesity:

Evidence for inheritance of human obesity has been provided by studies of families and twins, from the generic factors of obesity are obesity of either or both parents, which increase the risk of adult obesity in their young children more than the non obese parents ***(Raine et al, 2001)***. Studies of Families show that if both parents are obese more than 2/3 of their children will be obese; if only one Parent is obese the Risk of obesity in their children is about 1/3 ***(Raine et al., 2001)***. Studies involving twins suggest that approximately 50% of the tendency towards obesity is inherited ***(Kiess et al., 2001)***.

There is a group of rare diseases with associated Dysmorphic Features in which the evidence suggests that genetic transmission is of major importance as:

A. Prader - Willi Syndrome:

Obesity, hypogonadism, mental retardation, hypotonia and hyperglycemia ***(Jennifer et al., 2007).***

B. Laurence - Moon - Biedl Syndrome:

Obesity, hypogonadism, mental retardation, polysyndactyly and retinitis pigmentosa.

C. Alshtrom syndrome:

Obesity since infancy, progressive visual and hearing loss.

D. Beckwith & Weidmann syndrome:

Macrosomia – visceromegally & hypoglcaemia ***(Waickus et al., 1999)***.

E. Carpenter syndrome:

Obesity, mental retardation, polysyndactyly and abnormal skull shape ***(Jennifer et al., 2007).***

Molecular and genetic studies of human and mice have demonstrated existence of a large and diverse collection of genes that can influence fat mass by peripheral and central effects. Many of these genes act in known pathways and have unknown mechanisms of action. ***(Ravussin et al., 2000; Blakemore and Forguel 2008)***.

The underlying hypothesis for using these advances is that obesity is a heterogeneous disease, with multiple mechanisms that independently or synergistically increase fat mass. Thus diagnosis of the specific mechanisms that cause obesity in each individual may allow for treating each person's underlying problem specifically ***(Barsh et al., 2000; Ravussin et al., 2000)***.

Studies of people with hypothalamic and pituitary tumors demonstrated long ago that the hypothalamus influences body weight through many genes known to influence obesity and are expressed in the brain. Seven genes are known to cause human obesity eg. (leptin obesity gene and melanocortin, etc,...) and at least 20 genes are known to influence fat accumulation in mice ***(Farooqi et al., 2000)*** several principles have emerged from studies of obesity genes:

1. Mammals can become obese by many mechanisms.
2. Most human homologues of mouse obesity genes cause human obesity .thus studies of mice have been a powerful predictor of human obesity genes ***(Chen et al., 1999)***.

3. Only some of the genes that may cause obesity will be useful as drug targets ***(Rougier et al., 2000)***.

4. .Most common human obesity is caused by the interactions of multiple genes. Thus despite greater advances in the understanding of the biology of obesity, no single gene is known to cause common obesity, except (possibly) melancortin receptor (MCR) 4(MC4R) ***(Farooqi et al., 2000).***

The leptin obesity gene pathway and melanocortin pathway illustrates the general principles of obesity biology.Increased leptin, resulting from increased adipose mass causes decreased food intake and increased energy expenditure, which tend to return adipose mass to the individual's set point ***(Whipple et al., 2002).*** Thus the leptin and leptin receptor are a part of a feedback loop. The adipose mass set point is different in obese people, however, perhaps because of resistance to leptin action ***(Sarah et al., 2004).*** Although the absence of leptin can cause obesity in humans and mice, most obese humans have an excess of leptin - body weight and plasma leptin are correlated positively ***(Friedman et al., 1998)***.

Identification of the patients and families that have mutation in obesity genes has many clinical implications. Identifying of the patients and families early in childhood or as soon as possible allows clinicians to institute education, preventive measures, and intervention earlier so that the problem will not become and the child will be prevented from becoming obese ***(Chen et al., 1999***; ***Whiple et al., 2002).***

Because information on weight changes after lifestyle intervention in children with mutations in the melanocortin 4 receptor (*MC4R*) gene is scarce, ***Reinehr et al., (2008)*** compared weight changes after lifestyle

intervention between children with and without *MC4R* variations. A group of 514 overweight children (aged 5–16 years), who presented to participate in a 1-year lifestyle intervention based on exercise, behavior, and nutrition therapy were screened for ***MC4R*** mutations. For comparison, children with MC4R mutations leading to reduced receptor function (group A) were each of them randomly matched with five children of same age and gender without MC4R mutations (group B). Changes of weight status were analyzed as change of BMI standard deviation scores (BMI-SDSs). Furthermore, 16 children (3.1%) harbored *MC4R* mutations leading to reduced receptor function, and 17 (3.3%) children carried variations not leading to reduced receptor function. Children with and without MC4R mutations reduced their overweight at the end of intervention to a similar degree (P = 0.318 between groups based on an intention-to-treat analysis). The maintenance of weight loss after intervention among children with MC4R mutations leading to reduced receptor function failed in contrast to children without such mutations ($P < 0.001$ adjusted for BMI-SDS at baseline, age, and gender in an intention-to-treat analysis). Finally, ***Reinehr et al., (2008)*** concluded that children with MC4R mutations leading to reduced receptor function were able to lose weight in a lifestyle intervention but had much greater difficulties to maintain this weight loss supporting the impact of these mutations on weight status.

Although Molecular genotyping is now currently possible, the examination of several traits may provide information about cause for at least some children above the 97th percentile of weight for height or body mass index ***(Farooqi et al., 2000; Blakemore and Forguel 2008).***

Although there are no comprehensive gene tests for obesity, many of known mutations are accompanied by identifiable clinical symptoms that can be evaluated in children ***(Farooqi et al., 2000).*** Children fitting the profiles for any of the known obesity mutations should be considered for more detailed examination. ***(Barsh et al., 2000; Sarah et al., 2004)***.

4. Iatrogenic Obesity:

a. Cyproheptadine (Periactin):

It Increases food intake in humans and is among the major drugs that increase body fat ***(Bray, 1989)***. It is a drug introduced for its effects in stimulating the appetite, as well as for use in allergic disorders ***(James, 1985; Reilly, 2005)***.

b. Drugs used in treatment of thyrotoxicosis:

1. **Phenothiazinc series:** which can lead to very large increase in body fat in susceptible patients ***(James, 1985).***
2. **Tricyclic antidepressants:** particularly amitriptyline are known to produce weight gain ***(Bray, 1989)***.
3. **Lithium therapy:** has been reported to be associated with weight gain ***(Bray, 1989).***
4. **Steroids** (corticosteroid-analogues):
   a) Glucocorticoids: Weight gain with fat distribution similar to Cushing's syndrome occurs with glucocorticoid therapy ***(Bray. 1989)***.

b) Estrogens: Either alone or in birth control pills have been reported to increase body weight, largely due to fluid retention and probably not the -result of increased body fat ***(Bray, 1989;Reilly,2005)***.

c) Progestins: including medroxyprogesterone, are more likely to increase weight ***(Bray, 1989)***.

REGULATION OF BODY FAT

Fat serves as a vehicle for fat-soluble vitamins. Fat in the body support viscera such as heart, kidney, and intestine; and fat beneath the skin provides insulation against cold. However excess fat in the body over ideal levels is considered a threat to human health ***(Heymsfield et al., 1996; Ellie &Sharon, 2008)***.

The normal amounts of body fat change through childhood, as can be seen from either the BMI or skinfold thickness percentile charts. Infants gain fat, as a consequence of increasing adipose cell size, relatively rapidly until the age of 1 year, but then slim down until the ages of approximately 6 years, as adipose cells reduce in size. From this point onwards, there is a steady increase in body fat into young adult life (This-called adiposity rebound) associated with increase in adipose cell numbers. "There is little gender difference in the amount of body fat in infancy. However, after infancy subcutaneous fat increases more rapidly in girls, particularly during puberty when males demonstrate greater centralization of body fat stores **(*Raine et al., 2001)***. Additionally, lower birth weight seems to be associated with later risk for central obesity in both sexes **(*Oken & Gillman, 2003)***.

Based on ***Cheek's*** *data* ***(1998)***; body fat as a percentage of body weight in males' increases in the prepubertal phase of growth and declines coincident with the growth spurt. In contrast, fat as a percentage of body weight in girls remains relatively constant prior to adolescence, but increases during the adolescent growth spurt. Between the age of 10 and 15 years in boys and girls.

Leptin

Obesity is a major health issue in much of the human population and is an intensely and long studied syndrome. In the United States, it is estimated that over 30% of population is overweight by at least 20% ***(Zhang et al., 1999)***.

Recent advances in the biology of adipose tissue indicate that it is not simply an energy storage organ, but also a secretory organ, producing a variety of bioactive substances, .including leptin and adiponectin, that may influence the function as well as the structural integrity of the cardiovascular system.

Leptin, besides being a satiety- signal for the central nervous system and to be related to insulin and glucose metabolism, may also play an important role in regulating vascular tone because of the widespread distribution of functional receptors in the vascular cells ***(ElSheikh, 2001).***

On the other hand, the more recently discovered protein, adiponectin, seems to play a protective role in experimental models of vascular injury, in probable relation to its ability to suppress the attachment of monocytes to endothelial cells, which is an early event in the atherosclerotic process. There is already considerable evidence linking altered production, of some adipocyte hormones with the cardiovascular complications of obesity. Therefore, the knowledge of alterations in the endocrine function of adipose tissue may help to further understand the high cardiovascular risk associated with obesity ***(Fortune et al., 2003)***.

The ob protein, termed "Leptin from, the greek leptos meaning "thin" secreted by adipose tissue and is thought to act at an afferent

satiety center of the brain to regulate body fat mass (***Zhang et al., 1999***). Leptin discovered in 1974, is a peptide formed of 167 amino acids, identified in mice and humans^ made exclusively in fat cells (***Morin et al., 1998; Cooke 2002***).

Genetic studies, in obese mice have revealed the ob gene (LEP), its product leptin and the leptin receptor (LEPR) as important factors in the regulation of both appetite and energy expenditure (***Lonnqvist et al., 1999; Winters et al., 2000***).

Friedman, (1994) cloned the ob gene in mice in and reported that it makes leptin, which is produced in fat and then is released into the blood stream. Although leptin is mainly synthesized in adipocytes, it is also expressed in the placenta (***Masuzaki et al., 1997***), epithelium of the stomach and breast glands and under certain conditions, in skeletal muscles (***Reseland el at. 1999; Winters et al., 2000***). Leptin circulates specifically bound to proteins in serum, which may regulate its half-life and biological activity. Properties of ob-Leptin:.

- Protein produced in adipose tissue (***Zhang, 1994***).
- Secreted into bloodstream (probably bound into family of circulating binding proteins)(***Klein et al., 1996***).
- Regulated by both changes in % body fat & acute changes in food intake (***Maffai, 1995***).
- Both peripheral and central administration reduces food intake and body weight in mice (***Zhang, 1994***).
- Saturable transport into the brain (***Maffai, 1995 and Klein et al., 1996; ElSheikh, 2001***).

Leptin is believed to mediate signaling through activating leptin receptors (LEPR) in hypothalamic neuroendocrine centres. The description of the leptin receptors was reported by ***Tartaglia (1995)***. Isoforms of leptin receptor, members of the interleukni-6 cytokine family of receptors, are found m multiple tissues (***Houseknecht et al., 1998)***.

LEPR is expressed at least in six different alternatively spliced forms in different organs including brain, kidney, spleen, adipose tissue, heart and lung (***Friedman, 1996; Kon Stantinides, 2001)***.

The receptor for leptin in mice has been localized to the hypothalamus, a region known to be involved in maintenance of energy balance, and to the choroid plexus and lepto-meninges, which form part of the blood /brain barrier (***Mercer, 1996)***.

Leptin receptor exists in multiple forms: the two major forms are a short form (with a truncated intracellular domain) and long form (with the complete intracellular domain). The long form is thought to be the form that signals and mediates the biological effects of the ob protein (***Campfield et al., 1996; ElSheikh, 2001).***

Leptin is considered to be the major player in the regulation of the body fat. This, 16k, protein acts as a lipostat and by signaling to the hypothalamus regulates the energy expenditure & food intake ***(Alien and Bloom, 1986; Mastuda et al., 2003)***.

The main site of action of leptin is the hypothalamus where it activates "anorectic" pathways (as the melanocortin system) and antagonizes "orectic" pathways (such as neuropeptide system).

Leptin deficiency results in the elevation of the hypothalamic neuropeptide Y (NPY) in the hypothalamus. This peptide seems to be a

partner of leptin in the regulation of body fat by participation in the energy balance and neuroendocrinal signaling. Chronic administration of the NPY into the hypothalamus of normal animals mimics the phenotype associated with leptin deficiency including hyperphagia, obesity, reduced thermogenesis, decreased fertility, decreased, growth hormone production and insulin resistance in muscles, a step leading to non insulin dependent diabetes mellitus ***(Alien and Bloom, 1986)***. Leptin down regulates the expression of in RNA for neuropeptide Y (NPY) ***(Stephens et al., 1995)***.

The gene inactivation of the NPY, however, was not associated with changes in the body weight, the food intake or the body fat this unexpected finding was explained by the data reported by ***Ericson et al., (1996)***. These authors reported that generation of deficiency in the NPY gene in the ob/ob mice leads to less obesity than that observed in the ob/ob mutant mice In addition; these animals exhibit a less severe diabetes, sterility and somatotrophic defects. This suggests that the weight gain in the ob/ob leptin deficient mice may, to some extent, be mediated by the increased production of NPY. The partial and not total recovery from the effects of leptin deficiency in the ob/ob mice deficient in NPY suggests that the action of leptin is not confined to the regulation of the NPY and that other proteins may be implicated in the regulation of the body fat.

Additional members of this regulatory pathway seems to be the 131 amino acid protein, and its respective receptor, melanocortin receptor-4 (MRC-4) which exists in the arcuate nucleus of the hypothalamus ***(Alien and Bloom, 1986)***. The outcome of the binding of the MRC-4 is suppression of the feeding. Serum leptin levels are highly correlated with

body fat mass adults, children and newborns (***Considine, 1997; Lobstein and Baur, 2004)***.

Leptin levels have pulsative and diurnal character. In lean subjects with relatively low adipose tissue, the majority of circulating leptin is in the bound form. On other hand, in obese individuals the majority of leptin circulates in free form presumably bioactive protein and thus obese subjects are resistant to free Leptin ***(Nedvidkova, 1997)***

With the discovery of Leptin, it was learned that adipose (fat) tissue is not just a storehouse for energy, but that it plays a part in regulating energy balance. Fat cells release other agents in addition to leptin, one of which is tumor necrosis factor alpha (TNFa).Research also suggests that the increase in TNF-a released by fat cells, and obesity, may be protective mechanisms that somehow limit a person's ability to gain weight ***(Lobstein and Baur, 2004)***.

Obese individuals have significantly higher circulating leptin than normal lean subjects In addition; females have higher serum leptin than males with equivalent 'fat mass. Although leptin correlates with fat mass, circulating concentrations are altered by extremes in energy intake, such as fasting and overfeeding ***(Considine, 1997; Lobstein and Baur, 2004)***.

The nocturnal rise of leptin secretion is entrained to mealtime probably due to cumulative hyperinsulinemia of the entire day ***(McGregor, 1996; ElSheikh, 2001).***

Since obesity is a complex disease which results from the interaction of multiple genes and the environment, the recently discovered genes for leptin "ob gene" and the leptin receptor appear to play a major regulatory role in body energy balance and adipose tissue

deposition. Defects in the ob gene and leptin receptor gene have been demonstrated to be the cause of obesity in several rodents' models (***Considine and Caro, 1996; Lobstein and Baur, 2004***).

Karen (1998) found that the amount of leptin in the breast milk correlates with the amount of body fat of the mother; obese mothers produce large amounts of leptin, thin mothers produce almost no leptin in their breast milk, the hormone Leptin influences body weight "homeostasis" through effects on food intake and energy expenditure; it also modulates other physiological actions, including "lipid metabolism", "hematopoiesis", "pancreatic beta -cell function", "ovarian function", and "thermogenesis" Besides its role in development of obesity, leptin also signals metabolic information to the reproductive system. In humans leptin is needed for the initiation of puberty and the development of secondary sexual characteristics (***Karen, 1998; Sarah et al., 2004).***

Epidemiological evidence has revealed that undernutrition *in utero* is closely associated with obesity and related detrimental metabolic sequelae in adulthood. Recently, using a wild-type (wt) mouse model in which offspring were exposed to intrauterine undernutrition (UN offspring), ***Yura et al., (2008)*** reported that the premature leptin surge during neonatal growth promotes lifelong changes in energy regulating circuitry in the hypothalamus, thus playing an important role in the development of pronounced obesity on a high-fat diet (HFD) in adulthood.

Studies by ***Virve (1999)*** found that although plasma concentrations of gonadal hormones change markedly during estrous cycle in the rat, there is only a slight change in plasma leptin levels and no change in

leptin mRNA expression in different adipose tissue depots during the cycle.

Miller (1998) measured leptin levels in women with Hypothalamic Amenorrhea (HA) and demonstrated that leptin levels were significantly lowered in the group of women with HA compared to eumenorrheic controls.

In addition, leptin has multiple peripheral effects including the regulation of insulin secretion by pancreatic beta cells and regulation of insulin action and energy metabolism in adipocytes and skeletal muscle ***(Ilouscknccin et al., 1998; ElSheikh, 2001)***

Relation of Salivary and serum leptin to dental caries was upregulated in overweight or obese adults, but this relationship was not established in young children ***(Johnson et al., 2002). Tseng et al., (2008)*** found that salivary leptin may influence dental bacterial colonization leading to differences in incidence of caries between obese-overweight children and controls. Children aged 2–7 were recruited by ***Tseng et al., (2008)***: blood serum was collected and BMI was calculated, serum leptin was quantified by radioimmunoassay (RIA), number of teeth, decayed and filled surfaces were recorded after radiographic and clinical examination Raymond et al., found that Children as young as 2 exhibit elevated serum leptin levels, females were more prone to this effect than males, salivary leptin is not detectable by conventional methods(RIA) in this population and that obese-overweight children had significantly less dental decay than controls.

Because adipogenesis and angiogenesis are tightly correlated during the fat mass development, ***Boidloumie et al., (1998) and (1999)***

proved the hypothesis that leptin is able to modulate the growth of the vasculature and to exerts atherogenic effects through the generation of oxidative stress in endothelial cells*(Lobstein and Baur, 2004)*.

In adipose tissue, the level of ob mRNA is regulated by insulin and glucocorticoids - hormones responsible for glucose homeostasis as well as for the central regulation of feeding behavior **(*Friedman, 1994).***

. The two hormones, insulin and corticosterone increase leptin production in rodent and human adipose cells ***(Guerre. 1997; Robaczyk et el., 1997)***.

The possible therapeutic benefits of leptin treatment in humans is now being studied in clinical trials, and early data indicate that 4 weeks of daily leptin injections are safe and cause small but significant weight loss in lean and obese subjects compared with placebo effects. A subset of 8 obese subjects treated for a total of 6 months lost an average of 7.1 kilograms in a group-receiving placebo. Some of the obese subjects lost substantial amounts of weight but others did not. This limited study indicates that leptin might be an effective therapy for some obese subjects, although more patients need to be investigated. The authors conclude: Whether leptin finds its way into general usage as an anti obesity drug, the use of modem methods to identify and target the components of the leptin signaling pathway will form the basis for new pharmacological approaches to the treatment of obesity and other nutritional disorders. Further studies of leptin are also likely to reveal additional links between nutritional state and animal physiology ***(Considine, 1996;Lobstein and Baur, 2004)***.

EFFECTS AND CO-MORBIDITY OF OBESITY IN CHILDHOOD AND ADOLESCENCE

What are the concerns about children who are obese? Immediate concerns include social and psychological stress, metabolic and physical disorders, and future complications in adulthood ***(Oken et al., 2000; Pokin, 2006)***.

Health consequences related to overweight can begin in childhood or adolescence: overweight children and adolescents are at increase risk for various chronic diseases in later life. In study conducted by ***Lustig, (2001)***; nearly 60% of overweight children had at least cardiovascular risk factor compared with those with a BMI-for-age at or below the 85th percentile and 25% of overweight children-had 2 or more risk factors ***(Daniels, 2009).***

Psychological overweight are also significant Overweight in children has been linked to social discrimination; a negative self image in adolescence mat often persists into adulthood ***(Wadden et al., 1990)*** parental neglect, ***(McKinnon et al., 1999)*** and behavioral and learning problems ***(Dopheide, 2006)*** **Fig. (1).**

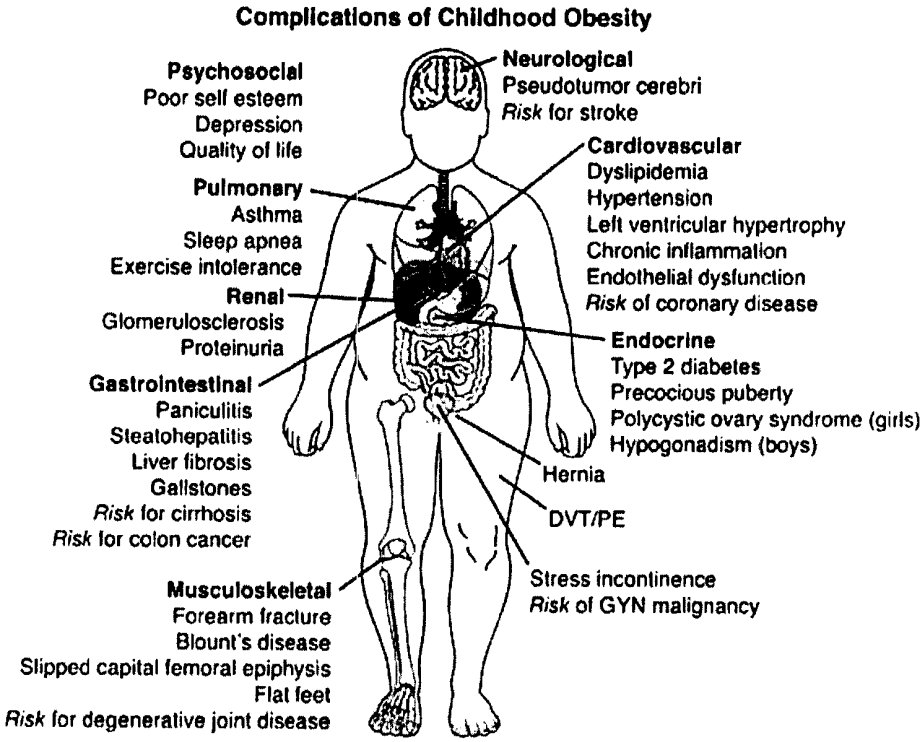

Fig. (1): Complication-childhood-obesity images
(Nathan & Moran, 2008)

1) Common medical consequences of overweight:

Hyperlipidemia:

A group of disorders characterized by elevated levels of cholesterol, triglycerides, and/or low density lipoproteins (LDL) and low level of high density lipoproteins (HDL) in the blood overweight in children increase the risk of cardiovascular disease and premature death in adulthood ***(Freedman et al., 2000;Syme et al., 2008)***.Hyperlipidemia may improve with weight reduction ***(Sabin & Shield, 2008).***

Data from the Bogalusa heart study showed that 90% of the children with high levels of triglycerides were also overweight ***(Caprio et al., 1996).***

Childhood type 2 diabetes mellitus:

Type 2 diabetes mellitus typically is considered a disease of adults, known as adult diabetes in the past; however, parallel to the epidemic of obesity in children, a second epidemic of type 2 diabetes is emerging. ***(Nathan &Moran, 2008)***.

There are significant fears that the disease process moves quicker in children than in adults, based on findings of individuals diagnosed in their 20s-who developed early kidney, eye, and cardiac disease ***(Bedair, 2002)***.

The prevalence of type 2 diabetes is increasing throughout the world whenever childhood obesity is becoming more prevalent ***(Fagor et al., 2000)***.

Many cases are found on routine blood glucose testing rather than from direct symptoms. The differentiation of type from type2 diabetes is not always apparent because of the overlap of several features ***(Misra and Khurana, 2008***).

Type 2 DM is caused by several metabolic features. Insulin resistance is a key of the condition and the presence of obesity promotes insulin resistance. The pubertal state also increase insulin resistance also decrease insulin sensitivity and most but not all patients present during puberty ***(Caprio et al., 1999, Bedair, 2002)***.

The main topic in the treatment of type 2 DM is weight reduction, if type2 DM treated poorly, it usually precipitates a crisis that requires an intensive care. Type 2 DM is a severe situation that can not be ignored patients and their families whom must be informed with the severity of the condition. ***(World Health Organization, 2006)***

Hepatic Steatohepatitis:

It is found in 40% of obese children in whom sonographic screening is performed ***(Baldridge et al., 1995; Salens et al., 2007).***

Because the hepatic steatohepatitis represents a histological picture similar to that of alcoholic hepatitis, so it is given an alternative name Non-Alcoholic Steatohepatitis ***(Sinaiko et el., 1999)***. Hyperinsulinemia also may play a role in hepatic steatosis ***(Strauss et al., 1999).***

If the condition persists, liver fibrosis or even cirrhosis may develop, the incidence is higher among male patients. Weight reduction is the only solution to shrink the liver towards normal size ***(Tazawa et al., 1997; Syme et al., 2008; Daniels, 2009).***

Choleithiasis:

The presence of stones in the gallbladder occurs with more frequency in obese adults and children compared with others (***Sabin and Shield, 2008).*** Although the gallstones occur less frequently among children and adults who are overweight, nearly 50 % of the cases of cholecystitis in adolescents may be associated with overweight ***(Dietz et al., 1982)***.

Psychological and Social Complications:

Obese children may suffer from lowered self-esteem and behavioural disorders. Later in life, there is ample opportunity for obese children and adolescents to decrease expectations and experience withdrawal or even depression .In addition there are economic and educational sequelaes of the social environment of obese individuals, particularly obese girls ***(Gortmaker et al., 1993; Wardle, 2006).***

Early Maturation:

Characterized by adolescents with a skeletal age more than 3 months in advance of chronological age, and is associated with increased fatness in adulthood (***Dipietro et al., 1999***). It is also associated with an increase in the truncal distribution of fat in women (***Dorsoty et al., 2000***).

Respiratory Effects:

Obese children carry the risk for; Restrictive Airway Disease caused by difficulty in respiration from the mass of adipose tissue and Obstructive Airway Disease caused by fatty deposition along the air way added to the tonsillar and adenoidal hypertrophy that is common at young age .Obstructive sleep apnea with carbon dioxide retention, hypoxia and right ventricular hypertrophy and failure is a potential cause of severe morbidity or even mortality.Symptoms: may vary from snoring to enuresis, day time somnolence or irritability, hyperactivity, poor school performance and neurocognitive deficits (***Gnilleminault et al., 1998***).

The most severe form is the obesity Hypoventilation syndrome, or Pickwickian syndrome, consisting of hypoventilation associated with carbon dioxide retention, hypoxia, polycythemia, right ventricular hypertrophy and failure, and possibly pulmonary embolism ***(Tairz. 1983)***.

Asthma occurs in 7% to 15% of children and the prevalence of asthma, like the prevalence of obesity, is increasing among children. The BMI and prevalence of obesity is higher in 6-16-years old children with asthma, perhaps up to 30% ***(Epstein et al., 2000; Landhuiset al.,2008)***.

Although exercise - induced bronchospasm may cause a limitation of physical activity and obesity, obesity causes or enhances bronchial hyper-reactivity to exercise and may predispose to ashma weight loss

may improve lung function in children with obesity and asthma (***Kaplan et al., 1993; Touchette et al.,2008)*** .

Pseudo Tumor Cerebri:

Pseudo-tumor cerebri, or benign intracranial hypertension, is usually a benign condition involving increased intracranial pressure with normal and small ventricular system and the absence of the focal neurological signs ***(De Viro, 1996)***.

Obesity is considered the most prominent cause of pseudo-tumor cerebri, although it may be caused by lateral sinus thrombosis and adrenal disease or glucocorticoid withdrawal, Pseudo-tumor cerebri may occur if there is obstruction to venous drainage caused by right heart failure or pulmonary disease with carbon dioxide retention and these conditions may occur in obesity. Symptoms and signs include those characteristic of increased intracranial pressure, including headache, dizziness, diplopia and mild unsteadiness. Signs: - papilledema, cranial nerve VI palsy (affect lateral rectus), diplopia peripheral visual field loss and irritability ***(De Viro, 1996; Jennifer et al., 2007).***

Blood Pressure:

Children and adolescents who are obese may have elevated blood pressure, and they should have blood pressure determinations obtained longitudinally (***Lauer et al., 1991***; ***Sabin and Shield, 2008)***.

Avoidance of false measurements of blood pressure (hypertension); by using the correct cuffs size and the measurement done after 3-5 minutes after the child is seated comfortably at rest (***Resnicow et al., 1993; World Health Organization, 2006)***.

Approximately 20%-30% of obese children have elevated blood pressure; and showed a risk for elevated blood pressure compared with controls. Furthermore, obese adolescents showed a risk for adulthood hypertension ***(Freedman et al., 1999; Daniels, 2009).***

An excessive rate of weight gain during childhood is a risk factor for systolic hypertension, dyslipidemia, and insulin resistance 15 years later ***(Sinaiko et al., 1999)***, which suggests that modification of the rate of weight gain may exert beneficial effects ***(Nathan &Moran,2008).***

Obesity related hypertension is a state of high cardiac output, increase intravascular volume, increased sympathetic nervous system activity, sodium retention and Hyperinsulinemia ***(Friesen et al., 1989)***, there is an increase in left ventricular mass in obese children and adults, and elevation of insulin level seems to be due to change in left ventricular mass rather than the elevation of BMI ***(Urbina et al., 1990; Sabin and Shield, 2008)***.

The composition of diet is also related to blood pressure (BP); BP was lower in those whom having higher intake of a combination of nutrients, including potassium, calcium, magnesium and vitamins. Investigators believed that diet rich in a combination of nutrients derived from fruits, vegetables, and low fat dairy products could contribute to primary prevention of hypertension if instituted at an early age ***(Falkner et al., 2000)***..

Weight loss decreases blood pressure in most cases, and improve cardiac risk profile in 6-15-year old children and fasting plasma insulin concentrations is also decreased significantly in some subjects ***(Nuutinen et al., 1992)***.

Biount Disease:

It is characterized by irregular growth of the proximal medial tibial epiphysis leading to bowing of the legs or tibia vara. There are characteristic radiographic findings to allow diagnosis ***(Skinner, 1996)***.

The condition was linked to obesity when studies showed a prevalence of obesity in 50% to 80% of children with Biount disease. Other followed supporting this link and indicated that it is aberrant varus stress due to obesity causing growth suppression and disruption of endochondral ossification in the knee, with obesity that leads to this condition ***(Thompson et al., 1990; Claude and Daniel, 2008).***

Younger age of onset and bilateral Biount disease are related particularly to obesity ***(Loder et al., 1993)***.

Slipped Capital Femoral Epiphysis (SCFE):

It is characterized that the epiphysis of the proximal femur slips off from the metaphysis posteriorly and medially, and by proximal and anterior migration of femoral metaphysis***(Skinner, 1996)***.

Other causes of SCFE are growth hormone deficiency, hypothyroidism, or testosterone or estrogen deficiency. The classic patient is an overweight, hypogonadal boy with delayed bone age.The decreased femoral antevertion seems to be related to the development of SCFE ***(Gelberman et al., 1986)***. Bilateral slips are more likely to occur in obese children.

Pain may be present from the hip to the foot, and often the patient cannot walk. On examination; the hip is oriented in external rotation, pain on passive manipulation, decrease internal rotation and abduction, and

these patients walk leaning over the involved hip and shortening of the affected leg also may be present. Diagnosis is accomplished by the antero-posterior-and lateral radiography of the hip. Surgical correction is required *(Loder et al., 1993; Claude and Daniel, 2008)..*

Flatfeet:

There is significant tendency toward flatfeet in obese children compared with controls. Flatfeet might lead to discomfort and reduced physical activity ***(Riddiford, 2000; Claude and Daniel, 2008)***

Bone Density:

Although obese children have higher bone mineral content, bone area and fat mass for chronological age than those of normal body weight, when the bone mineral content and bone area were adjusted for the body weight, in one study, the values were low for predicted value only in children with a BMI of more than the 85th ***(Colliding et al., 2000; Claude and Daniel, 2008).***

Obesity and Dental Caries:

The relationship between dental caries and eating habits (24-hr recall and food frequency recall) has been studied in Brazilian children aged to 12 years. Forty-two percent of children were born with an adequate, birth weight and most of them had a mixed diet before 6 months of age. The main food provided after weaning was cows milk in 40% of cases. The frequency of food intake was five times per day in 45% of the children. Thirteen percent of children studied were obese, and most of those ate white sugar and candies at least once a day. The prevalence of caries was 75%. These results indicate that children ingested more energy than needed. The data were insufficient to relate

obesity to dental caries but the high intake of sugar indicates that this might be a factor in the increased prevalence of dental caries hi children. However, other factors such as regular dental hygiene may be involved. ***(Ludwig et al., 2001; Hilgers et al., 2006; Marshall et al., 2007; Sheiham, 2006)***

Obesity and Immue Function:

Obesity during growth can also alter the immune function ***(Palloro, 1998; Boek, 1993)***. Excess adiposity can be associated with impairments in host defense mechanisms, as shown by studying of the immune function of obese subjects ***(Wardle et al., 2006).***

Clinical And Field Methods For Assessment Of Obesity

1. Weight:

Infants (0-2y) should be weighed unclothed on a leveled pan scale. The pan should be 100 cm long in order to support a 2-y-old child. Children should be weighed in their underwear with a digital or balance scale. Weight is recorded to the nearest 10 g. This measurement should be repeated three times and averaged ***(Lohman TJ, 1981)***.

Weight-for-age is recommended by the World Health Organization for assessing nutritional status. Self-reported weight is generally underestimated, especially in overweight ***(Crawley HF, 2005)***.

2. Body mass index (BMI):

BMI is widely used as an index of obesity in people from the school age children to adults, particularly in population studies ***(Fujii & Demura, 2003)***. It is the most used method to measure body fat % from clinical measurements. The BMI, index of Weight over height squared (Wt (kg) / Ht^{2}` (m)$^{2}$, has been classified as `the backbone of the obesity classification and surveillance statistics` ***(Prentice and Jebb, 2001; Styne, 2001)***.

In children, BMI above the age and sex-specific 85th percentile can be defined as overweight, and those above 95th percentile as obese ***(Prineas & Stephen, 1998; Rome, 2001; Styne, 2001)***.

In adults, the criterion to categorize under or overweight is the same for all age periods, that is, 25. BMI value of 25 to 30 is defined as overweight, 30 to 35 moderate obesity (obesity class 1), 35 to 40 severe obesity (obesity class II), and higher than 40, a very severe obesity

(obesity class III) (***Ayling et al., 2001***; ***Ellie and Sharon, 2008)***. Minimum mortality is associated with; a BMI of about 22 kg/m^2 in both sexes ***(Gray, 1989)***.

In respect of age, BMI increases from birth to around one year, then declines to around age six, then increases through the remainder of childhood and adolescence. The point at which BMI reaches its lowest level and begin to increase is termed **(adiposity rebound)** with earlier adiposity rebound being associated with increased risk of subsequent overweight. ***(Eisenman et al., 2004)***.

BMI in adults has a good specificity (95-100%); so that it seems to exclude subjects who are not overweight or obese, but it misses some that are obese (i.e. poor sensitivity; 36-66%).BMI reflects both fat and fat free components of body weight, without differentiation between them. The increase in BMI may be accompanied by increase in the fat mass and concomitant decreases in the fat free mass (attributed to reduced activity levels), or the reverse. (***Malina & Katzwzrzy K., 1999; McCarthy, 2003; Sweeting, 2007).***Consequently, muscular athletes may be classified as overweight by BMI standards and not be over fat ***(Ellie and Sharon, 2008)***. In addition, the BMI might provide a higher value than would be accurate in stunted children, suggesting better nutritional status than is actually the case ***(Dean, 1998)***.

A further disadvantage is that since BMI does not measure fat directly, there is no consensus about which cut-off to use in order to define obesity in children and adolescents. Unfortunately much less is known about level of risks associated with specific BMI levels in children and adolescents. Abdominal fatness has increased in infants, children and adolescents to a greater extent than overall fatness over the past 10-20

years, suggesting that obesity prevalence may be underestimated when based entirely on BMI (***McCarthy, 2006)***

The major limitation citied is the BMI's inability to distinguish weight from adiposity (***Parizkova & Hills, 2001***), as it does not measure fatness directly and makes no allowances for variation in frame size. It can not distinguish the overweight from the over fat and it is a poor proxy for central fatness (***McCarthy et al., 2003)***.

3. **Skin folds thickness:**

Subcutaneous (but not internal) fat is measured by firmly grasping a fold of skin with calibers and raising it, with no muscle included. Single site measurements, e.g.triceps skinfolds ***(Bray et al., 2001)*** are simplest. An alternative is to add skinfolds from a variety of sites generally representing both peripheral (e.g. biceps skinfold) and trunk (e.g. supra scapular) or abdominal skinfold areas ***(Sweting, 2007)***, Fig. (2).

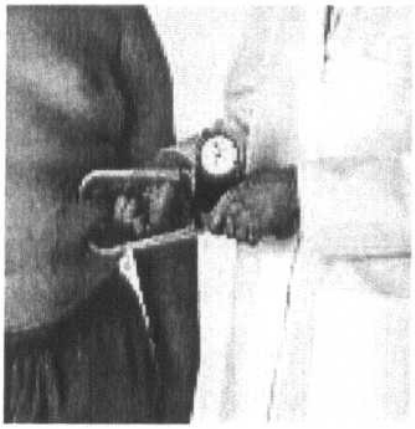

Fig. (2): Skin fold thickness
(McCarthy et al., 2006)

In all subjects, the upper eyelid had the thinnest skin and was used as the denominator to calculate relative ratios of skin thicknesses with respect to other sites of the face. Using-the upper eyelid average skin

thickness, the nasal tip skin thickness was 3.30 times thicker and the brow/forehead was 2.8 times thicker (***Hary et al., 2005***).

Skinfold thickness is cheap and fairly simple, but it needs to be partially undressed for measurements. However, it is difficult to measure reproducibly, particularly if the subject is fat (***Shah et al., 2005***; ***Sweeting et al., 2008)***.

4. Circumferences:

Circumferences at the waist, hip and thigh are used to predict body fat distribution in children, and the waist and hip are good predictors of intra-abdominal fat ***(Goran MI, 1998***). A flexible plastic tape measure with a local-loaded handle enables the operator to reproduce the tension on the end of the tape measure used for the measurement. ***(Eisenman, 2005)***.

Recently, we found that waist circumference alone is independently associated with cardiovascular risk factors ***(Syme et al., 2008).*** Waist circumference is an early indicator of the risk of maintaining excess adiposity, as well as its metabolic complications (***Moreno et al., 2007)***.

Scientist provided the distribution of waist circumferences among children age 2 to 18 y terms of percentiles at 10th, 25th, 50th and 90th percentiles ***(Pietrobelli and Tato, 2005).*** Unfortunately, waist circumference centiles for the Egyptian children is yet unavailable ***(Elmasry, 2008)***.

A larger waist/hip ratio (WHR) indicates relatively larger amounts of abdominal fat and has been used to describe body fat distribution. However there is some incidence that it is a poorer measure of body fat distribution in children (***Sönmez et al., 2003; Sweeting, 2007)***. Moreover

waist to height ratio could be used as rapid screening tool ***(Ashwell et al., 2005).***

Waist circumference criteria for the diagnosis of abdominal obesity are not applicable uniformly to all populations and ethnic groups ***(Elmasry, 2008)***.

Heterogenicity of composition of abdominal tissues, in particular adipose tissue and skeletal muscle, and their location-specific and changing relations with metabolic factors and cardiovascular risk factors in different ethnic groups do not allow a simple definition of abdominal obesity that could be applied uniformly ***(Misra et al., 2005;Syme et al., 2008).***

Determination of cutoff points of waist circumference is of paramount importance for prevention, optimum management of obesity and its complications ***(Elmasry, 2008)***.

Advanced measurement includes:

Bioelectrical Impedance Analysis (BIA):

Bioelectrical Impedance Analysis (BIA) is based on a simple concept: tissue rich in water and electrolytes is much more resistant lo the passage of an electrical current than adipose tissue. BIA measures the impedance of a low-energy electrical signal as it passes through the body, which is proportional to the length of the conductor (a function of height) and inversely proportional lo the cross-sectional area (volume). Usually, four electrodes are attached to the pediatric subject during the measurement, one each to the ankle and foot, and one each to the wrist and back of the hand. BIA provides an estimate of total water ***(Sweeting, 2007)***, Fig. (3).

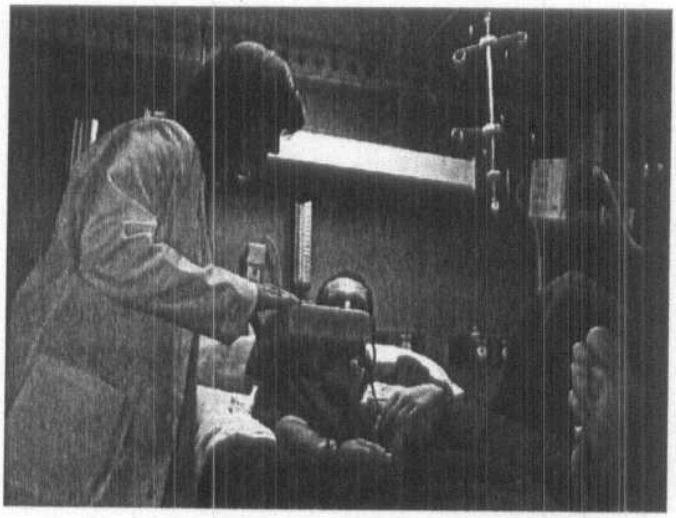

Fig. (3): Bioelectrical Impedance Analysis
(Sweeting, 2008)

Although less accurate than more sophisticated measurements, some current analyzers are relatively inexpensive ,portable and quick, meaning that BIA can now be used in he field and with large samples ***(Pietrobelli A et al., 2001; McCarthy et al., 2006)***.

Density Based Methods:

Hydrodensitometry is a classic method for estimating body volume and density and based on Archimedes` principle that if the density of an object exceeds that of water, it will sink. The hydrodensitometry system consists of a large tank of water (temperature of about 36°C) and a scale. The subject exhales maximally, submerges, and body weight is recorded on the scale. This is an estimate of weight underwater; the subject body weight is then measured outside the tank. Given two people of equivalent weight outside the tank ,the one with more fat which is less dense than water ,will weight less in water than the one with fat free tissue (such as bone and muscle) which is more dense than water. Many children found the immersion procedure quite difficult ***(Sweeting, 2007).***

Recent developments have used **Air** rather than water displacement for measurements of volume and may be more practical for large samples and children. This method is very attractive for children because it is easy and safe to use ***(Hassan et al., 2008)***.

Pediatric **Air Displacement Plethysmograph**, utilizes gas laws to determine body volume and body density. This device measures the volume of air the subject displaces inside an enclosed chamber ***(Urlando A et al., 2003; Sweeting 2007)***, Fig. (4).

Fig. (4): Air Displacement Plethysmograph
(Sweeting, 2007)

Dual-energy X-ray Absorptiometry (DXA);

Recent advances in techniques for measuring body composition have provided DXA for the assessment of whole body as well as regional measurements of bone mass, lean mass and fat mass. DXA is based on the differential attenuation of two photon beams as the various tissues of the body absorb them. Radiation dosage is very low. The great advantage of DXA may be its ability to assess regional body composition (i.e., trunk, arms, and legs). DXA offers a new method for the study of skeletal

maturation, mineral homeostasis, and environmental and nutritional factors involved in development and growth ***(Lapillonne A et al., 2007)*** because it measures three body compartments (i.e. lean mass, fat and bone).

The DXA method, like all indirect in vivo body Composition methods, is based on several assumptions of tissue constancy that may not always be accurate especially in pediatric samples ***(Ellie and Sharon, 2008).*** For example, the attenuation ratios are assumed to be stable for specific components. However, we found that attention ratios may change as thickness depth varies ***(Pietrobelli A et al., 2001)***. Despite these problems, we think that DXA has great potential as both a pediatric research and clinical tool, Fig. (5).

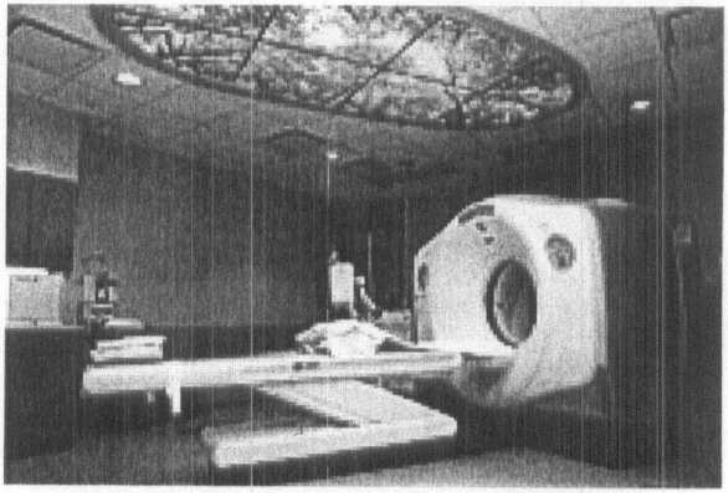

Fig. (5): Dual-energy X-ray Absorptiometry

(El Masry, 2008)

Imaging methods:

Computerized axial tomography (CT) and magnetic resonance imaging (MRI) provide investigators with the opportunity to evaluate tissue systems *in vivo* in both childhood and adulthood. CT and MRI can

produce cross-sectional high-resolution images, and multiple cross-sectional images can be used to reconstruct various tissue volumes. In this way, we can measure subcutaneous and visceral adipose tissue, skeletal muscle, brain, organs, skin and bone. Imaging techniques offer new insights into the physiology of intra-abdominal adipose tissue and its relation to health. These two methods have a high degree of accuracy and reproducibility. However, they have disadvantages such as cost, radiation exposure (i.e. CT) and limitation to research settings. The use of MRI in children is new, but it is the only in-vivo method that has been used to assess fetal body composition ***(Deans et al., 2002; Ellie and Sharon 2008)***. Pediatric body composition measured by MRI is useful for comparison between individuals and also to study body changes over time in longitudinal studies. Using MRI, ***Goran et al., (1997)*** found that the fat content of adipose tissue in neonates is approximately 66% and increases to 80%, (i.e., adult level) at 13 y of age, Table (1).

Table (1): Features used for appropriate choice of pediatric body composition method

Method	Cost	Features
DXA	Expensive equipment	Separates bone from tissue; provides data on fat distribution; easy for children to perform; very low X-ray radiation exposure
CT	Very expensive equipment	Not suitable in children due to high radiation exposure
MRI	Very expensive equipment	Provides excellent and precise measure of visceral and subcutaneous fat
BMI	Inexpensive:	Good for health-risk stratification; not useful for individuals
Skin folds	Inexpensive	Useful for large studies; provides information on fat distribution
BIA	Expensive	Estimates body water, and subsequently fat and fat-free mass

(Hemsfield SB et al., 2000)

Diagnosis and assessment might include the following:

- Medical history to help identify any underlying syndromes or secondary complications of overweight.
- Family history to identify familial risks for overweight/obesity. This includes the presence of obesity, eating disorders, type 2 diabetes, heart disease, high blood pressure, and abnormal lipid profiles (high total cholesterol, abnormal lipid profile). Dietary assessment to evaluate eating practices, including the quantity, quality, and timing of food intake to identify foods and patterns of eating that may lead to excessive calorie intake. A 24-hour recall, food record, or food frequency method of diet assessment may be used ***(ElMasry, 2007).***
- Physical activity assessment to assess daily activity levels. This assessment should include an estimate of time spent on exercise and activity, as well as time spent on sedentary behaviors, such as television, video viewing, and computer use. Physical examination to obtain information about the degree of overweight and any potential underlying complications of overweight, such as high blood pressure the clinical examination, include measurement of the anthropometric parameters and the standard detailed examination required for the evaluation of persons with any chronic multisystemic disorder such as obesity ***(Salens et al., 2007).***
- In the skin examination, include a search for, various forms of rashes, acanthosis nigricans, and possible contact dermatoses.
- A detailed cardiac and respiratory evaluation is crucial to exclude cardiomegaly and respiratory insufficiency ***(Ritchie and Connell 2007).***

- In the abdominal examination, include an attempt at excluding tender hepatomegaly (which may suggest Non Alcoholic Steato Hepatitis (NASH)) and distinguishing the striae distensae from the pink and broad striae that would suggest cortisol excess (***Nathan &Moran,2008).***

- When examining the extremities, include a search for joint those children and adolescents with a BMI-for-age at or above the 95th percentile and who are very athletic or whose family history suggests large frame size may be further assessed using triceps skin fold measurement to assess body fat ***(Lauer et al., 1975)***. Although measurement of skin fold thickness can be unreliable, a measurement of greater than the 95th percentile, measured by an experienced observer, provides evidence that the child has excess fat rather than increased lean body mass or large frame size ***(Owens et al., 1998; Sabin and Shield 2008)***.

- Psychological assessment: Screening questions to exclude depression are vital because this may be a consequence or a cause of excessive dietary intake and reduced activity ***(Dopheide;2006)***

- Because almost 30% of patients who are obese have eating disorders, screen for this in the history. The possibility of binging, purging, lack of satiety, food-seeking behavior, and other abnormal feeding habits need to be identified because management of these habits is crucial to the success of any management program ***(Kendall & Serrano, 2006).***

- When asking patients about their history, investigate whether the rest of the patient's family also has weight problems, inquire about the expectations of the subject, and estimate the level of motivation of the subject. ***(World Health Organization, 2006)***

- Also, investigate whether any of the previously mentioned co morbidities have occurred, and include questions to exclude the possible rare causes of secondary obesity.

- Imaging; this include;X-ray for chronological age detection, chest x-ray for chest complications cardiomegaly. Sonography-Abdominal to detect Steatohepatitis gall bladderstones. Imaging studies for Cushing syndrome should be performed after the biochemical evaluation outlined in Lab Studies has been performed. The rationale for this is that unguided imaging of the pituitary or adrenal glands may yield a 10% incidence of incidental non functioning pituitary or adrenal adenomas, which may mislead one from proper therapy and surgery. Ideally, the biochemical abnormalities should reconcile with the anatomic abnormalities before definitive therapy is offered. An abdominal CT scan is recommended if a primary adrenal problem is suspected. The presence of an adrenal mass larger than 4-6 cm raises the possibility that the mass is an adrenal carcinoma. CT-guided fine-needle aspiration then may have to role in management. If a pituitary source of excess ACTH is suspected, patients should, undergo a contrast-enhanced CT scan and MR imaging. ***(Strauss et al., 2000; Reilly, 2005)***.

PSYCHOSOCIAL CHARACTERISTICS OF OBESE CHILDREN/YOUNGSTERS AND THEIR FAMILIES

a) Psychosocial characteristics of obese children and youngsters:

Research into personal characteristics of obese children has been focused on their self-concept, in particular their body-and self-esteem. Various studies found lower self-esteem among 6-18-year old obese children, compared with their non-obese counterparts ***(Strauss et al., 1985; Braet et al., 1997; Pierce and Wardle, 1997; Pesa et al., 2000 Strauss, 2000; Phillippas, & Clifford 2005)***.Other studies, however, did not find convincing differences ***(Kaplan and Wadden, 1986; Kimm et al., 1991 and Wadden et al., 1984).***

French et al., (1995) reported in their review that only 13 of the 25 cross-sectional studies analyzed showed significantly lower self-esteem in obese youngsters. Of the 10 prospective studies examining changes in self-esteem in relation to weight changes, eight were treatment studies. of these studies showed improved self-esteem scores, without clear relations to actual weight loss .However, in their own cross-sectional study, an inverse association between physical appearance, self-esteem, and body mass index (BMI) was found in both adolescent males and females ***(French et al., 1996),*** On one hand, the explanation for these discrepancies may lie in the use of different definitions of the concepts studied and screening instruments used. On the other hand, various sample characteristics.

Research into self-concept and self-esteem has shown that self-esteem is multidimensional ***(Harter, 1986)***

Harter, (1986) distinguished six aspects of self-esteem, which determine an 'overall' self-concept. Studies with obese children, which primarily report such global self-concept (or self-esteem) scores, do not make clear to what extent the various aspects of the self-concept contribute to the general ('overall') self-concept.

Following, ***Philipp and Hill (1996)*** the insensitivity of a global measure of self-esteem could be revealed when self-esteem and body-esteem are measured concurrently. ***Braet et al., (1997)*** and ***Banis et al., (1998)*** showed low self-esteem among obese children, especially on ***Harter, (1986***) findings regarding physical (i.e., body-esteem), social, and global self-esteem subscales. Several studies only report differences in body-esteem and athletic competence ***(Philipp and Hill, 1998; Renman et al., 1999; Pesa et al., 2000; Stradmeijer et al., 2000).***

French et al. (1996) too, showed that self-esteem specific to physical appearance is inversely associated with BMI. In males, this negative association with BMI is particularly strong for the aspect 'athletic competence' (specifically tied to body weight or shape), in females this is especially the case for global feelings of self-esteem, as well as for social aspects (such as close friendships).

In addition, important developmental differences may occur in aspects of self-esteem related to overweight status. Only few studies included data from both children (pre-adolescents) and adolescents who were evaluated, using the same methods, in order to permit a direct age-based comparison, ***Stradmeijer et al. (2000***) found lowest body-esteem in overweight girls above 13 years of age, whereas, in overweight boys lowest body-esteem was observed before the age of 13. ***Mendelson and White (1985)*** found that, among younger obese children, low body-

esteem can go together with high general self-esteem. Only among obese boys in early puberty a positive relation has been found between negative self-concept and negative body-esteem. Among older obese boys (above 15 years of age), this relation is less clear. Among girls, however, this congruence becomes increasingly stronger as they get older. Among older obese girls, negative body-esteem goes hand in hand with an equally negative self-concept. Similar findings are reported by ***Strauss (2000)***.

(Bosh et al., 2003) found that obese children did not differ from their normal weight counterparts on measures of scholastic and global self-esteem at 9-10 years of age. However, after 4 years these children, and most profoundly the girls, show significant decreased levels of self-esteem. Unfortunately, the latter study is a rare exception, since longitudinal data are scarcely available.

Researchers recognize the consequences of self-evaluations with respect to emotional and behavioral functioning. Clinical and non-clinical obese populations have been object of these studies. Emotional and behavioral functioning, analyzed by means of the child behavior checklist (CBCL) ***(Achenbach, 1991)*** rather unequivocally showed that obese children have more behavior problems than non-obese children ***(Kramer, Beaudin & Thrush, 2005).***

However, the nature of these perceived behaviors varies greatly. Some authors found more withdrawn behavior; others found more somatic problems or depression ***(Wallender et al., 1988; Bosch et al., 1992; Braet 1993; Banis et al., 1998***; ***Kramer, Beaudin & Thrush, 2005)***.Both global social incompetence and specific externalizing behaviors (such as aggressiveness) were found to a greater extent among

obese children ***(Banis et al., 1988; Epstein et al., 1994; Braet et al., 1997***).

The most prevalent problems found by ***Epstein et al., (1994)*** were anxiety depression among young boys and social problems among young boys and girls. It is remarkable that more unfavorable scores are found among younger obese children than among obese adolescents (***Braet et al., 1997 and Stradmeijer ,2000)***

Comparisons of psychosocial functioning of obese children and youngsters with children suffering other chronic somatic illnesses seem appropriate. ***Banis et al. (1988)*** and ***Wallander et al. (1988)*** observed strong similarities in the CBCL-scores of obese and other chronically ill children: all displayed scores are falling between the normal and the clinical range. Their conclusion was that obesity leads to a 'risk profile' with respect to psychosocial development.

Gortmaker et al. (1993) compared overweight adolescents and young adults with young people with other chronic health conditions, such as asthma, diabetes, muscular-skeletal abnormalities, rheumatoid arthritis, and congenital heart anomalies. Their most important conclusion was that being overweight has greater social or societal consequences (such as less likely to be married, fewer years of education, etc.) than other chronic physical conditions ***(Healthy Place Depression Community [HPDC] 2006***). Nevertheless, without longitudinal data no conclusions can be made about the nature of the relationship between psychosocial problems and obesity ***(Stice & Marti, 2006).***

Research into psychosocial functioning among obese children has been strongly influenced by the stereotyping and stigmatization research carried out by ***Staffieri, (1967).Staffieri*** presented pictures of body

shapes of children to 6-10-year-old subjects, Independent of the shape of the subjects (among whom were fat children), the silhouettes of an endomorph type were predominantly ascribed socially unfavorable personal characteristics, such as lazy, dirty, stupid, mean, and lying. These children were also accepted less often as friends ***(Stice & Marti, 2006). Hill and Silver (1995)*** replicated this finding in a rather large group of obese children the overweight body shape was associated with poor social functioning, impaired academic success, and low-perceived health, unhealthy eating, and lack of fitness

A child may feel as though they are not .beautiful. if they do not resemble those presented by today's media. It is clear that not only does childhood obesity have effects on the overall physical health of the child, but also the mental wellbeing. An overweight child may face criticism from peers as well as finding it difficult to participate in age-related activities such as sports and other forms of recreation. Peer teasing is common place in schools. Teasing in childhood is associated with body dissatisfaction, binge eating and emotional difficulties in obese adults ***(Wardle et al.,, 2006).*** Low self-esteem and symptoms of depression are possible outcomes of obesity in childhood (***Burrows & Cooper, 2002).***

Sobel et al., (1995) showed that adolescents display low comfort in engaging in dating activities with very overweight partners. ***Gortmaker et al. (1993)*** showed that females who had been overweight during adolescence completed fewer years of school, were less likely to be married, and had lower household incomes. Overweight adolescent males were also less likely to get married. Particularly, stigmatization among obese adolescents is based on their own supposed responsibility for their obesity ***(Dejomg et al., 1980; Stice & Marti, 2006).***

Even information (explaining the chronic condition of obesity) has minimal positive effects on attitudes or behavioral intentions towards obese peers ***(Bell and Morgan, 2000)***. So, being extreme overweight is different from many other chronic conditions in terms of 'visibility', and own 'responsibility' for the unattractive physical condition and difficulties for changing it ***(Gortmaker et al., 1993; Heo, Pietrobelli & Fontaine, 2006)***

In summary, it is important to acknowledge the presence of considerable variation in personal dysfunctioning within the obese population. ***Wallander et al., (1989) and Epstein et al,.(1994)*** have tried to explain this variation also by linking their investigation to the research into family characteristics ***(Wardle et al., 2006).***

b) Family characteristics in relation to obese children and youngsters:

Bruch's theoretical assumptions ***(1973)*** have played a central role in research into family characteristics of obese youngsters. Her conceptualization of developmental obesity is distinct from other (psychosomatic) approaches in that a determining role is assigned to the mother. In her view, the predominant and exclusive gesture of comfort and protection of these mothers, in response to the child's signals of discomfort, should be provision of food ***(Bosh et al., 2003)***. For that reason, obese children do not have learned to discriminate between different sources of (emotional) arousal: physiological signals related to food deprivation are not distinguished from arousal related to emotions, such as anxiety or anger ***(Stice & Marti, 2006).*** In her opinion this inadequate learning process is started from infancy on. Finally, negative feelings will be easily interpreted in only one way: as a need for food. By

their overprotective attitude, these mothers mask their lack of sensitivity, warmth and support to compensate their own failures and frustrations and to satisfy their own needs (***Wardle et al., 2006).*** These mothers are typified as dominant ***(Valtolina and Ragazzonni, 1995***) in contrast with the fathers as weak.

The earliest attempts to test ***Bruch's*** assumptions were carried out in the 1950s by five Danish researchers ***(Casper, 1988)***. Parental characteristics described by Bruch could not be confirmed empirically, either in clinical studies (i.e., obese children under treatment), or in non-clinical studies (i.e., obese children in 'normal' school populations). Generally, their parents seem to be as well adapted as parents of average-weight children. Neither significant more signs of disharmony seem to be found in these families. Nonetheless, these studies emphasized that the observed differences in psychopathology might be attributed to the different samples used: *Bruch's* sample consisted mainly of inner-city, and lower-class subjects. In the Danish studies, the families were more equally distributed over different subgroups and social classes ***(Bosh et al., 2003)***.

It was also thought that marital conflicts would be frequently present in families with obese children and youngsters ***(Brush, 1973; Mendolson et al., 1995). Minuchin et al.,(1978)*** although not specifying the nature of the relationship between family functioning and obesity in particular, described 'psycho-somatogenic' families as enmeshed, rigid, and conflict avoiding. In agreement with Bruch, he also assumed the existence of over-protection in these families. The clinical report of ***Harkaway (1986)*** with only five two-parent families with 12-14-year-old obese girls supported the family structures written by ***Minuchin***. This is

the only publication in the ***Minuchin*** tradition on families with obese children we found. ***(Wardle et al., 2006)***

However, there seems to be little or no support by empirical studies for the psychosomatic assumptions of ***Bruch*** and ***Minuchin*** concerning family functioning ***(Loader et al., 1985; Mendolson et al., 1995***). The majority of the empirical studies, however, are limited by small group sizes and inadequate control groups. ***Kinston et al. (1990)*** and ***Mendelson et al., (1995)*** only observed differences in family functioning among obese girls. These authors related these gender differences to research findings of ***Constanzo and Woody (1984***) who showed that parents experience obesity in their daughters (compared with obesity in their sons) as more problematic ***(Wardle et al.,2006).*** They attributed this finding more to personality factors than to family factors. They reported emotional eating and loss of control regarding food more often too. ***Mendelson et al., (1995)*** concluded that prejudices in society regarding obesity, particularly in women, start at an early stage within families ***(Bosh et al., 2003)***.

However, most studies do not specifically control for cross-cultural and socio-economic differences. Recent and better controlled studies do not support these family characteristics either: rather than overprotection, more negative interactions, rejection, and less cohesion (emotional involvement) were found in 'obese families', based on family relation questionnaires ***(Banis et al.,1988;Garley 1992;Johnson et al., 1997; Renmann et al.,1999;Bosh et al.,2003)***

Mothers in families with an obese child rate their families as more dysfunctional than do mothers in control families (***Kingston et al., 1987).***Obese children, in their tendency to avoid conflicts, seem to adopt

highly dependent positions ***(Brush, 1973).Wallander et al., (1989)*** found a positive relation between obese children's dysfunction and conflicts within the family and a negative relation to cohesion and organization within the family. ***Epstein et al., (1994)*** concluded that psychiatric symptoms in the parents were significantly related to the obese children's psychosocial problems ***(Bosh et al., 2003)***. The degree of the child's obesity did not make an independent contribution to the explanation of psychosocial functioning. Here too, no further research was carried out to discover the extent to which the history of the course of obesity affects the individual variation. ***Klesges et al., (1992)*** for example, could not find a relationship between aspects of family functioning and the percentage of body fat within a time span of several years. Considering the importance clinicians have attached to family systems in the development of obesity, it is quite amazing that research is so limited ***(Valtolina and Marta, 1999)*** However, longitudinal studies found that parents neglect, rather than overprotection, is an especially important predictor of adult obesity ***(Lissau and Sorenson, 1994; Bosch et al., 2003)***

PREVENTIVE AND CURATIVE INTERVENTIONS OF OVERWEIGHT OBESE CHILDREN

Preventive intervention programs:

Once established, obesity is difficult to treat, especially when the obese state has become chronic. As a consequence prevention is not only appealing, but also necessary ***(Nestle, 2006.)***

Preventive interventions have traditionally been classified as primary, secondary, or tertiary. When applied to obesity, this typology implies distinctions between attempts to reduce [1] the incidence of obesity, [2] the duration of the obese state and [3] the disability arising from the established obese state. A recent classification system has proposed three levels of prevention, such as: (a) universal (or public health) prevention, which targets everyone in the population regardless of risk; (b) selective prevention, which targets sub-groups of the population with a risk of developing obesity; and (c) indicated prevention, which focuses on high risk individuals***(Bosh et al., 2003)***.

Prevention as well as curative interventions of obesity must be focused on equilibrium of the energy balance: energy input from food intake has to be equal to energy expenditure (output) by physical activity and/or exercise. Therefore, the main intervention goals have to be: (a) striving for more adequate eating behavior (patterns) and (b) enhancing the activity-level. This means that a radical change has to be made in lifestyle behaviors, such as food and exercise habits, generally embedded in a web of environmental (familial, societal cultural) and peer group influences ***(Bar-or et al., 1998)*** .Reduced activity is a potential source of energy imbalance. For example, less than 50% of American children

engage in routine physical activity, less than 36% of schools offer physical education classes, sedentary activity has increased, as has TV watching and playing computer games ***(Jackson et al., 1991)***.Physical activity seems more important in the prevention than in the treatment of obesity(***Media and Childhood Obesity, 2008***). Active people weigh less and have less fat than inactive people. A low physical activity is characteristic of obese children and youngsters, and it may be one cause of juvenile obesity ***(Bosh et al., 2003)***. It is assumed that the current overweight and obesity epidemic is more determined by a decrease in the level of habitual physical activity than a decrease in resting metabolic rate or in dietary-induced thermogenesis (Subsequently, a more physically active lifestyle is likely to be the cornerstone of a prevention strategy centered on the promotion of healthy weights. Regular physical activities have favorable effects too on conditions that are comorbid with obesity, such as cardiovascular diseases or diabetes.

Bar-or et al., (1998) referred to the intervention studies of concerning management of juvenile obesity and enhancing physical activities, by saying: 'It seems that the long-term effect of an intervention program is greater when lifestyle physical activities are promoted rather than a regimented exercise prescription ***(Salens et al., 2007)***. Furthermore, a mere reduction in the time spent on sedentary activities can induce a better and more sustainable weight control than does an exercise program. Furthermore, attitudes toward vigorous exercise among children reinforced for reduction in sedentary behavior seem more positive than attitudes among children reinforced for enhanced physical activity ***(Salens et al., 2007).***

Besides playing computer games, viewing television constitutes the most prevalent sedentary behavior among children and youngsters in the

western world today ***(Bosh et al., 2003)***. Watching television decreases the time available for activity and exercise. At the same time, it encourages snacking and consumption of energy dense foods ***(Nestle, 2006). Mackenzie (2000)*** refers to a publication by Strauss in 1999, indicating that more than 90% of foods advertised on television are high in fat, sugar and salt. American studies cited by ***Mackenzie*** show that youth are watching TV on average 4.8 h a day, with an estimated 33% watching more than 5h a day and only 11% watching 2 h or less a day. These data are consistent with other observations suggesting that sedentary behavior co-varies with other addictive behaviors, such as smoking and alcohol consumption Increased television viewing is associated with higher rates of childhood obesity, not only due to reduced physical activities, but also to unhealthy eating behavior patterns ***(Bar-or et al., 1998; Phillippas, & Clifford 2005).***

Accordingly, excessive and/or undesired food intake is the other pole of the energy imbalance: in case of overweight the input is larger than the output. Fast-food habits (i.e., typically high caloric fat foods), small amounts of the daily recommended intake of fruits or vegetables, uncontrollable eating behaviors, lacking regular eating patterns, and snacking all lead to an energy imbalance.***(Nestle,2006).***

MacKenzie (2000) refers to various American studies concerning parental (modeling) influences on biased food preferences and eating patterns, but also to improper use of undesired foods as rewards for performing non-food related tasks. Thus, many childhood food preferences and eating habits are formed by parental food beliefs, eating habits, and use of food as reward.

In summary, the key interventions for prevention as well as treating obesity are increasing physical activity and consuming a healthy diet ***(Bosh et al., 2003)***. Following the above-mentioned levels of prevention: (a) the universal obesity prevention programs should be mainly focused on the community as a whole (regardless of their current level of risk) by means of mass media; (b) the universal and selected prevention programs can also adequately be directed at school populations (schools are extremely useful for instituting prevention programs); and (c) selected and indicated prevention programs can be most easily applied within families. Gradually, from level-to- level there is a shift from prevention to more curative intervention programs. Both prevention as well as curative intervention focus on consuming a healthy diet. However, the majority of prevention programs focus more on increasing physical activities, while treatment programs focus more on changing psychosocial dysfunctioning, in order to modify eating behavior patterns ,especially in case of chronic obesity***(Phillippas, & Clifford 2005)***.

Gill (1997) argues strongly in favor of integration of prevention strategies into curative management: weight management has to include the primary prevention of weight gain in children and adults, together with weight loss, weight maintenance and the management of weight related factors. Both, preventing and treating obesity involve environmental changes, motivational strategies, but also cognitive and attitudinal techniques, and social skill-training. Important means for health promotion are the enhancement of self-efficacy, i.e., assessing you as being capable of making lifestyle changes, and modeling, i.e., learning through the observation of others' behavior ***(Bosh et al., 2003; Phillippas, & Clifford 2005);***

A. Public health policy approaches:

Gill, (1997) distinguished two public health strategies: (a) those, which aim to improve the knowledge and skills of individuals in community and (b) those which aim to reduce exposure of populations to underlying environmental causes of obesity. Up till now, the first strategy has not led to impressive results. Effects of these programs have probably been limited by the lack of awareness of problems associated with obesity in the general population, and many individuals are already attempting to control their weight (although mostly in rather inadequate ways). However, failure of this strategy can't be a reason to do nothing at all: it only illustrates the need for optimalisation of this approach to a more effective intervention strategy ***(Bosh et al., 2003)***. ***Gill, (1997)*** emphasizes more the second strategy, i.e., reduction of exposure to obesity-promoting stimuli, such as the persistent temptation of high-energy foods or the convenience of a sedentary life-style ***(Dopheide, 2006).***

Jeffrey, (2002) gives an overview of various strategies to diminish the constant potential exposure to inexpensive but highly palatable food, such as controlling: (a) advertising (restricting promotion of high-fat food items on children's television programs); (b) sales conditions (removing vending machines from schools with high-fat or high-nutrient foods); (c) prices (by increasing the cost of higher caloric foods and at the same time decreasing the cost of lower caloric foods) and improving (d) environmental controls (increasing the availability and affordability of exercise participation); and (e) public health education.(***Nestle and Jacobson, 2000; Media &Childhood Obesity,2008)***.

B. School programs:

School-based interventions offer important potential, because no other institution has as much continuous and intensive contact with children during their first two decades of life ***(Story, 1999)***. Most of the school-based programs reported in the literature contained a knowledge-based approach, with modification of attitudes toward and behaviors concerning diet and exercise. One of the first reviews in this field, to be sure narrowly focused on minority adolescents, has been written by ***(Jackson et al., 1991)***.

Unfortunately, the magnitude of attitudinal and/or behavioral changes accomplished by the programs evaluated in the studies was not large and most of the changes were assessed by self-reports. An important conclusion was that 'an external locus of control, a feeling of low self-efficacy, and an inability to choose or provide appropriate modeling will make it more difficult to change behavior***(Bosh et al., 2003;(Dopheide, 2006).*** Potential efforts to promote physical activity and healthy eating should be part of comprehensive and coordinated school health programs ***(Wardle et al., 2006).***

Story, (1999) presented such an integrated model, consisting of the following interacting components: health instruction and school food services, an adequate, stimulating nutrition environment (such as school stores), physical education classes, school worksite health promotion (for teachers, staff or food service workers), school commitment, support, and integrated community and school efforts. Parents of children and youngsters also need to be actively involved in these efforts. ***Stone et al., (1998)*** formulated a similar model, including community programs (Guidelines for Schools and Community Programs to Promote Lifelong

Physical Activity among Young People) ***(Bosh et al., 2003).*** Their review is the most extensive one, including all studies from 1980 to 1997, which met the following inclusion criteria: (a) quantitative assessment of physical activity; (b) comparative research designs; (c) ages from preschool- through college age; and (d) published in English. They reviewed 22 school-based studies, 14 completed and 8 in progress; only three foreign studies were included. There were fewer community studies; only seven were reviewed. Most is known about upper-elementary-age-students (i.e., above 8 years old).

A number of studies used a multiple theoretical approach, such as Social Cognitive Theory, Social Learning Theory, and incidentally the Organizational Change Theory. A number of older studies were weak, but the studies in progress were stronger. The most extensive large-scale study is the Child and Adolescent Trial for Cardiovascular Health (CATCH), multi-center randomized trial (5106 students, over 96 schools), which consisted of a physical activity curriculum in the schools and a program involving parents at home. Measures over 2 years included, validated self-reports, direct observation, and a timed run to assess fitness. Participants in schools gained greater levels of moderate to vigorous activity during physical education classes and also a significantly greater physical activity in general, amounting to almost 1.5 h per week ***(Goran et al., 1999 and Luepker, 1999; Salens et al., 2007).***

To optimize the effectiveness of school-based prevention programs, it should be adequate to gather beliefs and attitudes among school staff as well as some information and recommendations from the youth themselves for development of these programs ***(Kaplan and Waden, 1986; Neumark et al., 1999***) .These researchers examined staff

and student support for such programs ***(Bosh et al., 2003).*** Maybe the most interesting finding among youngsters was their emphasis on the necessary accessibility for all adolescents, not only overweight ones: programs should be available to all interested adolescents. The programs have to offer fun and exciting activities, providing both educational and fitness opportunities. Adolescents lead busy Jives, so programs need to be flexible with regard to their needs and schedules. However, programs should not only focus on healthy life promotion, but also on discussion groups about weight related concerns and problems, as well as support groups for overweight youth. To decrease stigmatization about obesity, these activities (under supervision of school staff) have to focus on weight acceptance and tolerance, A remarkable finding was that half of the teachers and school health care providers tended to believe that obesity largely is caused by behavioral factors (overeating and inactivity), but at the same time 54% of the respondents believed that biological factors could play an important role in the etiology of obesity. Even though their data presentation does not make clear if the 'half of the teachers is the same group as the mentioned 54% of the respondents there must be a huge overlap, suggesting that respondents were aware that multiple factors play a role in he onset of obesity. Between 20 and 25% of the respondents received obese persons as more emotional, less tidy, less likely to succeed at work, or having more family problems than non-obese persons ***(Bosh et al.,2003).***

Neumark et al., (1999) stress the unique position of school personnel to help overweight youth. Consequently, they recommend more staff training aimed at increasing their own sensitivity about weight-related attitudes and behaviors, improving their skills in working with (non)overweight youth, and increasing their objective knowledge with

regard to causes and consequences of obesity ***(Bosh et al., 2003; Philippes & Clifford, 2005)***.

C. Parents and families:

The importance of including family-based components to enhance the effectiveness of preventive interventions has been emphasized, within the description m school-based approaches ***(Neumark et al., 2000)*** Nevertheless, prevention programs specific focused on families are scarce ***(Goran et al., 1999)***. The programs mentioned by Grill, ***(1997)*** and by ***Goran et al., (1999)*** are more curative (parent training) programs than preventive interventions ***(Bosh et al., 2003).***

Few prevention studies used family-based components within universal health approaches. Increased social support and reduction in the feeling of isolation may pre-eminently occur when at least one parent is involved in the management of child weight problems ***(Epstein et al., 1994; Grill, 1997)*** In other words, optimizing of the effectiveness of (curative as well as preventive) interventions of childhood obesity mean automatically involving actively the parents in these approaches, because they are very influential in shaping eating and physical activity patterns in children. ***Baughum et al., (2000)*** studied maternal perceptions of their overweight preschool children. Although, nearly 60% of these mothers were able to assess themselves as overweight, it was remarkable that nearly 80% of them failed to perceive their own overweight children as overweight. Their conclusion was that childhood obesity prevention efforts are unlikely to be successful without a better understanding of how mothers perceive the problem of overweight in their preschool children. But also, that the challenge is to encourage healthy, lifelong diet and exercise habits in children without producing in children a

preoccupation with thinness or poor self-concept to body weight' focusing on the psychosocial aspects and family dysfunction can be helpful in achieving and maintaining weight reduction***(Bosh et al., 2003; Nestle, 2006)***.

What does this mean for prevention of (childhood) obesity? First of all obesity is a physical condition, so the most obvious intervention goals are focused on ameliorations in physical functioning: establishing more healthy eating behavior (patterns) and enhancing daily physical activities. However, focusing on physical activities and exercise training seems to be more important in the prevention of overweight and obesity than it is in the curative interventions. This does not mean that improvements in eating behavior and eating habits do not have to be strived for in preventive approaches too. However, these interventions occur in other forms, such as reducing tentative exposure to highly palatable foods, improving school food services, education, and so on ***(Story,1999)***, in comparison with the techniques applied within therapeutic interventions. The gradual shift from purely preventive interventions (universal and selected level) to more curative preventive interventions (indicated level) reflect also this shift in emphasizing intervention goals: from output (enhancing the activity level) to input (more adequate eating behavior patterns). Modification of eating behavior, eating habits or patterns for example, has more influence in realizing weight reduction than modification of the activity level, particularly in the first treatment phase. In the consolidation phase of treatment later on, in order to stabilize weight and to prevent weight increase, this curative practice (by stressing the enhancement of daily activities) resembles more the universal or selected prevention approaches. In this respect, the state of stabilizing weight for patients during the treatment course is comparable with the

state of 'risk'-persons or developing obesity. However, after (moderate) gained weight reduction daily physical activities are the only guarantee to keep the weight stable. It does not surprise that active people weigh less and have less fat than inactive people. For this reason, the output focus (enhancing the activity-level) is so important in prevention, especially on universal or selective level of prevention ***(Bosh et al., 2003)***.

In 2007, the Expert Committee on the Assessment, Prevention, and Treatment of Child and Adolescent Overweight and Obesity released guidelines to help physicians prevent and treat childhood obesity. The American Academy of Pediatrics and other members of the Expert Committee should be commended for recognizing the gravity of the childhood obesity epidemic and for devoting resources in an attempt to address this problem. The guidelines are concrete, clear, and specific; provide quantifiable and measurable criteria. The committee agrees that the primary goal should be developing healthy eating and activity habits, not achieving ideal body weight Eating and physical activity patterns are partly learned behaviors and can be changed. The ideal program should modify the environment that shapes behavior. Family influence is the most important factor in child obesity treatment ***(Barlow, 2007).***

Prevention must be defined more broadly than family-based or school-based interventions or than the application of traditional treatment methods. In an environment so antagonistic to healthful lifestyles, no quick or easy solutions to the problem of obesity should be expected. Accordingly, substantial involvement of and investment by governments at all levels is needed. ***(Neumark et al., 2000; Phillipes and Clifford, 2005; Jennifer &. Bowdoin, 2008).***

SUBJECTS AND METHODS

This study is analytical case-control study.

I- Subjects:

Target population was school aged children of both sexes. Age range was between 9-11 years. The subjects were recruited from a governmental school at Dokki district Giza Governorate (Abu BAKR EL SEDEK Primary school).Children were screened for Weight, Height, Weight/ Age, Height/ Age and Body Mass Index/age (BMI) was calculated according to ***WHO standards*** (2007). Children were divided by using Body Mass Index (BMI) (defined as weight in Kilograms divided by square of the height in meters kg/m^2) into 3 groups:

- 54 Obese children (BMI $\geq 95^{th}$)
- 50 overweight children(BMI $\geq 85^{th} \leq 94^{th}$)
- 50 nonobese children (BMI $\geq 25^{h} \leq 85^{th}$).

- **Inclusion criteria:**

1- Children between 9-11 years, i.e. at 4^{th} primary to six primary grades.

2- Both sexes are included.

3- Prepubescent children (***Tanner stage I***)

- **Exclusion criteria:**

1- Children below 9 or over 11 years.

2- Endocrinal causes of obesity.

3- Genetic disorders causing obesity.

4- Children with chronic debilitating diseases e.g. (diabetes mellitus) rheumatic and congenital (heart diseases and chronic lung diseases, hypertension), and children on corticosteroids therapy.

5- Mentally affected children

6- Pubescent children

- **Ethical criteria:**

Written consent was obtained from parents after explanation of the aim of the study.

II- Methods:

The three studied groups were subjected to:

1. Nutritional Status Assessment through: Anthropometric measurements that includes measuring weight, height (sitting & standing), circumferences (Head, Arm, Hip and Thigh circumferences) Bicresteric and Bitrochantric width, the techniques and landmarks for measurements used were those recommended by International Biological Program IBP (***Tanner and Falk, 1986).***

i- Weight for Age:

Weight was measured without shoes and in light clothing to the nearest 0.5 kg: Weight for age was calculated according to ***WHO standards (2007) using Anthroplus software of P/C (2009) computers (WHO 2OO9).***

ii- Height for Age:

- Standing Height: Height was measured without shoes, the subject stood on flat floor, heels, buttocks, shoulders and back of the head touching the upright level, and the head was comfortably erect with the lower

order of orbit in the same horizontal plane as the external auditory. The arms were handing at the sides in meats natural manner. A head piece as metal bar was gently lowered crushing the hair making contact with top of the head and a mark is drawn and the measured to the nearest 0.5 cm.

Height for age was calculated according to ***WHO standards (2007)***

- Sitting Height: Sitting height was measured with an Anthropometer. The subject sit erect on a measuring table or bench, with legs hanging unsupported over the edge of the table and with the hands resting on the thighs the subject sit as erect as possible with head and eyes were in a horizontal plane looking straight a head. The head, shoulders and buttocks should touch the vertical surface of the measuring device (subject should be asked to inhale deeply and maintain fully erect position and the measurement was taken before subjected exhaled). A metal bar was gently lowered crushing the hair making contact with top of head and a mark was drawn and then measured to the nearest 0.5cm ***(Martin D.A.et al., 1988).*** Sitting height was taken to exclude Endocrinal causes of obesity.

iii- Circumferences:

- Head Circumference: It was measured by applying the flexible tape, above the ears, mid way between the eye browes and hair line to the occipital prominence at the back of the head. (***Goran et al., 1998).***

- Mid Upper Arm Circumference: Arm circumference was measured at a level mid way between Acromion and Olecranon process using flexible plastic tape which was placed gently but firmly around the arm to prevent compression of soft tissue. Right arm is usually measured

except in left handed children where the left arm was measured. The arm was bent at elbow at 90- angle degree, with the upper arm held parallel to the side of the body. The circumference was recorded to the nearest 0.5cm. ***(Frisansho, 1989).***

-Waist Circumference: It was measured using flexible plastic tape with a sprung handle to ensure reproducible levels of tension.(***Pietrobelli and Tato,2005)***.

- Hip Circumference: It was measured by flexible plastic tape. ***(Power et al., 1997).***

- Waist /Hip and Waist /Height and ratio was then calculated and compared among the three groups (***Sweeting, 2007).***

- Thigh Circumference: It was measured by flexible plastic tape. It gave us indication of increased body fat. (***Power et al., 1997; Goran et al., 1998).***

iv- Bircresteric breadth (shoulder breath):

It was measured with the child standing erect and maximum horizontal breadth among the shoulders was taken. It was useful in indicating obesity ***(Goran et al., 1998).***

V- Bitrochanteric breadth:

It was measured by the subject standing with the heels together and arms folded over the chest. An Anthropometer with straight blades was used. The examiner was stood behind the subject and maximum distance was recorded to the nearest 0.5cm. Mild considerable pressure must be applied with the blades to compress the soft tissue. ***(Frisansho, 1989).***

2. Sociodemographic Data:

This was done according to technique of ***Abd ElGhaffar and Kashkowsh (1990)*** including professional and educational levels. Both parents education at level and occupation were taken, Family members and child order would also be recorded:

i) Occupational level scores: was divided into 7 Gades from manual to practitioners:

a) Manual workers (non skilled) (1st level) (one degree).

b) Skilled workers (2nd level) (2 degrees).

c) Semiprofessionals (3rd level) (3 degrees).

d) Governmental employees (4th level) (4 degrees).

e) Business men (5th level) (5 degrees).

f) Professionals (6th level) (6 degrees).

g) Practitioners (7th level) (7 degrees).

ii) **Educational level scores:**

a) Illiterate	(one degree).
b) Read & write	(2 degrees).
c) Primary education	(3 degrees).
d) Preparatory education	(4 degrees).
e) Secondary education	(5 degrees).
f) University education	(6 degrees).
g) Post-graduate education	(7 degrees).

iii) **Number of Family Members:**

Information about number of family members and housing condition (address & number of rooms) were also obtained.

iv) Child Birth Order:

Child birth order was also taken for comparative reasons.

v) Single Parent or not:

Data if child had lost one or both of his parents or not (this may be due to divorce, death or any other cause).

3- Behavioural Assessment:

i. Cognitive Abilities:

This was assessed by a battery of tests that cover verbal and non verbal intelligence, memory, learning and attention using Raven Progressive Colored Matrices, Figural memory test and Auditory Vigilance Tests. Each child is subjected to these tests individually for a 45-60 minutes in a closed room in the school.

- **Raven Progressive Colored Matrices:**

The Colored Progressive Matrices is used to assess the general intelligence of children. It is composed of 3 sets A. B, and B of twelve problems each arranged with increasing difficulty to asses the chief cognitive processes. The three sets together provide 3 opportunities for a person to develop a consistent theme of thought and the scale of 36 problems as a whole was designed to assess as accurately as possible mental development up to intellectual maturity. Presenting the test as colored illustrations printed in a book made the problem to be solved obvious with the least verbal explanation. At first the child was illustrated that he had got a picture of a carpet with deficient part, so he had to try to complete the deficient part from some drawings which were found below the main drawing. The numbers of correct answers were counted and

recorded ***(Raven et al., 1977)*** then we extract a percentile score from the manual from of Raven Progressive Matrices. ***(El Korashi, 1980),*** then we extract the Intelligent Quotient (I.Q) from tables prepared for this purpose ***(Abd El Lateef et al., 1980).***

- **Auditory Vigilance Test:**

This test was used to measure the Attention Ability modeled after suggestion of (Polite, 1984). It is a measure of the efficiency of identifying signal stimuli in the context of non signal stimuli ***(Khalifa et al., 2001).***

- **Figural Memory Test:**

It was used to measure Memory and Classification Ability. This was through free recall of visual objects; it also tapped some aspects of classification of ability by recalling the visual figures in order according to their relation ***(Pilots, 1984***). The child was subjected to 20 figures divided in to 5 groups (Animals, plants, fruits, transportation vehicles and birds) child would be shown the 20 figures one after one, then he would be asked to recall them. He would be assed according to:

a) How main figures he recalled (Memory).

b) To what extent he was systematized and related figures in groups while recalling (Classification Ability).

ii. Psychosocial Assessment:

This was done by using Arabic Children's Depression Inventory, Pediatric Symptom Checklist and Body Image Test.

- **Arabic Children's Depression Inventory (ACDI):**

The Arabic Children's Depression Inventory wasderived from ***Kovocs (1992) and Kazdin (1986)*** and wasconstructed by ***ABD El Khalek (1993).*** The Arabic inventory was composed of seven factors that covered the symptoms of juvenile depression;

It contains twenty seven items to which children were subjected so as to cover the symptoms of juvenile depression e.g. sadness, sleep disorders, isolation and self confidence. The children had to response to those twenty seven items through one of three alternative answers i.e. rarely, sometimes and often. (See appendix)

- **Screening for psychosocial functioning through Pediatric Symptom Checklist (PSC):**

The Pediatric Symptom Checklist was used to screen the children. It consists of thirty-five items questionnaire and was designed to reflect parent and teacher impression separately on the child psychosocial functioning. They had to evaluate though the child through three alternatives rarely; rarely, sometimes and often. After word a mark would be given for the answers by the pediatrician, so that a value of (2) is assigned to often, (1) to sometimes and (zero) to rarely.

The presence of significant behavioral or emotional difficulties was suggested to children aged 4-5 years received 24 or more points and when children aged 6-16 scored 28 or more points (***Murphy JM et al., 1992).*** To determine what kinds of mental health problems were present, four factor scores on the Pediatric Symptom Checklist would be used:

a) Pediatric symptom check attention subscale: It consists of four items Questions (4, 5, 13, and 14). Children who received 4 or more points

on those four would need a work up for Attention Deficit Hyperactivity Disorder (ADHD).

b) Pediatric symptom check internalizing subscale: It consists of eight items; Questions: 1, 2, 3, 10, 16, 17, 19, and 20. It is used as a screen for depression and anxiety for children who received 8 points or more. Referral of children who showed positive scores for counseling should be done (***Kessler R. et al., 1995.)***

c) Pediatric symptom externalizing factor: It consists of ten items; Questions: 15, 23, 24, 25, 26, 27, 28, 31, 32, and 33. A score of 8 or more was a sign of conduct disorder, oppositional defiant disorder, rage disorder etc.. Those children should receive behavioral intervention ***(Castello EJ et al., 1988).***

d) School problems: It consists of four items; Questions: 6, 7, 8, 9. It is used as a screen of school problems children have as performance and learning problems as well as relation with teachers. A score of 4 or more should receive intervention.(see appendix).

- **Body Image Test:**

This was to evaluate child self-esteem. Most of studies of children's self esteem have equated actual weight with physical appearance; perceived size was a better predictor of self-esteem than actual body weight (***Friedlander et al., 2003).*** The children would be asked to choose between three silhouettes (normal, over weight and obese) that best represented their current (perceived) body size and then asked to choose the silhouette they would want to look like (desired). None matching of the perceived and desired indicated body image dissatisfaction. Accurate

perception meant that the perceived body size matched their actual Body Mass Index (BMI) (*Collins, 1991).*

4- Global School Health Survey (GSHS):

The GSHS is a school-based survey conducted among students and it was recommended by the ***World HEALTH Organization*** since ***2003*** The GSHS uses a standardized scientific sample selection process; common school-based methodology; and core questionnaire modules, core expanded questions, and country-specific questions that are combined to form a self-administered questionnaire which can be administered during one regular class period. The purpose of the GSHS is to provide accurate data on health behaviours and protective factors related to the cause of morbidity and mortality among children among students and to, establish programs, and advocate for resources for school health and youth health programs and policies. In this study, a total of twenty-three items were used to monitor health risk behaviours among students as regard:

a) Dietary Behaviour.
b) Health Education at school
c) Physical activity.
d) Teasing.
e) Violence and unintentional injury. (See appendix)

5. Dietary intake:

The 24 hour recall method was used. This was conducted through qualitative and quantitative information about the different items of food and beverages consumed by every child in the past 24-hour including

school meal would be used (***Emmous, Hayes 1973).*** Data of dietary history would be computed using the Nutritional Institute's (Egypt) Food Consumption tables. In order to calculate the average daily intake of total calories, macronutrients (proteins, fats & carbohydrates) and micronutrients (vitamins & minerals). These nutrients would be calculated as percentage of recommended dietary daily allowances ***(RDA)*** for age and sex (***RDA, 1989).***

6- Academic achievement:

This was assessed using the mean score of mid-year and final year tests scores of Arabic Language and Arithmetic's subjects for each child as these two subjects are considered a good indicator of academic and learning performance (***Silver, 1989).***

7- Statistical analysis:

Data was analyzed using the statistical package for Social Science for Personal Computers (SPSS/PC) using virgin 13. Descriptive analysis included Frequency Distribution, Percentage Distribution, Range, Mean and Standard Deviation, it included also One way analysis of variance (ANOVA), Student's t-Test was done for comparison of the Quantitative values , Chi-squared tests and simple relative risk (RR) was used for comparing Qualitative values (***Rieglman &Hirsh .1989)***.

RESULTS

The results of this study are illustrated below starting from table (2) to table (22) and from fig. (6) to fig.(16).

Table (2): Mean ± SD, SE and range of Anthropometric parameters of studied group of children.

	Obese N = 54	**Overweight N = 50**	**Non obese N = 50**
Age (years) Mean ± SD SE Range	10.4 ± 0.9 0.1 9 – 11.9	10.6 ± 0.9 0.1 9.1 – 11.9	10.6 ± 0.9 0.1 9.2 – 11.9
Weight. (Kg) Mean ± SD SE Range	53.3 ± 9 1.3 39 – 83	45.3 ± 6.5 0.9 35 – 64	37.1 ± 6.6 0.9 23 – 57
Standing height. (cm) Mean ± SD SE Range	138.9 ± 7.7 1.1 122 – 158	141.3 ± 5.8 0.8 131 – 160	143.8 ± 7.5 1.1 128 – 163
Sitting height Mean ± SD SE Range	71.2 ± 5.5 0.7 62 – 90	72.8 ± 5.1 0.7 62 – 85	70.5 ± 4.5 0.6 62 – 87
Arm circumference (cm) Mean ± SD SE Range	28.3 ± 2.2 0.3 23 – 33	25.4 ± 1.9 0.3 22 – 29	22.7 ± 1.7 0.2 18 – 27
Waist circumference (cm) Mean ± SD SE Range	82.6 ± 8.9 1.2 54 – 99	75.8 ± 6.6 0.9 62 – 94	68.5 ± 6.3 0.9 51 – 80
Hip circumference (cm) Mean ± SD SE Range	96.6 ± 8.1 1.1 80 – 125	89.2 ± 6.3 0.9 80 – 103	83.3 ± 5.4 0.8 69 – 99
Thigh circumference (cm) Mean ± SD SE Range	48.4 ± 6.3 0.8 23 – 65	45.3 ± 4.1 0.6 34 – 54	41.6 ± 4.4 0.6 23 – 55

SD=Standard deviation SE = Standard error.

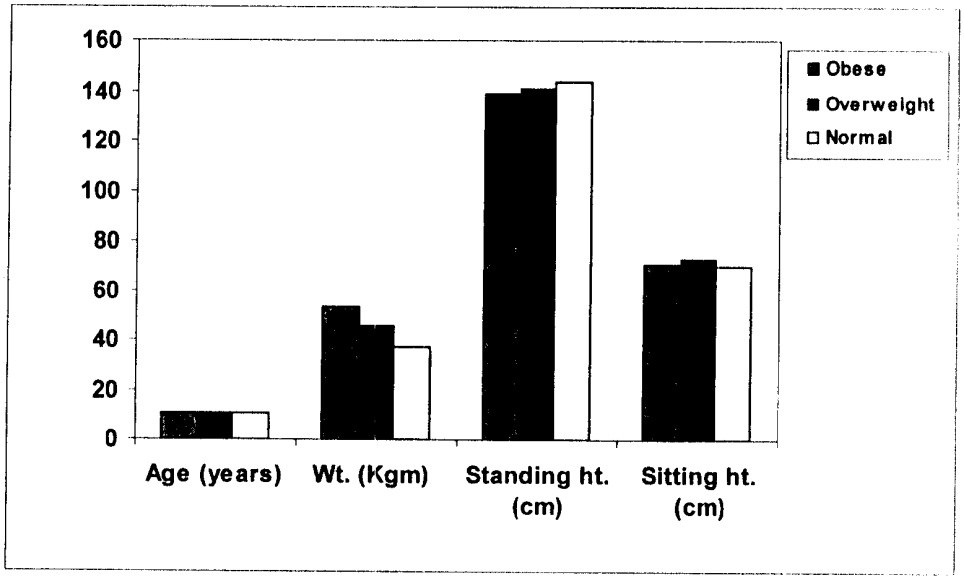

Fig. (6): Mean values of Anthropometric parameters of studied groups of children.

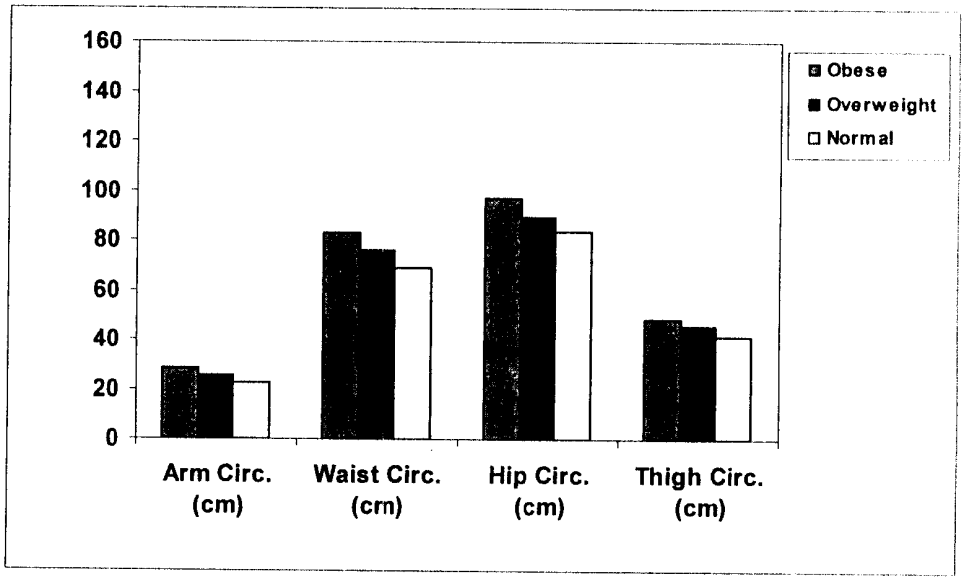

Fig. (7): Mean values of Anthropometric parameters of studied groups of children.

Table (2), Fig. (6, 7) show obese, overweight and non obese children regarding their Anthropometric parameters. There is no significant difference between the three groups as regard age using one way analysis of variance **(ANOVA F = 1.1; P = 0.4).**

Table (3): Comparison between obese, overweight and non obese Children as regard Anthropometric parameters

	Obese N= 54	**Overweight N=50**	**Nonobese N=50**	**P**
WAZ	2.7±0.61	2.1±0.19	0.29±0.06	**0.01**
HAZ	0.26±0.12	0.1±0.13	0.09±0.17	N.S
Waist/height ratio	0.62±0.02	0.56±0.09	0.41±0.03	**0.001**
Waist/hip ratio	0.91.8±0.005	0.85±0.01	0.79±0.03	**0.000**

Values are mean ±SD

WAZ = Weight for age Z score. HAZ = Height for age Z score.
P = Level of sgnificance≤0.05 N.S= non significant

Table (3) shows comparison between obese, overweight and nonobese children regarding Anthropometric parameters. Waist/hip ratio for obese children was (0.92) while for overweight was (0.85) while nonobese waist to hip ratio was (0.79) and the difference was statistically significant **;(P=0.000).** There was also statistical Significant difference as regard waist/ height ratio **;(P=0.001)** and mean weight for age z score between the three groups; **(P = 0.01).**

Table (4): Mean (SD) of Anthropometric parameters among obese-overweight group and non obese group.

Test	Group	N	Mean ± SD	SE
Age (years)	Obese-overweight.	104	105 ± 0.91	0.09
	Non obese	50	10.6 ± 0.96	0.14
Weight (kg)	Obese-overweight.	104	49.5 ± 9.1	0.9
	Non obese	50	37.1 ± 6.6	0.9
Standing height (cm)	Obese-overweight.	104	140.1± 6.9	0.68
	Non obese	50	143.8 ± 7.5	1.1
Sitting height (cm)	Obese-overweight.	104	72.0 ± 5.3	0.52
	Non obese	50	70.0 ± 4.5	0.63
Head circumference (cm)	Obese-overweight	104	54.nn2 ± 1.6	0.16
	Nonobese	50	53.02 ± 1.04	0.15
Arm circumference (cm)	Obese-overweight	104	26.9 ± 2.5	0.25
	Nonobese	50	22.7 ± 1.7	0.24
Waist circumference (cm)	Obese-overweight.	104	79.3 ± 8.6	0.84
	Nonobese	50	68.5 ± 6.3	0.9
Hip circumference (cm)	Obese-overweight.	104	93.05 ± 8.13	0.8
	Nonobese	50	83.3 ± 5.4	0.77
Thigh circumference (cm)	Obese-overweight	104	46.9 ± 5.5	0.54
	Nonobese	50	41.6 ± 4.4	0.52
Bicresteric breadth (cm)	Obese-overweight.	104	31.6 ± 6.9	0.7
	Nonobese	50	33.9 ± 5.5	0.8
Bitrochanteric breadth (cm)	Obese-overweight.	104	40.6 ± 5.9	0.6
	Nonobese	50	39.9 ± 5.05	0.71

Table (4) shows mean and standards deviations (SD) of Anthropometric parameters among obese-overweight children and non obese children. The two groups are of the same age group. There is no significant difference between the two groups as regard age (t = -0.6.P=0.55).

Table (5): Sociodemographic data of obese-overweight and nonobese children.

Test	N	Obese-overweight (104)	(%)	Nonobese (50)	(%)	χ^2	P	OR	95% CI
▪ **Paternal:**									
- Educational									
Non educated	78	54	51.92	24	48.00	0.160	0.730	0.15	0.58 - 2.25
Educated	76	50	48.08	26	52.00				
- Job									
Manual worker, skilled worker or semiprofessional	70	43	41.35	27	54.00	2.400	0.170	0.59	0.3 - 1.16
. Governmental employers, professionals or practitioners	84	61	58.65	23	46.00				
▪ **Maternal :**									
- Educational									
Non-educated	91	63	60.58	28	56.00	0.290	0.600	1.21	0.61 - 2.4
Educated	63	41	39.42	22	44.00				
- Job									
Housewives	119	81	77.88	38	76.00	0.700	0.840	1.11	0.5 - 2.5
Semiprofessionals. and governmental employers	35	23	22.12	12	24.00				
▪ **Birth order**									
The first child	59	41	39.42	18	36.00				
Not the first child	95	63	60.58	32	64.00	0.170	0.730	1.16	0.57 - 2.33
▪ **Single parent**									
No	144	95	91.35	49	98.00	2.460	0.170	4.60	0.57 - 37.7
Yes	10	9	8.65	1	2.00				

χ^2 = Chi squared. OR= odd ratio. C.I. = confidence interval.
P = Significance level ≤ 0.05

Table (5) shows comparison between sociodemographic data of obese- overweight children and nonobese children; 48.8% of fathers of obese-overweight children are illiterate and 51.92% are educated while 48% of normal children fathers are non educated (illiterate, only read and write or primary) and 52% are educated (preparatory, secondary or

university degree) There was no significant difference between the two groups regarding paternal education and paternal job. As regard maternal education; 60.5% of mothers of obese-overweight children are not educated (illiterate, only read and write or primary) while only 39.4% are educated (preparatory, secondary or university degree). 44% of mothers of nonobese children are educated while 56% not. There is no significant difference between the two groups regarding maternal education.77.8% of mothers of obese-overweight children are house wives and 22.12% are working, 76% of mothers of nonobese children are not working and 24% of mothers of non obese children are working .There is no significant difference between the two groups children regarding maternal job. Birth order i.e. the order of child among his sisters and brothers showed no significant difference between the two groups. There is no significant difference between the two groups regarding single parent i.e. having only one parent because of divorce or death of one of parents.

Table (6): Comparison between obese, overweight and nonobese children as regard Intellectual and Memory Abilities.

	Obese N=54	Overweight N=50	Nonobese N=50	F	P
▪ Raven					
- Score					
Mean ± SD	22.5 ± 4.2	25.6 ± 5.9	28.7 ± 3.9		
SE	0.6	0.8	0.5	21.6	**0.00**
Range	15.33	14 – 36	17 – 36		
- Percentile					
Mean ± SD	35.1 ± 24.1	51.9 ± 29.5	68.7 ± 24.6		
SE	3.3	4.2	3.5	21.5	**0.00**
Range	5 – 90	5 – 95	5 – 95		
▪ Figural Memory					
- Free recall					
Mean ± SD	12.8 ± 2	12.4 ± 1.9	12.7 ± 2		
SE	0.3	0.3	0.3	0.7	0.5
Range	8 -17	9 – 16	7 – 18		
- Classification ability.					
Mean ± SD	7.1 ± 1.6	6.9 ± 1.4	6.9 ± 1.6		
SE	0.2	0.2	0.2	0.3	0.8
Range	4 – 11	4 – 10	3 – 11		

Significance level. $P \leq 0.05$.
F = ANOVA: One way analysis of variants

Table (6) shows comparison between obese, overweight and nonobese children as regard Intellectual and Memory abilities by using One was analysis of variants (ANOVA).The three groups showed significant difference regarding Raven's score (F = 21.6; P=0.000); Raven's percentile (F = 21.5; P=0.000).The intelligent quotient level (I.Q) was lower in obese and overweight children as regard Raven's score and percentile than their peers. The Mean of Raven's score of obese children is (22.5 $\pm$ 4.2) versus the mean of overweight children (25.6 $\pm$ 5.9). Both means are lower versus nonobese children (28.7 $\pm$ 3.9), Raven's percentile mean is also lower in obese (35.1 $\pm$ 24.1) versus mean of overweight (51.9 $\pm$ 29.5) and means of both groups are lower versus mean of nonobese children (68.7 $\pm$ 24.6).

Table (7): Comparison between obese, overweight and nonobese children as regard Attention Ability by using Auditory Vigilance Test

	Obese N=54	Overweight N=50	None obese N=50	F	P
Auditory Vigilance					
- Right one					
Mean ± SD	26.1 ± 1.3	25.9 ± 1.1	26.1 ± 1		
SE	0.2	0.2	0.1	0.3	0.7
Range	21 – 27	22 – 27	22 – 27		
- Error one					
Mean ± SD	1.8 ± 1.9	1.3 ± 1.1	0.9 ± 1.1		
SE	0.3	0.1	0.1	4.9	**0.00**
Range	0 – 8	0 – 5	0 – 5		
- Right two					
Mean ± SD	14.8 ± 0.6	14.6 ± 0.6	14.6 ± 0.7		
SE	0.1	0.1	0.1	1.7	0.2
Range	12 – 15	13 – 15	13 – 15		
- Error two					
Mean ± SD	0.7 ± 0.9	0.6 ± 0.8	0.6 ± 0.7		
SE	0.12	0.1	0.1	0.4	0.6
Range	0 – 3	0 – 3	0 – 2		
- Total Right.					
Mean ± SD	40.9 ± 1.5	40.6 ± 1.4	40.6 ± 1.5		
SE	0.2	0.2	0.2	0.6	0.5
Range	36 – 42	36 – 42	36 – 42		
- Total Error					
Mean ± SD	2.6 ± 2.7	1.9 ± 1.4	1.5 ± 1.6		
SE	0.4	0.2	0.2	3.6	**0.00**
Range	0 – 11	0 – 6	0 - 6		

Significance level $P \leq 0.05$
F = ANOVA: One way analysis of variants
SD=Standard deviation.. SE=Standard error.

Table (7) shows comparison between the three groups regarding Attention Ability by using Auditory Vigilance Test. There was significant difference between the three groups regarding the mistakes obese, overweight have done in identification of signal stimulation in relation to nonobese children in the simple test (error 1) (F=4.9; P=0.00) and also in

the total of mistakes (total error) of both the simple test (error 1) and the more difficult test (error 2) (F=3.6; P=0.00).

Table (8): Comparison between obese, overweight and nonobese children as regard psychosocial parameters using Arabic Children Depression Inventory (ACDI).

	Obese N=54	**Overweight N=50**	**Nonobese N=50**	**F**	**P**
ACDI					
Mean ± SD	29.7 ± 4.2	26 ± 3.4	21.1 ± 2.9		
SE	0.6	0.5	0.4	6.4	**0.00**
Range	20 – 39	20 – 33	17 - 22		

Significant level $P \leq 0.05$ F = ANOVA; One way analysis of variants

Table (8) shows comparison between obese, overweight and nonobese children as regard Depression Evaluation by using Arabic Children Depression Inventory (ACDI) using ANOVA. There is significant difference between the three groups (F = 6.4; P =0.002). The mean scores of obese children group (29.7 ± 4.2) and the overweight group (26 + 3.4) is higher than the mean score of non obese group(21.1 ± 2.9).

Table (9): Mean (SD) of Cognitive parameters among obese-over weight and nonobese children.

Test	Group	N	Mean ± SD	SE	t	P
▪ Raven						
- Score	Obese-overweight.	104	24.000 ± 5.35	0.52	-5.55	**0.000**
	Nonobese	50	28.7000 ± 3.9	0.55		
- Percentile	Obese-overweight.	104	43.2 ± 27.9	2.7	-5.5	**0.00**
	Nonobese	50	68.700 ± 24.64	3.5		
▪ Figural Memory						
-Free recall	Obese-overweight.	104	12.6 ± 1.9	0.19	-0.45	0.66
	Nonobese	50	12.7 ± 2.1	0.3		
- Classification ability	Obese-overweight	104	7.03 ± 1.5	0.15	0.3	0.7
	Nonobese	50	6.94 ± 1.6	0.22		
▪ Auditory Vigilance						
- Right one	Obese-overweight.	104	26.03 ± 1.23	0.12	-0.25	0.800
	Nonobese	50	26.1 ± 1.05	0.15		
- Error one	Obese-overweight	104	1.6 ± 1.65	0.16	2.41	0.02
	Nonobese	50	0.9600 ± 1.17	1.15		
- Right two	Obese-overweight	104	14.71 ± 0.6	0.056	1.43	0.15
	Non obese	50	14.6 ± 0.70	0.09		
- Error two	Obese-overweight	104	0.7 ± 0.9	0.7	0.66	0.51
	Nonobese		0.6 ± 0.70	0.7		
- Total right	Obese-overweight.	104	40.7 ± 1.5	0.15	0.4	0.700
	Non obese	50	40.6 ± 1.55	0.22		
- Total error	Obese-overweight.	104	2.25 ± 2.2	0.21	2.04	0.04
	Nonobese		1.54 ± 1.61	0.23		

Significant level $P \leq 0.05$. t = student's t-test. P = level of significance.

Table (9) shows mean (SD) levels of Cognitive parameters among obese-overweight children (104) and non obese children (50). The mean Raven test score used to measure intellectual ability of children is lower in bese-overweight (24 ± 5.35) non obese (28.7 ± 3.9); there is significant difference among the two groups (t = -5.55, P = 0.000). also the mean of Raven's percentile is lower in obese-overweight children (43.2 ± 27.9) versus normal children (68.7 ± 24.64) with significant difference between the two groups (t = -5.55; P = 0.000). As regard Attention ability measured by Auditory Vigilance Test; there is significant difference among the two groups regarding mistakes in identification of signal stimulation in the simple test (error1)(t = 2.41;P = 0.02) and in the total errors(total error) of both the simple test (error 1) and the more difficult test (error 2);(t = 2.04; P ≤ 0.04).There is no significant difference as regard Figural Memory test scores among the two groups.

Table (10): Mean (SD) of Psychosocial parameters as regard Arabic Child Depression Inventory (ACDI) and total score of Pediatric Symptom Checklist (PSCL) among obese-overweight and nonobese children.

Test	Group	N	Mean ± SD	SE	t	P
ACDI	**Obese-overweight.**	104	28.6 ± 3.95	0.39	5.15	**0.001**
	Non obese	50	21.1 ± 2.9	0.41		
▪ PSCL total score						
- Parent	**Obese-overweight.**	104	21.67 ± 4.7	0.461	15.96	**0.000**
	Non obese	50	10.54 ± 2.72	0.45		
- Teacher	**Obese-overweight.**	104	22.61 ± 3.76	0.47	5.23	**0.024**
	Non obese	50	10.8 ± 3.71	0.42		

Significant level P ≤ 0.05 t = student's t-test P = level of significance
PSCL=Pediatric symptom checklist

Table (10) shows comparison of psychosocial behavior among obese-over weight and nonobese children as measured by Arabic Child Depression Inventory (ACDI) and Pediatric Symptom Checklist (PSCL). There is significant difference between the two groups as regarding (ACDI) ; P value =0.001. As regard (PSCL) mean of total score presented by parents was 21.67 ± 4.7, 10.54 ± 2.72 in obese-overweight and non obese respectively and there was significant level of difference among the 2 groups; (t=5.51; P=0.000) In teacher (PSCL); mean of total score was 22.61 ± 3.76, 10.8 ± 3.7 in obese-overweight and nonobese respectively with significant level of difference (t=5.51; P=0.000) between the 2 groups.

Table (11): Psychosocial evaluation of obese-overweight and non obese children regarding Body Image Test using 3 different Silhouettes.

Body Image	N	Obese - overweight (104) (%)	Nonobese (50) (%)	χ^2	P	Odd ratio	95% CI
Normal	47	4 3.85	43 86.00				
Overweight	55	50 48.08	5 10.00	36.000	**0.000**	0.50	0.4 - 0.6
Obese	52	50 48.08	2 .4.00				

χ^2 = Chi squared OR= odd ratio C.I. = confidence interval P = Significant level ≤ 0.05

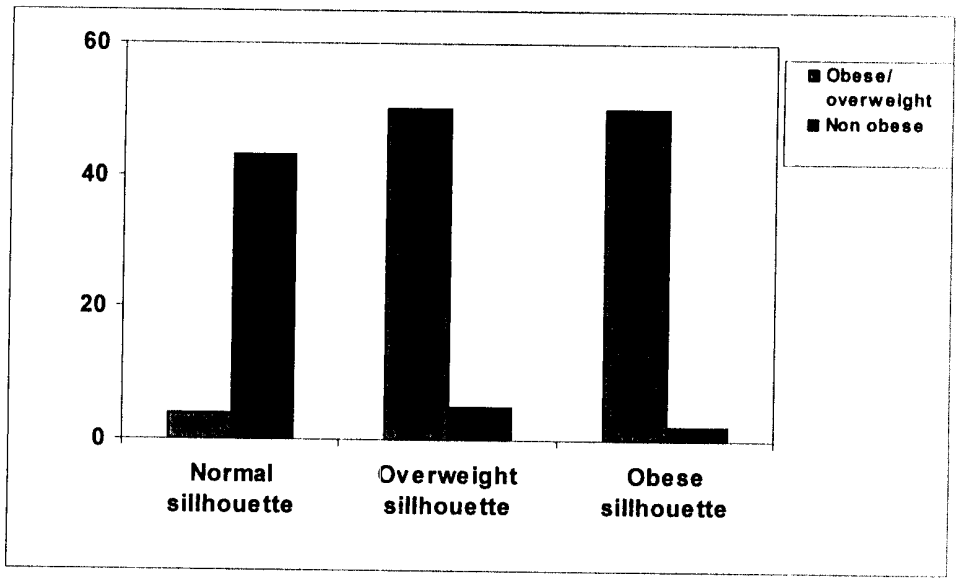

Fig. (8): Psychosocial evaluation of obese-overweight and non obese children regarding Body Image Test using 3 different Silhouettes

Table (11) Fig. (8) show comparison between the two groups using the Body Image Test using three different sizes silhouettes. 3.8% of obese-overweight children self perceived themselves as normal weight 48% perceived themselves as overweight and 50% perceived themselves as obese .On the other hand in nonobese children (50); 86% perceived themselves as normal, 10% perceived themselves as overweight and 4% perceived themselves as obese. The difference in Body Image Test between the two groups is significant ($\chi^2 = 36.00$; P=0.000).

Table (12): Psychosocial evaluation of obese-overweight and non obese children regarding school problems, conduct disorder and Attention Deficit Hyperactivity Disorder (ADHD) using Pediatric Symptom Checklist (PSC) presented by parents & teachers.

PSCL	N	Obese-overweight (104)	(%)	Nonobese (50)	(%)	χ^2	P	Odd ratio	95% CI
▪ **School Problem**									
- Parent									
No	61	23	22.12	38	76.00	40.99	**0.000**	0.90	0.04 - 0.29
Yes	93	81	77.88	12	24.00				
- Teacher									
No	99	54	51.92	45	90.00	21.32	**0.000**	0.72	0.44 - 0.33
Yes	55	50	48.08	5	10.00				
▪ **Conduct disorder**									
- Parent									
No	68	18	17.31	45	90.00	93.6	**0.000**	0.35	0.18 – 0.4
Yes	86	86	82.69	5	10.00				
- Teacher									
No	80	30	28.85	45	90.00	68.5	**0.000**	0.40	0.3 - 0.58
Yes	74	74	71.15	5	10.00				
▪ **ADHD**									
- Parent									
No	84	46	44.23	38	76.00	13.74	**0.000**	0.25	0.12 - 0.53
Yes	70	58	55.77	12	24.00				
- Teacher									
No	77	43	41.35	34	68.00	9.6	**0.003**	0.33	0.16 – 0.7
Yes	77	61	58.65	16	32.00				

χ^2 = Chi squared OR= odd ratio C.I.= confidence interval P = Significant level ≤ 0.05

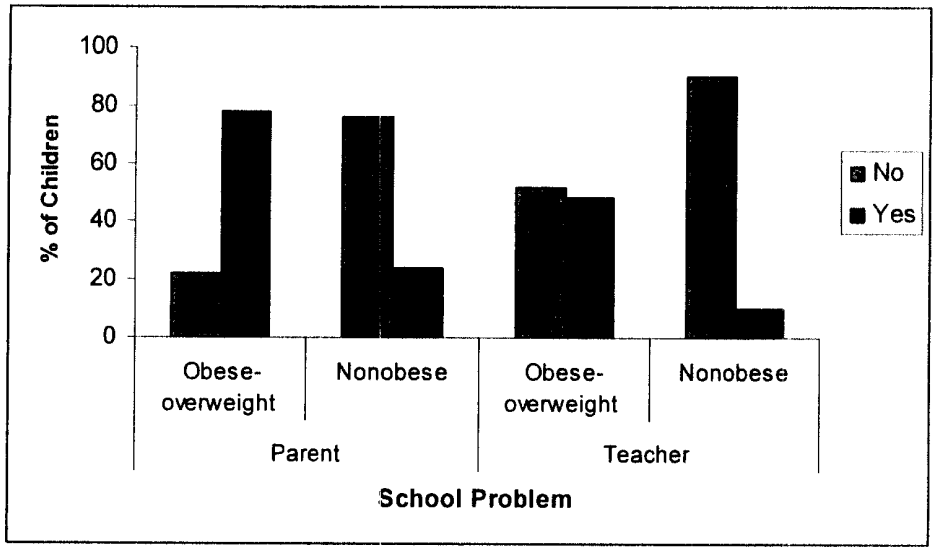

Fig. (9): Psychosocial evaluation of obese-overweight and non obese children regarding school problems using PSC presented by parents & teachers

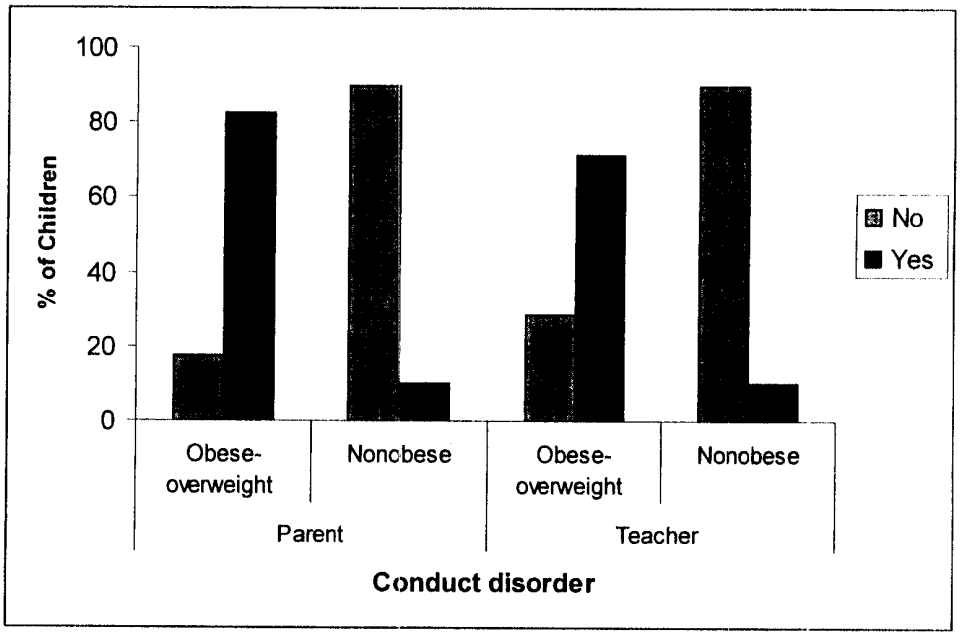

Fig. (10): Psychosocial evaluation of obese-overweight and non obese children regarding conduct disorder using PSC presented by parents & teachers

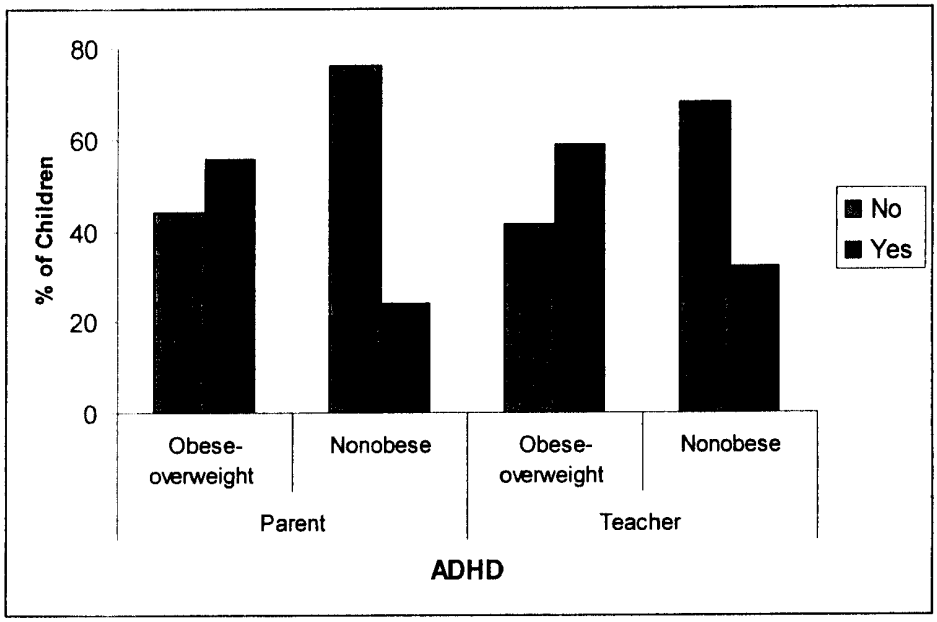

Fig. (11): Psychosocial evaluation of obese-overweight and non obese children regarding ADHD using PSC presented by parents & teachers

Table (12), Fig. (9, 10 and 11) shows comparison between the two groups by using Pediatric Symptom Checklist (PSC) presented by parents and teachers; 77.8%, of obese-overweight children were having school problems as reported by parents i.e. (performance and learning) versus 24% of non obese and there is significant difference ($\chi 2$ = 40.99; P=0.000). In evaluating conduct disorder using parents` Pediatric Symptom Checklist (PSCL) 82.5% of obese-overweight children were having conduct disorder versus 10% of nonobese and the difference is significant ($\chi^2$= 93.6; P = 0.000). In teachers` PSC 71.15% of obese-overweight children were having conduct disorder versus 10% of non obese and the difference is significant ($\chi 2$= 68.5; P= 0.000). Evaluating symptoms of ADHD by using parent and teacher Pediatric Symptom Checklist (PSC); in parents` PSC 55.7% of obese-overweight children reported symptoms of ADHD versus 24% of non obese and there was significant difference ( $\chi 2$ = 13.74; P= 0.000). In teachers` PSC ;58.6% of obese-overweight children reported symptoms of ADHD versus 32% of non obese and there is significant difference ($\chi 2$ = 9.5; P=0.003).

Table (13): Psychosocial Evaluation of obese-overweight and nonobese children regarding Depression and Anxiety by using Pediatric Symptom Checklist presented by parents & teachers.

PSCL	Obese + overweight (104)	(%)	Nonobese (50)	(%)	χ^2	P	Odd ratio	95% CI
▪ **Depression**								
- Parent								
No	28	26.92	39	78.00	35.84	**0.000**	0.104	0.5 - 0.23
Yes	76	73.08	11	22.00				
- Teacher								
No	24	23.08	44	88.00	57.7	**0.000**	0.04	0.02 - 0.11
Yes	80	76.92	6	12.00				
▪ **Anxiety**								
- Parent								
No	41	39.42	49	98.00	47.7	**0.000**	0.13	0.002 - 0.100
Yes	63	60.58	1	2.00				
- Teacher								
No	47	45.19	48	96.00	36.9	**0.000**	0.03	0.008 - 0.15
Yes	57	54.81	2	4.00				

χ^2 = Chi squared.P=Pediatric Symptom Checklist C.I.= confidence interval P = Significant level ≤ 0.

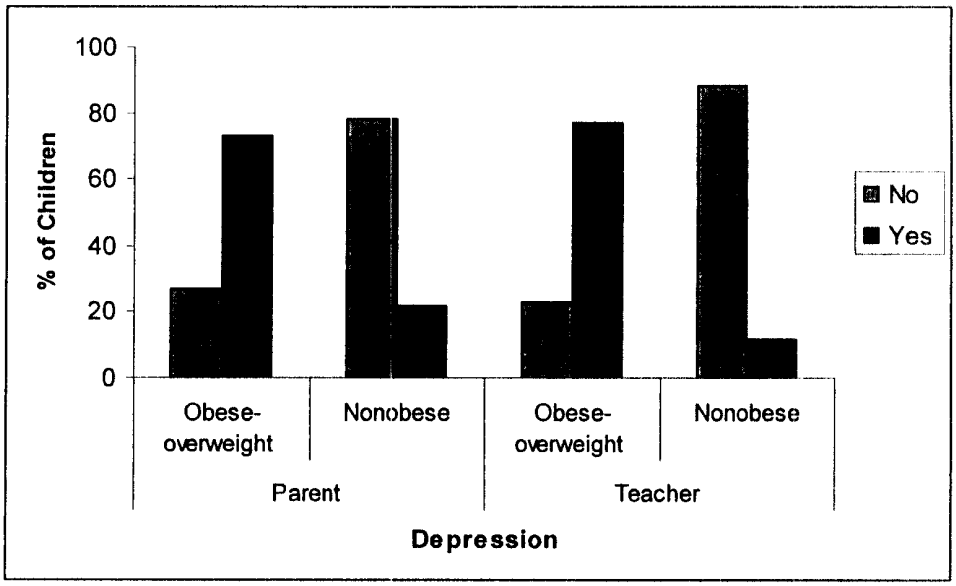

Fig. (12): Psychosocial Evaluation of obese-overweight and nonobese children regarding Depression by using PSC presented by parents & teachers

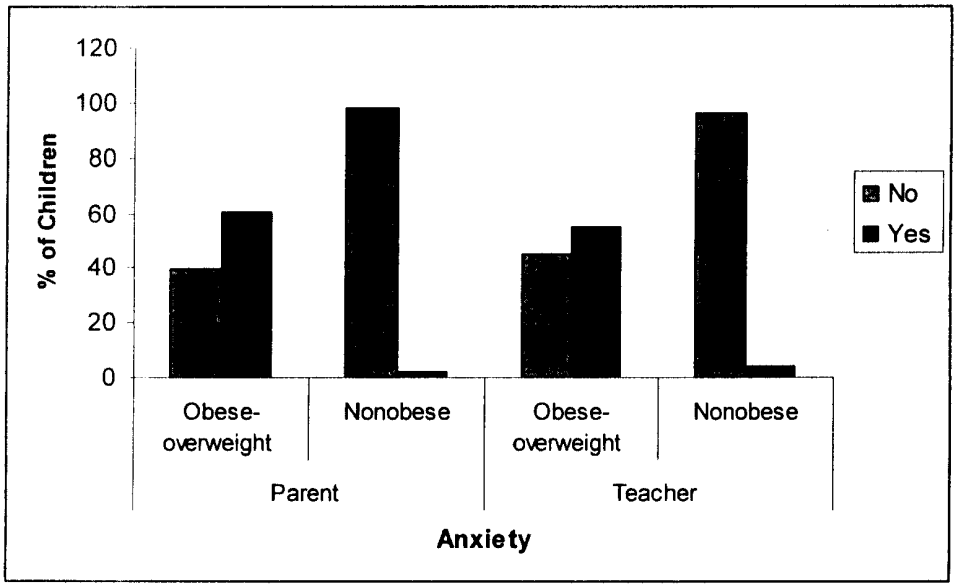

Fig. (13): Psychosocial Evaluation of obese-overweight and nonobese children regarding Anxiety by using PSC presented by parents & teachers

Table (13), Fig. (12 and 13) show comparison between depression and anxiety evaluation by using PSCL; in parents` PSCL 73.08% of obese-overweight children versus 22% of non obese children and there was significant difference ($\chi 2$ = 35.84; P = 0.000). In teachers` PSCL 76.9% of obese-overweight children show symptoms of depression versus 12% of non children and there was significant difference between the two groups ($\chi 2$= 57.7; P = 0.000). As regard anxiety symptoms in parent PSCL 60.5% of obese-overweight children reported anxiety symptoms versus 2% of non obese and the different was significant ($\chi 2$= 47.7; P = 0.000). In teacher PSCL 54.81% of obese-overweight children reported anxiety symptoms versus 4% of non obese and the different was significant ($\chi 2$ = 36.9; P=0.000).

Table (14): Comparison between obese, over weight and non obese children as regard academic achievement scores.

	Obese N=54	Overweight N=50	Nonobese N=50	F	P
Arabic Language					
▪ **Mid. Year**					
Mean ± SD	71.5 ± 14.6	68.1 ± 14.7	73.9 ± 14.9		
SE	1.9	2.1	2.1	1.9	0.1
Range	50 – 98	16 – 91	0 – 96		
▪ **Final exam**					
Mean ± SD	72 ± 14.7	68.5 ± 15.7	76 ± 14.8		
SE	1.9	2.2	2.1	3.1	**0.00**
Range	49 – 98	40 – 98	0 - 98		
Arithmetic					
▪ **Mid. Year**					
Mean ± SD	70.6 ± 14.9	71.3 ± 15.2	76.8 ± 15.1		
SE	2	2.1	2.1	2.6	0.1
Range	40 - 98	44 – 96	0 - 92		
▪ **Final exam**					
Mean ± SD	70.4 ± 14.5	70.6 ± 17.2	79.7 ± 15.2		
SE	1.9	2.4	2.1	5.8	**0.00**
Range	48 - 98	42 – 96	0 - 96		

Significant level.. $P \leq 0.05$.

F = ANOVA : One way analysis of variants.

P = Level of significance.

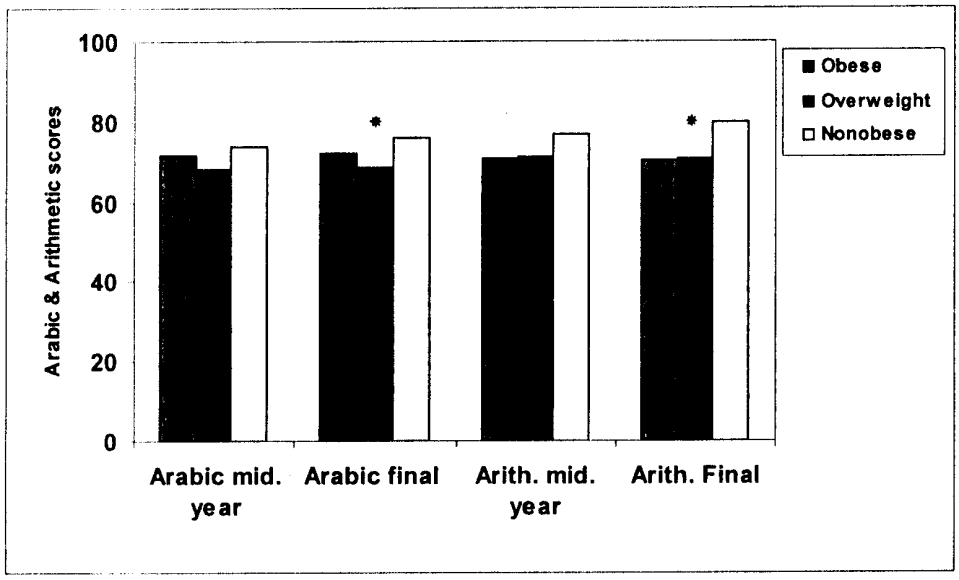

Fig. (14): Comparison between obese, over weight and non obese children as regard academic achievement scores.

* There is high significant difference between the three groups as regard their final exams scores; for Arabic (F = 3.1; P = 0.00); for Arithmetic (F = 5.8; P = 0.00)

Table (14), Fig. (14) show comparison between obese overweight and non obese children as regard academic achievement in Arabic language and Arithmetic. There is no significant difference between the three groups as regard mid year exams (F for Arabic language = 1.9; P = 0.1) and for Arithmetic (F = 2.6; P = 0.1). There is high significant difference between the three groups as regard their final exams scores; for Arabic (F = 3.1; P = 0.00); for Arithmetic (F = 5.8; P = 0.00).

Table (15): Relation between childhood obesity-overweight and health risk behavior as regard Body Image, plans to lose weight and physical activity

Test	N	Obese - overweight (104) (%)		Non obese (50) (%)		χ^2	P	OR	95% CI interval
▪ Body image									
- Normal	63	14	13.46	49	98.00	99.830	0.000	**0.003**	0.000 - 0.25
- Obese/ Overweight	91	90	86.54	1	2.00				
▪ Plan to do									
- No plan to lose weigh	64	15	14.42	49	98.00	97.110	0.000	**0.003**	0.000 - 0.3
- Plan for to lose weight	90	89	85.56	1	2.00				
▪ Physical activity in the past 30 days									
- No	147	98	94.23	49	98.00	9.110	0.430	3.000	0.35 - 25.62
- Yes	7	6	5.77	1	2.00				

χ^2 = Chi squared. OR= odd ratio. C.I.= confidence interval.
P = Significant level ≤ 0.05.

Table (15) shows the effects of body weight on health risk behaviour as regard Body Image and self perception. 86.54% of obese-overweight children perceived themselves as obese-overweight while only 13.4% perceived themselves as non obese. The difference between 2 groups is statistically significant (χ^2 = 99.8; P = 0.000). As regard plan to lose weight; 85.58% of obese-overweight children were planning to lose weight while 14.42% were not. The difference between the two groups is statistically significant (χ^2 = 97.11; P = 0.000). Regarding physical activity of children in the past thirty days; 94.2% of obese-overweight and 98% of non obese children reported to have no physical activity; On

the other hand 5.7% of obese-overweight and 2% of non obese children had physical activity in the past thirty days.

Table (16): Relation between childhood obesity-overweight on health risk behaviour as regard health education at school.

Test	N	Obese + overweight (104)	(%)	Nonobese (50)	(%)	χ^2	P	OR	95% CI
▪ Heath Education to gain healthy weight during this year									
- No	150	100	96.15	45	90.00	1.970	0.305	1.500	1.3 – 1.7
- Yes	4	4	3.85	5	10.00				
▪ Heath Education to Lose extra weight during this year									
- No	151	102	98.08	49	98.08	0.001	1.000	1.040	0.92 - 11.76
- Yes	3	2	1.92	1	2.00				
▪ Educational importance of fruits and vegetables during this year									
- No	124	81	77.88	43	86.00	1.420	0.300	1.74	0.7 – 4.4
- Yes	30	23	22.12	7	14.00				
▪ Educational importance of milk products during this year									
- No	106	70	67.31	36	72.00	0.35	0.58	1.25	06 - 2.62
- Yes	48	34	32.69	14	28.00				

χ^2 = Chi squared OR= odd ratio C.I.= confidence interval
P = Significant level ≤ 0.05

Table (16) shows evaluation of educational health programs in school during this year as reported by children, 96% of obese–overweight

and 90% of non obese reported the absence of educational health programs teaching ways of how to gain healthy weight; 98% of obese-overweight reported receiving no health educational health programs for how to lose weight during this school year.

Table (17): Relation between childhood obesity-overweight and health risk behaviour as regard dietary behaviours.

Test	N	Obese - overweight (104)	(%)	Nonobese (50)	(%)	χ^2	P	OR	95% CI interval
▪ Hunger due to no enough of food in their homes during the past 30 days									
- Rarely	29	12	11.54	17	34.00	11.145	**0.002**	0.253	0.11 – 0.59
-Usually	125	92	88.46	33	66.00				
▪ Breakfast meal during the past 30 days									
- Rarely	56	43	41.35	13	26.00	3.440	0.750	2.006	0.955 – 4.217
- Usually	98	61	58.65	37	74.00				
▪ Reason for no breakfast									
- No reason	87	57	54.81	30	60.00	0.400	0.604	0.81	0.41 - 1.604
- Having a reason	67	47	45.19	20	40.00				
▪ Number of eating fruits per day during the past 30 days									
- Rarely	146	97	93.27	49	98.00	1.534	0.440	0.30	0.34 – 2.4
- Usually	8	7	6.73	1	2.00				
▪ Number of eating vegetables/ day during last 30 days									
- Rarely	125	84	80.77	41	82.00	0.033	1.000	0.92	0.4 – 2.2
- Usually	29	20	19.23	9	18.00				

Test	N	Obese - overweight (104) (%)		Nonobese (50) (%)		χ^2	P	OR	95% CI interval
▪ Milk products/ day during the past 3o days									
- Rarely	44	29	27.88	15	30.00	0.740	0.850	0.902	0.43 – 1.9
- Usually	110	75	72.12	35	70.00				
▪ Drinking carbonated drinks/day during the past 30 days									
- Rarely	136	91	87.50	45	90.00	0.204	0.800	0.78	0.3 - 2.32
- Usually	18	13	12.50	5	10.00				
▪ Fast food during the past 7 days									
- Rarely	85	55	52.88	30	60.00	0.700	0.500	0.75	0.38 – 1.48
- Usually	69	49	47.12	20	40.00				

χ^2 = Chi squared OR= odd ratio C.I.= confidence interval
P = Significant level ≤ 0.05

Table (17) shows dietary behaviour of children during the past thirty days.88.4% of obese-overweight children and 66% of non obese children reported hunger feeling most of the time or always because there was no enough food at their homes .There is significant difference between the two groups ($\chi^2 = 11.14$; $P \leq 0.002$).41.6% of the obese-overweight, 26% of non obese children reported to be breakfast skippers. 54.8% of obese-overweight children, 60% of non obese children of breakfast skippers were having no reason for skipping this meal. 93% of obese-overweight and 98% of non obese children did not eat fruits such as apples, bananas and citrus or ate it less than one time per day during the past thirty days. Only 6.7%of obese-overweight and 2% of non obese children usually ate fruits one or more times per day during the past thirty days. 80% of obese-overweight and 82%of non obese did not eat vegetables such as

cucmber.spinach and eggplant or ate it less than one time per day during the past thirty days. Only 19.23%of obese-overweight and 18% of non obese children usually ate vegetables one or more times per day during the past thirty days. 72.12% of obese-overweight and70% of non obese children usually drank milk or ate milk products such as yogurt, cream cheese and cheddar cheese products one or more times per day during the past thirty days. 12.5%of obese-overweight children, 10%of non obese children usually drank carbonated drinks such as Coke, Pepsi, 7-up and Fanta one or more times per day. Regarding fast food consumption such as McDonalds, Kentucky or Burger King by the children during the past seven days; 47% of obese-overweight and 40% of non obese children usually ate fast food one or more days in the past seven days.

Table (18): Relation between childhood obesity-overweight on health risk behavior as regard teasing, physical abuse and serious injuries.

Test	N	Obese + overweight (104)	(%)	Nonobese (50)	(%)	χ^2	P	OR	95% CI interval
▪ Teased or not by adults in the past 12 months									
- Less than or 5 times.	82	40	38.46	8	16	28.130	0.000	8.40	3.6 – 19.7
- More than 5 times.	72	64	61.54	42	84				
▪ Physical abuse in past 12 months by an adult family member									
- Less than or 5 times	78	51	49.04	27	54.00	0.330	0.610	0.82	0.42 - 1.61
- More than 5 times	76	53	50.96	23	46.00				
▪ Serious injuries in past 12 months year									
- No injuries	134	87	83.65	47	94.00	3.200	0.122	0.33	0.1 - 1.2
- Injury for one or more times	20	17	16.35	3	6.00				
▪ Teased or not by peers in the past 30 days									
- Not teased by peers	57	16	15.38	41	82.00	64.300	0.000	0.04	0.2 - 0.098
- Teased by peers	97	88	84.62	9	18.00				

χ^2 = Chi squared OR= odd ratio C.I.= confidence interval
P = Significant level ≤ 0.05

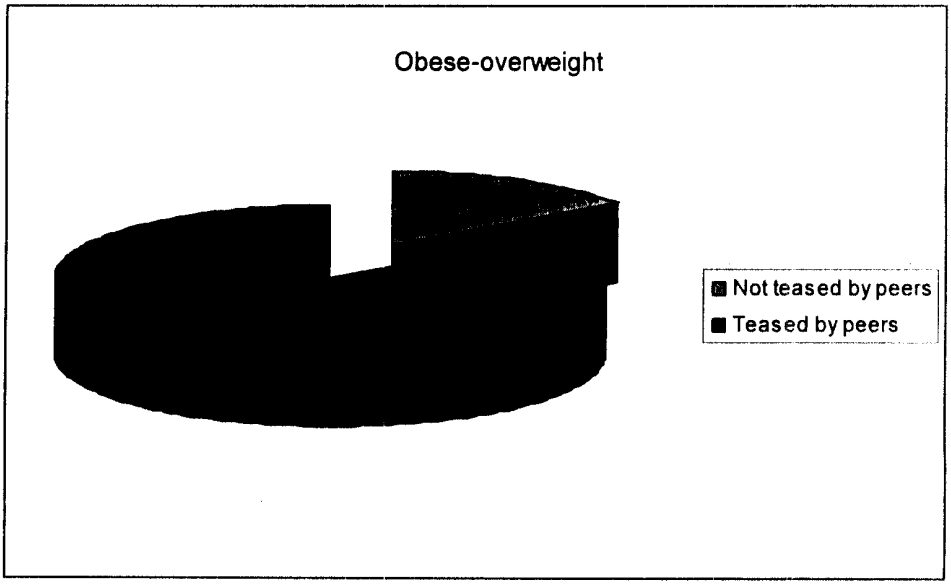

Fig. (15): Relation between childhood obesity-overweight on health risk behavior as regard teasing

Table (18) , Fig. (15) Show health risk behaviour of children as regard teasing, physical abuse and serious injuries in the past year. 61.54% of obese-overweight and 16% of non obese children have been teased by adults in the past year more for more than five times.,38.4%of obese-overweight and 84% of non obese children have been teased for five times or less in the past year. There is significant difference between the two groups ($\chi^2 = 28.1$; P = 0.000).50.96%of obese-overweight, 46%of non obese children were physically abused by an adult family member for more than five times in the past year. Regarding various injuries; 16.35% of obese-overweight and 6%of non obese children were seriously injured one or more times in the past year. Regarding teasing by peers in the past thirty days; 84.62% of obese-overweight and 18% of non obese children have been teased by peers and the difference between the two groups is statistically significant ($\chi^2 = 64.3$; P = 0.000).

Table (19): Relation between childhood obesity and health risk behaviour as regard physical activity pattern.

Test	N	Obese-overweight (104) (%)		Nonobese (50) (%)		χ^2	P	Odd ratio	95% CI
▪ Watching TV& Computer/day									
- l-2 hours per day	56	38	36.54	18	36.00				
- 3 hours or more per day	98	66	63.46	32	64.00	0.004	1.000	1.024	0.51 - 2.15
▪ Riding bicycle or walking in the past 7 days									
- Zero days	119	83	79.81	36	72.00				
- One or more days	35	21	20.19	14	28.00	1.200	0.310	1.54	0.704 – 3.36
▪ Going to & from school in the past 7 days									
- Walking	66	36	34.62	30	60.00	8.900	0.003	0.35	0.18 - 0.71
- Vehicle	88	68	65.38	20	40.00				
▪ Physical activity for a total of at least 60 minutes per day during the past 7 days									
- Zero days	95	69	66.35	26	52.00				
- One or more days	59	35	33.65	24	48.00	2.940	0.111	1.82	0.91 - 3.62

χ^2 = Chi squared OR= odd ratio C.I.= confidence interval
P = Significant level ≤ 0.05

Table (19) shows health risk behaviour of children as regard their physical pattern; 63.46% of obese-overweight and 64%of non obese children spent three hours or more hours per day doing sitting activities such as playing computer games, Atari, playing cards, playing chess, talking with friends or watching television. As regard riding bicycle or walking in the past seven days; 20.19% of obese-overweight and 28% of

non obese children reported doing this for one day or more days during the past seven days. Regarding the method of transportation from and to school in the past seven days; 65.38% of obese-overweight and 40%of non obese children used a vehicle. On the other hand 34.62%of obese-overweight and 60% of non obese children walked from and to school in the past seven days and the difference between the two groups is significant (χ^2 = 8.9; P=0.003).As regard daily physical activity of children; 33.65 % of obese-overweight and 48% of non obese children were physically active for a total of at least 60 minutes per day for one or more days during the past seven days.

Table (20): Mean ± SD of Energy, Macronutrients and Micronutrients among obese, overweight and nonobese children.

N	54 Obese	50 Overweight	50 Nonobese	P
Energy (kcalories)	1763±521	1580 ± 422	1495± 506	**0.000**
Macronutrients:				
Proteins (gm)	39.3±11.9	41.2± 16.1	40.9± 17.2	**0.001**
Fat(gm)	48.1±10.3	43.9 ±12.2	38.9± 13.1	**0.01**
CHO (gm)	340.1±58.6	265.3 ± 48.9	242,6± 83.2	**0.01**
Micronutrients:				
Iron (mg)	7.5 ± 4.3	7.1± 2.3	8.9± 4.4	**0.05**
Zinc (mg)	5.3 ± 2.6	6.4± 2.7	7.8± 2.6	**0.01**
Copper (mg)	1.04 ±1.2	1.19± 1.3	1.6± 1.4	N.S.
Calcium (mg)	241.6±107.6	302.6±129.6	382.6 ± 170	**0.001**
Vitamins:				
A µg (RE)	397.5± 68.2	408.7± 58.2	630.9±62.4	**0.001**
C (mg)	39.1± 33.2	45.3 ±22.3	46.8 ± 31.9	**0.005**
Thiamine (mg)	0.61± 0.29	0.69± 0.36	0. 73± 0.37	N.S
Riboflavine (mg)	0.60 ± 0.33	0.73± 0.38	0.79 ± 0.43	**0.05**

RE =Retinol equivalents :1RE=1 1ug retinol or 6 µg β-carotene NS=Non sgnifcance.
CHO =Carbohydrates P= Significant level ≤ 0.05

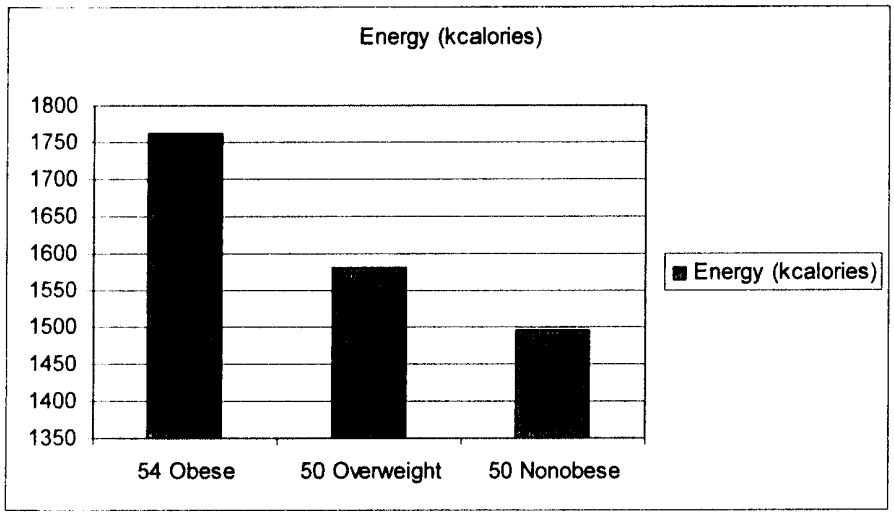

Fig. (16): Energy consumption among obese, overweight and nonobese children

Table (20), Fig. (16) show Mean Nutrient Daily Intake of energy, total proteins, and vitamins (A. C, B) among obese, overweight and nonobese children. Overweight and Obese children consumed more calories, fat and carbohydrates than their peers; (P =0.000 for calories; P= 0.01 for fat and P = 0.01 for carbohydrates).

Iron, .Zinc and Calcium consumption was also lower in obese children than their nonobese peers (P =0.05. for iron, P =0.01 for zinc and P =0.01 for calcium).The same was notice regarding Vitamins A, C and B.

Table (21): Percentage Of children With Daily Dietary Intakes < 80% Recommended Dietary Allowances (RDA).

	Obese	Overweight	Nonobese	χ^2	P
Energy	23.2	24.9	43.6	10.12	**0.01**
Macronutrients:					
Proteins	23.7	18.9	15.6	13.8	**0.01**
Micronutrients:					
Iron	56.8	59.4	44.9	8.2	**0.05**
Zinc	81.9	79.3	85.2	6.1	**0.05**
Copper	51.4	49.3	44.9	7.1	**0.05**
Vitamins:					
A	79.9	85.3	82.2	3.2	N.S
C	62.2	48.8	30.2	14.8	**0.001**

Values are %
χ^2 = Chi squared P = Significant level ≤ 0.05

Table (21) shows the percentage of children who consumed <80 % RDA as regard macronutrients & micronutrients: 23.2 %of obese,24.9of overweight and 43.6% of nonobese children consumed <80% of RDA for Energy (Kcalories) intake with a statistically different level of significance(χ^2=10.12 ; P= 0.001).As regard micronutrients; 44.9 % of nonobese ,59.4 % overweight and 56.8% obese children consumed <80% of RDA for iron intake and the difference between the 3 groups is significant (χ^2=8.1;P =0.05) ; 81.2% obese,79.3% overweight children. & 85.2% nonobese children consumed <80% of RDA for zinc intake and the level of significance was different between the 3 groups (χ^2=6.1; P=0.05)). Also vitamins A&C and copper showed high percentage of low intake among children with statistically different level of significance among the three groups regarding vitamin C (P=0.01) & copper (P=0.05).

DISCUSSION

Obesity has reached epidemic proportions globally, with more than 1 billion adults overweight - at least 300 million of them clinically obese and is a major contributor to the global burden of chronic disease and disability. Often coexisting in developing countries with under-nutrition, obesity is a complex condition, with serious social and psychological dimensions, affecting virtually all ages and socioeconomic groups ***(SCN, 2004).***

This study aimed to investigate the relation between obesity and psychosocial adjustment in primary schools children aged from 9-11 years and the impact of this on their academic achievements.

In this study, obesity was assessed by body mass index. (BMI) Body Mass index is a ratio of the body weight in kilograms divided by the square of the height in meters. This study showed increase (BMI) in relation to obesity. Although the relationship between BMI and adiposity is not as tight in children as it is in adults it still appears to be a useful tool for identifying overweight and obese children.

Based on (BMI), our patients will be divided into two groups. A BMI over and or equal to 85% is defined as over weight and a BMI over and or equal to 95%is defined as obese according to ***WHO standards (2007).***

In this study there are increased waist, hip, thigh and mid-arm circumferences in relation to obesity. Waist and hip circumferences is now accepted as a reasonable guide to the level of intra-abdominal fat and has a clear association with the risk of metabolic disease in adults

according to ***Who, (2000***). Its meaning and use in children is less certain. However, ***Higgins et al., (2001)*** have indicated that waist circumference correlates well with the level of truncal fat and that this is also associated with markers of cardiovascular risk. Waist & Hip circumferences also appear to track through childhood and adolescence into adulthood which agreed with ***Goran et al., (1998).***

Waist circumference is cheap, easy to assess and has a relatively low intra and inter-observer variability. However, ***Hassan et al., (2005)*** reported that the work linking waist circumference to ill health in children is still very limited at present and there have been no cut-off points defined. In addition, waist circumference is only a measure of abdominal rather than total adiposity and so is not useful on its own as an indicator of obesity.

Meiz et al,(2002); ***Keiss et al., (2004)*** found that in adults the most commonly used circumferences for assessing body fat distribution have been waist, hip and thigh. These sites have been measured also in children, but the significance of these measurements and the ratios derived from them in relation to adiposity is not clear in childhood as reported by ***Ashwell and Heish, (2005***). In addition, no growth references are available.

Due to the fact of unavailability of cut-off points of waist and hip circumferences ; in this study; Weight for Age (z-scores), Waist /Hip ratio and Waist/Height ratio were also used for comparing the three groups;obese,overweight and nonobese recording statistical difference between the three groups.

Regarding these measures Weight for Age z-score was higher in obese (2.7) and overweight (2.1) groups than their non obese peers

(0.29).;Waist/Hip ratio was (0.92) for obese, (0.85) for overweight and (0.79) for nonobese children. Waist / height ratio was also higher in obese, overweight than nonobese children. This agrees with the findings of ***Ashwell and Heish,(2005***) and of ***Hassan et al., (2005).***On the other hand; ***Ellis,(2001); Pietrobelli and Tato et al.,(2005***) and ***Sweeting (2007)*** suggested that waist/hip ratio is a poorer measure of body fat distribution in children and recommended infrequent using it.

In addition, in this study mid-upper arm circumference has been used to monitor fatness in primary-school children considering the findings of the study of ***Power et al., (1997)*** who demonstrated that it might also be a useful measure for assessing fatness during later childhood.

In this study; **Sociodemographic data i. e.** both parents" occupation & education level, family members and child order was recorded. There was no significant relation between these factors and obesity in our children and this agreed with the studies of ***Yiper, et al, (1994); Power et al., (2003)***. The insignificant relation might be because of the small number of our participating children and this made the selection bias very likely. This might be also to the similar social background of the three groups living in the same area and having almost the same socioeconomic level.

Although several studies have focused on the association between sociodemographic and obesity, ***Lamerz et al .,(2005)***was the first study to not only demonstrate that the association already prevails in early childhood but to also illustrate which sociodemographic factors in particular determine this inverse relationship.

Most of the studies have defined social background by one or two variables as described in the literature, such as gender, parental BMI, education, and employment, living space per person and single parenthood.

Lamerz et al., (2005) collected a broad range of variables defining social background; however, parental education was the variable most strongly related (in an inverse manner) with childhood obesity. In addition, a social strata index, defining the summary measure of sociodemographic variables into a social status scaling system, revealed a strong inverse dose–response association between social class and childhood obesity which was in contrast to findings of our study.

A limitation of study ***Lamerz et al., (2005)*** is that children's obesity was only defined by BMI percentile. One might argue that there is a considerable variability in findings depending on how or by which index overweight and obesity are defined.

Peng et al.,(1999) as well as ***Lobstein and Frelut, (2003)*** could demonstrate that prevalence of childhood overweight and obesity was dependent on method and assessment criteria, and changed considerably when measuring other variables than BMI (for example, percentage of body fat or skin fold thickness. However, BMI and BMI percentiles are widely respected criteria for defining obesity in children and adults as reported by ***Kuczmarski, et al., (2002)*** and even allow comparisons between different populations.

Another limitation is that ***Lamerz et al., (2005***) did not use a longitudinal approach in order to study the association between children's obesity and social background, taking into account secular trends of increasing obesity as indicated by ***Herpertz.et al., (2003)***.

Dietz et al., (1999) reported that the social structure of the societies has changed remarkably over the last years with an on average increase of household-income and single-parent households, as well as a rise in the number of families who are dependent upon social welfare and thus leading to the decline of the inverse relation between increase BMI and social background .Nevertheless, ***Rasmussen et al., (1999)*** have demonstrated that the inverse relationship between social background and subsequent obesity has been constant over the years in spite of societal changes. Also in ***1999; Parsons et al.;*** reported that Obesity may lead to a social decline, and/or a low social class may promote the development of obesity which was in contrast to this study.

Lamerz et al., (2005) found that the most important single associated factor for a child being in the 90th percentile or higher of Body Mass Index in the screening population was maternal education, they proved that obesity was particularly prevalent in children whose mothers had less than nine years of education. On the other hand of all the variables listed .On the other hand ***Langnaseet al., (2002)*** found that paternal education and type of maternal occupation were the most influential significant factor for childhood obesity. In this study, there was no relation between maternal or paternal occupation and education and obesity in children.

The fact that maternal education did not turn out to be a significant factor of children's obesity in our case–control study may be due to smaller sample size and that the children had almost the same social background.

Anderson et al., (2003) explained their finding that maternal education in their screened population had a greater influence on

childhood obesity than paternal education by the fact that young children usually spend more time with their mothers than their fathers and due to the responsibility of mothers for diet intake and upbringing of their children than fathers.

In this study, there was a strong relation between obesity in children and cognition as measured by cognitive abilities and by Raven's Colored Progressive Matrices Test and that was in contrast to the results of ***Halkjaer et al., (2003)*** who found no relation between increased Body Mass Index (BMI) and general intelligence. On the other hand they found an inverse relation between the increase in BMI and academic achievement in children which agrees with our findings regarding lower academic achievements of obese and overweight children.

Perhaps with education and academic achievements acting as a mediator or indicator of cognitive ability. In agreement with us; ***Van et al., (2000)*** have not found these inverse associations between education, intelligence and subsequent weight or BMI changes, although cross-sectional, inverse associations between educational level and Body Mass Index at baseline were found in their study which agrees with the results of this study .It has been proposed that this could be due to an effect of earlier weight gain on educational attainment.

However; in contrast to this study ***Halkjaer et al., (2003)*** found that education, but not intelligence, was inversely associated with risk of remaining obese. They investigated whether intelligence test score and educational level assessed in patients was associated with subsequent BMI changes and the risk of development and persistence of obesity and found that both intelligence test score and educational level had an

inverse effect on the subsequent BMI changes and risk of developing obesity.

On the other hand, ***Gortmaker et al., (1994)*** has found that obesity in childhood and adolescence influences later adult social class status affecting their intelligence and educational attainment Thus, there may well be bi-directional interactions between cognitive ability or education and body weight.

Several reasons for these findings may be considered as mentioned by ***Jeffrey et al., (1997)*** who related that to the high ability in intelligence testing and educational attainment due to stronger expectations of a slim physical appearance and, therefore, a higher motivation for weight regulation or loss. Through their high cognitive skills, the well-educated might also have a better ability to receive and implement general-health guidelines into their everyday lifestyle, compared with the less-educated groups, who might not feel the same pressure to be slim. In a recent British study ;***Wardle et al., (2001***) suggested that part of the social gradient in obesity is due to a higher frequency of weight monitoring, a lower threshold for defining themselves as overweight, a higher deliberate effort at weight control utilized in more restricted dietary practices, and a higher level of physical activity in the higher social classes

In the present study; there is high significant difference between the three groups as regard their final exams scores; for Arabic language for Arithmetic .Nonobese children reported higher scores in final exams regarding final Arabic Language and Arithmetic subjects versus obese and overweight children which denotes higher school academic achievements of nonobese children agreeing with findings of ***Halkjaer et al.,(2003)*** and ***Van et al., (2000***).

Tesadole et al.,(2000) and ***Halkjaer et al.,(2003)*** demonstrated another though speculative, possibility is that the biological pathways leading to weight gain and eventually obesity may also imply disturbances of the brain function at higher levels than the hypothalamic regulation of energy balance.

The main objective of our study was to evaluate the frequency of psychosocial disorders in our sample of population. There are strong inverse relations between increase in Body Mass Index and psychosocial disorders in our sample of primary school children, regarding depression, low self esteem, attention deficit hyperactivity disorders and anxiety.

There was strong relation between the self esteem of children and their Body Mass Index. Studies on self-esteem in obese children reported inconsistent results. In agreement with the findings of this study; ***French et al., (1995); Manus and Killeen, (1995); Pesa et al.,(2000); Stradmeijer et al., (2000)*** and ***Strauss, (2000***) indicated that obese children and adolescents have moderately lower self esteem than nonobese peers.

However; Gortmaker, ***(1993); Rumpel and Harris, (1994)*** and ***Renman et al., (1999)*** revealed no differences in self-esteem between population-based groups of obese children and adolescents and nonobese controls in their studies.

Furthermore ***French et al., (1995)*** and ***Pesa et al.,(2000)*** reported that self-esteem is not significantly lower in obese populations once body image is controlled for.

The most consistently replicated finding by ***Rumpel and Harris, (1994);French et al., (1995); Manus and Killeen, (1995); Renman et***

al., (1999);Buddeburg-Fisher et al., (1999); Pesa et al., (2000) and *Israel and Ivanova,(2002)* was that obese children and adolescents have a more negative body image than their peers. This is consistent with the present study in which there is significant difference between obese, overweight and non obese children regarding their self esteem and body image which were inversely related to the increase of BMI.

Ebbeling et al., (2002) conducted a study that proved that overweight children as young as age five years can develop low self-esteem and negative body image. Another study completed by *Grilo et al., (1994)* demonstrated that "the greater the frequency of being teased about weight and shape while growing up, the more negative one's appearance is regarded, and the greater the degree of body dissatisfaction in adulthood".

Self-esteem in obese children varies with gender and age and that was posited by *Mounir et al., (2004:a)* who found in their study that females are at greater risk for self-esteem problems because body image is an important component of their self-esteem. Also; the studies of *Stradmeijer et al., (2000)* and Israel *and Ivanova,(2002)* reported that some obese females develop lower self-esteem as they go through puberty into adolescence. .In addition; *Israel and Ivanova,(2002)* reported that severely obese females express lower self-esteem than moderately obese females, which suggests that self-esteem relates to the severity of obesity.

Obesity stigmatizes young children even before adolescence, placing them outside the social norm which was reported in the study of *Zametkin et al.(2004*) who found that when shown drawings of children of different sizes, children rank obese classmates as the least desirable

playmates and thus increasing the severity of negative self esteem of these children.

Pesa et al.,(2000) reported in their study in female adolescents and children that dieting is associated with lower self-esteem. Also ***Mounir et al., (2004:a)*** posited that the frustrating dieting cycle of losing and regaining weight may itself contribute to lower self-esteem.

In addition, ***Zametkin et al., (2004)*** correlated dieting with perceived, not actual, body weight. Therefore, although some studies show that an adolescent female's severity of obesity is correlative with lower self-esteem, dieting behavior, regardless of the severity of obesity, is an indicator of lower self-esteem

Rumpel and Harris, (1994) reported a clear relationship between lower self-esteem and obesity children seeking clinical treatment than in children in the general population. However, no data are available to support this relationship in community samples because subjects with obesity as severe as that seen in clinically referred patients are rare.

On the other hand ***Zametkin et al., (2004)*** found that associations between the severity of obesity and low self-esteem may be more difficult to assess in a population-based study. They hypothesized that clinically referred children represent a subgroup of obesity associated with especially low self-esteem. In addition, parents who seek clinical treatment for their child's obesity may exhibit more concern, an indicator for negative self-esteem in children.

In the present study; 97% of obese-over weight children perceived themselves as obese and overweight reporting negative body image and low self esteem. On the other hand only 14%of nonobese children

reported negative body image and low self esteem.

Manus and Killeen, (1995) and ***Israel and Ivanova, (2002)*** reported that some obese children and adolescents with normal self-esteem use compensatory methods to protect themselves from lower self-esteem. ***Manus and Killeen, (1995)*** suggested that obese children use discounting (diminishing the importance of domains in which they are less competent) as a coping mechanism. For instance, such children might view their physical appearance as unimportant and place more importance on other domains in which they excel. They also use distortion (enhancing their perception of competence) by underestimating their actual body size or weight. Similarly, ***Israel and Ivanova (2002)*** suggested that both obese girls and boys place decreased emphasis on their physical self-esteem and increased emphasis on other self-esteem dimensions to maintain general self-esteem.

Parental concern for the child's well-being is an important factor influencing his/her self-esteem as proved in a study conducted by ***Davison and Birch,(2001)*** who found that for 9-year-old obese girls, the mothers' restriction of food and the fathers' opinion of the child's obesity were significantly associated with the child's negative self-perception.

In Addition ***Stradmeijer et al., (2000)*** as well as ***Zametkin et al., (2004***) found that parental concern in obese 10-to 16-year-olds more significantly correlated with self-esteem problems than did Body Mass Index. Parental acceptance or lack of concern may be a protective factor for self-esteem.

Further researches are needed on why some obese children are more susceptible than others to low self-esteem.

The results of this study found that obese-overweight children

showed higher scores of psychosocial disorders than their non obese peers. Regarding depression; this study reported higher scores of depressive symptoms among obese-overweight children versus their nonobese peers. This agrees with the results of ***Sheslow et al., (1993)*** ***Wallace et al., (1993)***; ***Csabi et al., (2000)*** & ***Mounir et al., (2004 :b)*** who suggested a higher rate of depression among obese children than among children of normal weight.

The most commonly used screening device for pediatric depression is the Children's Depression Inventory (CDI), a 27-item, symptom-oriented scale conducted by ***Kovacs, (1985)*** and has been effectively used in several studies involving obese children.

However, ***Zametkin et al., (2004)*** reported one noteworthy disadvantage of the CDI is that it is exclusively a self-report measure.

Therefore, if a physician suspects depression, it may be useful to supplement the CDI with a parent-report measure such as the pediatric symptom Checklist as was conducted in our study.

In the present study; we used Arabic Child Inventory of Depression (ACDI) derived from ***Kovacs (1980)***, and ***Kazadin (1968),*** and constructed for Egyptian children by ***Abdel Khalek (1993),*** as a self report by the child and Pediatric Symptom Checklist as a report by patents and teachers for screening of depressive symptom among children.

This study reported higher depressive symptoms among obese-overweight children than their nonobese peers as reported by the child self report and both parents and teachers reports. Despite the common belief that overweight children are less happy than average weight peers, data on the relationship between obesity and depressive symptoms from a

population of Egyptian children was lacking.

Previous studies have suggested that gender differences in clinical depressive symptoms do not emerge until puberty; on the other hand in Northern California; ***Ericson et al., (2000)*** found a modest association between depressive symptoms and body mass index for girls but not for boys; girls' depressive symptoms were strongly associated with overweight concerns.

Ford et al.,(2001) found that among low and increased reported Body Mass Index ,significantly impaired physical functioning rather than mental functioning were noted.

In the same time on comparing effect of obesity and other chronic diseases on depression ***Varni et al., (2007)*** found that cancer and thalassemia have no effect on depressive symptoms where the patients showed no statistically changes compared to the obese control group regarding their mean depressive scores.

Barlow and Dietz,, (1998) and Zametkin et al., (2004) suggested that depressed children should not participate in a weight-control program unless they do so with concurrence of a mental health expert. If the child's depression remains untreated, the weight-control program may be futile or even harmful and to distinguish weather the depressive symptoms are a cause and/or effect to enable successful intervention and subsequent reduction of the risks of adult obesity.

In addition to depression, the present study reported other psychosocial disorders among obese-overweight versus their nonobese peers by using Pediatric Symptom Checklist (PSCL).

By using both parent and teachers reports; the study found that

obese-overweight children reported higher scores regarding anxiety, school problems, attention deficit disorders (ADHD) and conduct disorder versus their non obese peers.

This study found an inverse relation ship between increasing weight and presence of anxiety.

A French epidemiological data shown by ***Fombonneet al., (1994)*** and based on a community sample of school-aged children indicated a prevalence of mental disorders of 5%. By far; the most frequent disorders were anxiety disorders. Separation anxiety and social phobia appeared to be more frequent in these children and adolescents This observation converges with the classical portrayal of these children as being excessively dependent on their family environment, as displaying excessive attachment to parental figures associated with separation anxiety and fear of criticism, and as avoiding social contact, all of which confine them to familiar surroundings. Poor social competences of obese children and adolescents confirm this pattern, as poorer activities scores in obese adolescents than in obese children. It is nevertheless difficult to determine whether this relational pattern precedes or follows obesity, because of the social handicap imposed by the cultural of environment on these overweight children.

On the other hand ***Britz et al.,(2000)***; ***Stradmeijer et al.,(2000)*** suggested that there might be an overrepresentation of psychosocial disorders in patients seeking help for their obesity in a specialty clinic, compared with the broader population of obese children .This help seeking population may over select for anxiety disorders

The results of our study and other similar studies results cannot be generalized to all obese children. It would be worthwhile to replicate our study on a population of overweight children followed in private practice or who are not clinically-referred.

In this culture, obesity is a significant source of stress that may contribute to the development of psychosocial disorders and to the maintenance of obesity. But another hypothesis by ***Barlow and Dietz, (1998)*** may be that psychopathology (and family interactions between child and parent disorders), particularly anxiety, may influence the patient's initial level of motivation to seek professional help.

Vila et al., (2003) did not find any association between severity of obesity and anxiety, in agreement with ***Epstein et al.,(1996); Drucker et al., (1996)*** suggesting that "super-obese" youngsters may be less anxious and depressed, perhaps because they have been obese for along time or because they have become fatalistic regarding the large amount of weight they have to lose. "Super-obesity" could be related to lack of personal or familial attention to and anxiety about weight gain and that was contrary to the results of ***Favaro and Santonastaso, (1995)*** and to the results of our study which found an association between obesity and anxiety.

Vila et al., (2003) suggested that presence of anxiety in obese youngsters was highly correlated with parents' psychosocial disorders. They also reported that obese adolescents did not seem to have a higher risk than obese children. The limitation of this study was the association with parents' poor cooperation and lesser involvement in the problems of their overweight child. This raised the possibility that parents' judgment was contaminated by their own psychopathology.

Johnson et al., (2002) have shown in a community-based

prospective longitudinal study that childhood adversities as parental psychopathology or maladaptative parental behavior is associated with eating and weight problems during adolescence that persist into early adulthood.

In this study screening for attention deficit hyperactive disorders (ADHD) by Pediatric Symptom Checklist (PSCL) reported more prevalence of ADHD symptoms among obese-overweight children than nonobese and the difference was statistically significant. In this study both teachers and parents Pediatric Symptom Checklist reported correspondence in results suggesting higher scores of anxiety symptoms of obese-overweight children versus their nonobese peers.

Waring and Lapane, (2008) reported in a recent cross-sectional analysis of 62,887 children and adolescents aged 5 to 17 years; reported that children and adolescents with ADHD who do not currently take medications are at increased risk for being overweight than children and adolescents without ADHD.

Agranat et al., (2005) suggested that the impulsivity and poor behavioral regulation often found in youth with ADHD may lead to the development of eating patterns that put youth at increased risk for obesity. In addition, youth with ADHD, especially those who are not taking medications for the condition, may spend more time watching television or playing computer or video games.

In this study; our finding that children with ADHD are more likely to be overweight is in accordance with the previous studies of ***Holtkamp et al., (2004); Bandini et al., (2005); Hubel et al., (2006)*** and ***Lam and Yang,(2007)*** who linked the degree of overweight to the presence ADHD.

Chien et al., (2006) posited that both the management of ADHD and the prevention of childhood obesity are important topics in the field of pediatric research and health care which agrees with our study. Also ***Chien et al.,*** reported that children with ADHD who are not currently taking medication may be at increased risk for overweight compared with those who are receiving treatment.

In the light of these findings ***Schwimmer et al., (2003)*** found that children and adolescents with ADHD should be monitored for overweight and they suggested that by monitoring weight status of these youth will be better prepared to prevent the development of childhood obesity and the negative physical health and psychosocial consequences. ***Schwimmer et al.,*** suggested also that future work is needed to better understand the longitudinal and pharmacologic factors that influence the relationship between ADHD and weight status in children and adolescents.

A 23-item questionnaire to assess health risk behaviour based on ***world Health Organization (2003)*** questionnaire in Global School Health Survey (GSHS) was developed and applied to the three groups; (obese, over weight and nonobese). The overall score and the score of each domain were compared among the three groups.

In this study; the scores for Body Image Test, trying to lose weight feeling of hunger at home and teasing domains were higher in obese.-overweight children in comparison to nonobese children

Horwood et al., (2005) and ***Sato et al. (2008)*** reported that Emotional scores domain regarding self esteem and body satisfaction were lower in obese-overweight children than nonobese and this agrees with our findings.

On the contrary to our study; ***Pinhas-Hamiel et al., (2006)*** reported that the Emotional and School domain scores of the moderately obese children were similar to the nonobese children, and that Physical domain and Social domain scores decreased progressively with increased body mass index scores.

This study reports a high prevalence of teasing among obese and over weight group by both adults and peers and that agrees with the findings of ***Eisenberg et al., (2003)*** and ***Janssenet al.,(2004)*** .The prevalence of teasing victimization was also similar to previously reported prevalences by ***Wolke et al.,(2001)*** and ***Griffiths et al., (2006)*** confirming that teasing is widespread among primary school children influencing their self esteem

This study identified the impact of obesity on peer victimization, previously identified in adolescents by ***Mounir et al. (2004:a)*** .They declared that weight teasing by peers and adults was common among adolescent girls and that obese and overweight were at great risk for being teased about their weight .

However, this study did not examine the relationship between obesity and teasing for each sex separately, to establish gender differences

Other longitudinal study by ***Olweus,(1994)*** established the data that pathways for obesity and teasing, and adverse effects, also differ by gender in pre-adolescence. For boys, obesity can have different or mixed effects on peer relationships

Victimization of obese pre-adolescents is likely because they deviate from appearance and physically slim ideals, which is found to be

especially prevalent in pre-adolescent girls by ***Hill et al., (1998)*** .Weight category and appearance therefore appears to have more disadvantages for girls than for boys, as has also been reported in adolescence. Adolescent obese girls are less likely to date and be involved in romantic relationships, and no differences are reported in the dating status of obese boys by ***Pearce et al.,(2002)*** suggesting that obesity in boys may be of less disadvantage if they are dominant in the peer group.

Unfortunately this study did not examine other reasons for teasing involvement, and our findings relate solely to weight category. There may be other reasons for subsequent teasing which we have to explore elsewhere .Factors that may also be associated with both teasing and weight, such as self-esteem; this requires further investigation and researches.

This study concluded that parents, school personnel, and health professionals need to reduce the occurrence of this behaviour and the social marginalization of obese children at an early age, before the strong importance on friendship networks for social and emotional development occurs during adolescence

Simlar to findings of the present study***; Mendez M & Popkin B, (2004)*** reported that increased consumption of more energy-dense, nutrient-poor foods with high levels of sugar and saturated fats, combined with reduced physical activity, have led to high obesity rates .

In this study Data of dietary history was collected and computed using the nutritional institute's (Egypt) food consumption tables in order to calculate the average daily in take of total calories, macronutrients (proteins, fats & carbohydrates) and micronutrients (vitamins & minerals). These nutrients were calculated also as percentage of

recommended dietary daily allowances (***RDA)***.

In this study; overweight and obese children consumed more calories, fats and carbohydrates than their peers and the level was statistically different; these results agree with results of ***Wolfs et al.,(1994) ; Ben Miled et al.,(2000) ; Gibson`s, (2000)*** and as well as results of ***Mansour et al., (2004)***.43% of obese-overweight children were breakfast skippers versus 26% of their nonobese peers, those who skip breakfast may eat more later in the day as well as already overweight to control which was posited previously by ***Mansour et al., (2004)*** .

In the present study; the percentage of dietary deficit <80 % RDA as regard micronutrients (iron & zinc &vit. C); ranged between 44.9 % in nonobese to 59.4 % in obese-overweight children for iron intake; while zinc intake showed 81.2% among overweight-obese children. & 85.2% deficiency among nonobese children and regarding vitamin C intake 62.2% of obese,48.8% of overweight and 30.2%of non obese consumed <80% RDA. Also vitamin **A** showed high percentage of low intake among children irrespective of their nutritional status which agrees with the results of ***Wahba et al., (1998***) and ***Mansour et al.,(2004***) in which they found the same results regarding vitamin A` lower intake among a group of 2818 school children in Egypt.

A limitation to our study is that dietary recall was obtained from children without assistance from their parents.

On the other hand strength of our study is that observations of school breakfast and school lunch were used to validate these parts of children's 24 hour dietary recall which agreed with ***Mertz,, (1992)*** and ***Baxter et., al., (2006)*** who asserted that observation is the best method for validating dietary reports, and recommended the observations of the

children consumption of cafeteria type food particularly unhealthy fast food such as potato chip, burgers and sausages.

Another strength of our study is that quality control for each aspect of data collection (observations, interviews, and measurements of weight and height) was assessed throughout data collection, and was acceptable.

Dietary validation studies with adequate sample sizes of children for each BMI category, sex, and race need to be designed and conducted to extend and better understand children dietary reporting and its relation to Body Mass Index.

SUMMARY

Childhood obesity is increasingly being recognized as a global epidemic and represents a serious public health concern given its associated health complication In addition to adverse medical effects, there is a growing body of evidence indicating deleterious psychosocial sequel of obesity in youth. This includes, but is not limited to, depression, weight-based teasing, and social isolation and discrimination, all of which have been shown to have negative effects on self-esteem in overweight youth.

Aim of the study: The aim of this study is to explore the relationship between obesity and psychosocial adjustment, self esteem, and perceptions of appearance in a clinical sample of obese, over weight children and non–obese children (prepubescent and aged 9-11 years and matched for age, socioeconomic status, and gender). Dietary intake, dietary patterns and health risks behaviours would also be studied in relation to obesity of children.

Subjects & Methods: Target population were school-aged children aging from (9-11) years. Children were recruited from Abu-Bakr ElSedeek primary governmental school at Dokki district in Giza governate. All children aged 9-11 years were subjected to weight and height measurement and 154 cases were chosen and were divided into three groups: group (A), group (B) and a control group by using body mass index (BMI) defined as the weight in kilograms divided by the square of the height in meters .A BMI over and /or equal to 85th percentile is defined as over weight .and a BMI over and /or equal to 95th percentile is defined as obese. The study was done on 104 patients (fifty four obese and fifty over weight) **the control group**: included fifty normal children with nonobese BMI in the same school.

All children were subjected to evaluation of ***Nutritional status*** through measurements of weight, height, arm circumference, waist and hip circumferences. Weight for age (wt/age), height for age (ht/age) values was calculated according to WHO Standards with the help of Anthro Plus software. The ratios of waist/hip, waist/height age, were calculated using values provided by Frisansho as reference.***Socio-demographic data;*** Both parents occupation & education level, family members and child order were recorded. ***Dietary Intake*;** was conducted in order to obtain qualitative and quantitative information about the different items of food and beverage consumed by every child. The 24-hours recall method is used. Data of the dietary history was computed using the Nutrition Institute's (Egypt) food consumption tables, in order to calculate the average daily intake of each child of total calories, macronutrients (protein, fat & carbohydrates) and micronutrients (Vitamins & minerals). These nutrients were calculated as percentage of recommended dietary daily allowances (***RDA)*** for age groups. ***Psychological Assessment;*** was assessed by a battery of psychological tests that covered verbal & non verbal intelligence, memory, learning, problem solving, and attention. The children were individually tested in one session (45-60 min. duration) in separate isolated room at the school. The tests were: Raven's Colored Progressive Matrices for assessing the general intelligence of children The auditory vigilance test: This measures the attention ability. It is a measure of the efficiency of identifying signal stimuli in the context of non-signal stimuli.. The figural memory test: which is a measure of free recall of visual objects; it also taps some aspects of classification ability. **Arabic children's depression Inventory (ACDI):** The Arabic children's depression inventory derived from ***Kovacs and Kazdin*** and standardized for Egyptian children by ***Abdel-khalek***, it comprises seven factors that cover the symptoms of juvenile depression. It contains 27 items in which children responded by themselves through three alternatives i.e. Rarely, Sometimes or

Often. **Pediatric symptom checklist (PSC)**: This was filled out by parents and teachers. It is a highly reliable and valid tool for the assessment of behavioral problems of children between 4-16 years. The Pediatric symptom checklist (PSC) is a psychosocial screen designed to facilitate the recognition of cognitive, emotional and behavioral problems so that appropriate interventions can be initiated as early as possible. The PSC consists of 35 items that are rated as Never, Sometimes or Often. . **Body ImageTest:** Children are subjected to test their perceived size by the silhouette test. This is to evaluate their self esteem. ***Academic Achievement*:** is assessed using the mean score of final year tests and mid year tests scores of Arabic Language and Arithmetic subjects for each child, they are considered a good indicator of academic and learning performance .***Global School Health Survey(GSHS):*** 23 items based on the GSHS were used to evaluate health risk behaviours of the selected children. The GSHS is a school-based survey conducted among students and it was recommended by ***WHO***. The purpose of the GSHS is to provide accurate data on health behaviours among children. **Statistical Analysis:** Our studies included analysis of variance, student's t test for comparison of the means, simple correlation and stepwise multiple regression, chi-squared test and simple relative risk (RR).). Data have been processed with the help of the SPSS-Pc program of personal computers.

Results: There was significant difference regarding anthropometric parameters weight/age, waist/hip and waist/height i.e. our patients showed higher values in relation to nonobese. There was no significant relation between Socio-demographic data i.e. both parents" occupation & education level, housing conditions, family members and child order. In this study, our patients had lower IQ scores than controls with no significant difference in memory and classification ability scores. The cases had higher scores in

psychosocial behavior disorders regarding depression, self-esteem,ADHD, and anxiety. The cases also had higher scores in Pediatric Symptom Checklist (PSC) indicating the presence of cognitive, emotional and behavioral problems than nonobese with correspondence of both parent and teacher forms. Our study reported a high prevalence of teasing by peers and adults among obese and over weight group in relation to nonobese. In Our study Children have provided 24-hour dietary recalls (24HDRs) Obese and overweight found to consume more fats and carbohydrates than peers and to consume less micronutrients including vitamin C, iron. zinc ,copper and calcium with statistically significant difference between the 3 groups regarding the previously mentioned nutrients.

CONCLUSION

The study confirmed that obesity in primary school children affects their psychosocial characteristics, cognition and their academic performance.

The study concluded that changes in the psychosocial characteristics related to obesity in primary school children is not limited to, depression, weight-based teasing, and social isolation and discrimination, but also showed to have negative effects on self-esteem as regard acceptance of children to their body image.

The study confirmed that obesity in children was associated with lower scores in IQ level regarding their general intelligence, lower scores in attention and they also showed many behavioral problems in the Pediatric Symptom Checklist, so they need further evaluation.

Our study concluded that obesity in children was associated with more serious outcomes affecting other aspects of children's lives, such as academic performance.

The study concluded that there was no association between **Socio-demographic data** Further studies are needed to explore the relation between familial background and childhood obesity regarding the fact that in this study no significant relation was found may be due to the same social and economic level of the children living in the same area, same school and having almost the same familial socioeconomically background.

A final conclusion which must be known that, the more severe the degree of obesity. The greater the psychosocial problems. In this respect; obesity does not differ from other chronic diseases.

Recommendations

- This study agrees and recommends that the primary goal to treat obesity should be developing healthy eating and activity habits, not achieving ideal body weight putting in mind that eating and physical activity patterns are partly learned behaviors and can be changed. The influence of family and peers are the most important factor in child obesity treatment.

- This study recommends also increased funding for and expansion of public and nonprofit recreation programs and facilities , for school breakfast and lunch programs that comply with nutritional demands of children and adolescents and other work support programs that reduce the financial burdens on families with children.

- It is important to discuss issues of stigmatization and responses to hurtful teasing experiences with obese- overweight children within educational settings by the social workers and by the media.

- Family members, teachers need to increase their awareness of the impact of their remarks and behaviour toward overweight children and to change the criteria of evaluating a person for his achievement. This study suggests that health education in school is essential and its importance in maintenance of healthy habits in children must not be ignored as children stay in school most of the day.

- This study suggests that health education in school is essential and its importance in maintenance of healthy habits in children must not be ignored as children spend in school most of their time.

- Continued research aimed at understanding, identifying and treating childhood behavioural disorders and obesity are needed to ensure that attention is given to these disorders. A greater knowledge of these issues will help ensure proper intervention helping to foster healthier, more successful and happy children.

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Serial number:

BMI:

Personal History:-
Date:
School:
Class:
Name:
Birth Date:

Measurements:

Wt:
Head circumference:

Standing ht:

Sitting ht:

Arm circumference:

Waist circumference:

Hip circumference:

Thigh circumference:

Bicresteric breadth:

Bitrochantric breadth:

Familial Background:-

Paternal:
- Education:
-Job:
Maternal
-Education:
-Job:

Family members:
Birth order:

24 Hours Dietary Recall:

Breakfast:

Snack:

Lunch:

Snack:

Dinner:

Snack:

School meal:

اختبـــار الذاكـرة الشكليـة الحـــرة

الاســـم :ـ

تاريخ الميلاد :ـ

اسم الفاحـــص:ـ

الجـــنس :ـ

العمـــر :ـ

رقم	الصـــورة	ترتيب الاســـتدعاء	رقم	الصـــورة	ترتيب الاستدعاء
١	خـــروف		١١	مـــوز	
٢	كـــلب		١٢	برتقـــال	
٣	جمـــل		١٣	اتـــومبيل	
٤	حـــصان		١٤	دراجـــة	
٥	ســـنبلة		١٥	ســـيارة	
٦	شـــجرة		١٦	طـــائرة	
٧	نخـــلة		١٧	عصـــفورة	
٨	كـــوز ذرة		١٨	اوزة	
٩	بطـــيخة		١٩	بومـــة	
١٠	عنقـــود عـــنب		٢٠	دجـــاجة	

درجـة الذاكـــرة :ـ

درجـة التصـــنيف :ـ تقدر كل انتقـال من فئة الى اخرى بدرجة واحدة)

ورقة الاجابة

دارالقلم للنشر والتوزيع
ص.ب ٢٠١٤٦ الصفاة 13062 الكويت
شارع السور - عمارة السور - الدابق الأول
هاتف: ٢٤٥٧٤٧٨ - ٢٤٥٩٤٧٨ - برقيا تريب كو

اختبار

المصفوفات المتتابعة الملونة لرافن

إعداد : دكتور عبدالفتاح القرشي

اسم الطالب : ..... الجنسية : .....

اسم المدرسة : ..... تاريخ الاختبار : / / ١٩

الصف الدراسي : ..... تاريخ الميلاد : / / ١٩

النوع : ذكر / أنثى العمر الزمني : / /

	المجموعة أ			المجموعة أ ب			المجموعة ب		
١			١			١			
٢			٢			٢			
٣			٣			٣			
٤			٤			٤			
٥			٥			٥			
٦			٦			٦			
٧			٧			٧			
٨			٨			٨			
٩			٩			٩			
١٠			١٠			١٠			
١١			١١			١١			
١٢			١٢			١٢			

الدرجة الكلية : ..... الزمن : .....

الترتيب المئيني : .....

اسم الفاحص : .....

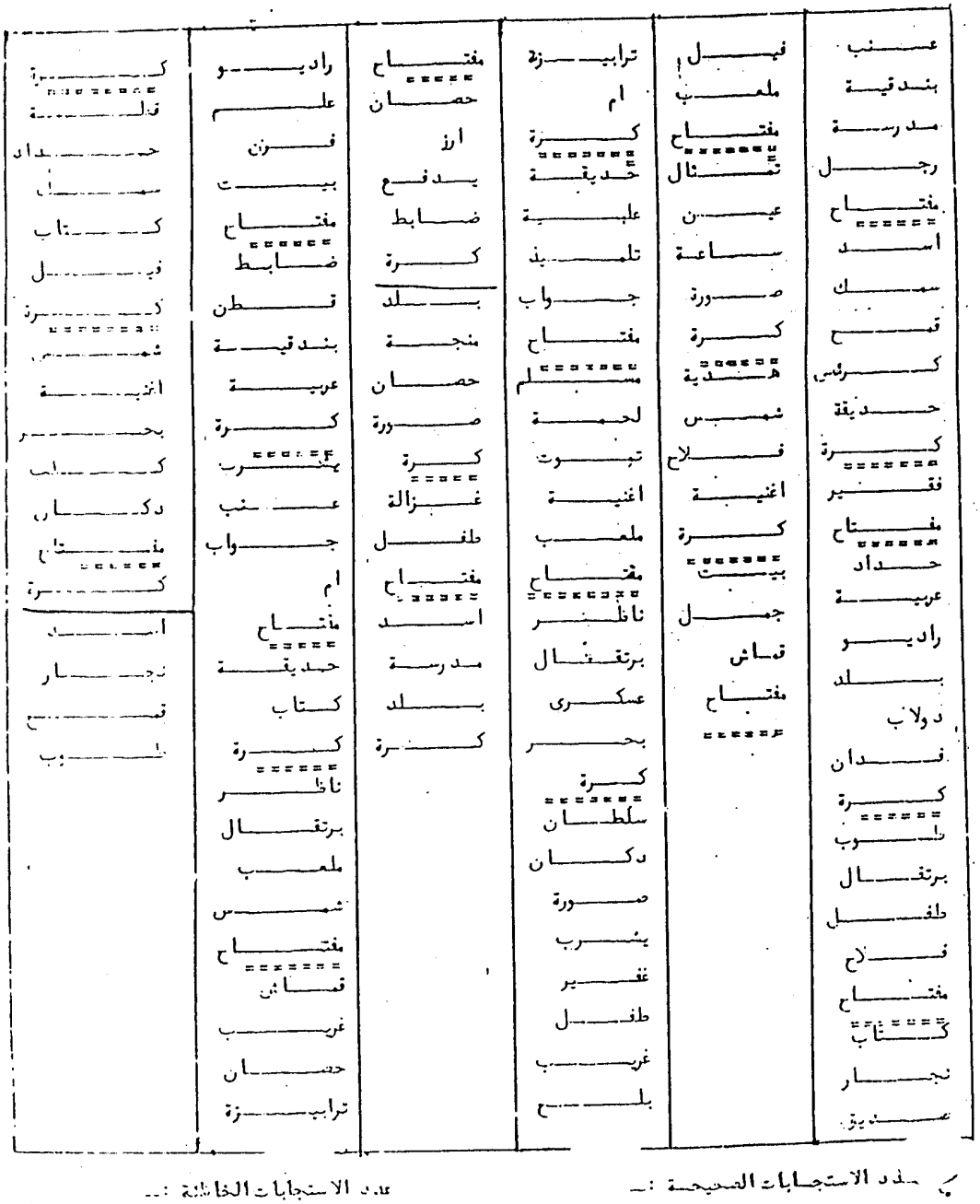
اختبار القياس السمعى

الاسم :ـ

تاريخ الميلاد :ـ

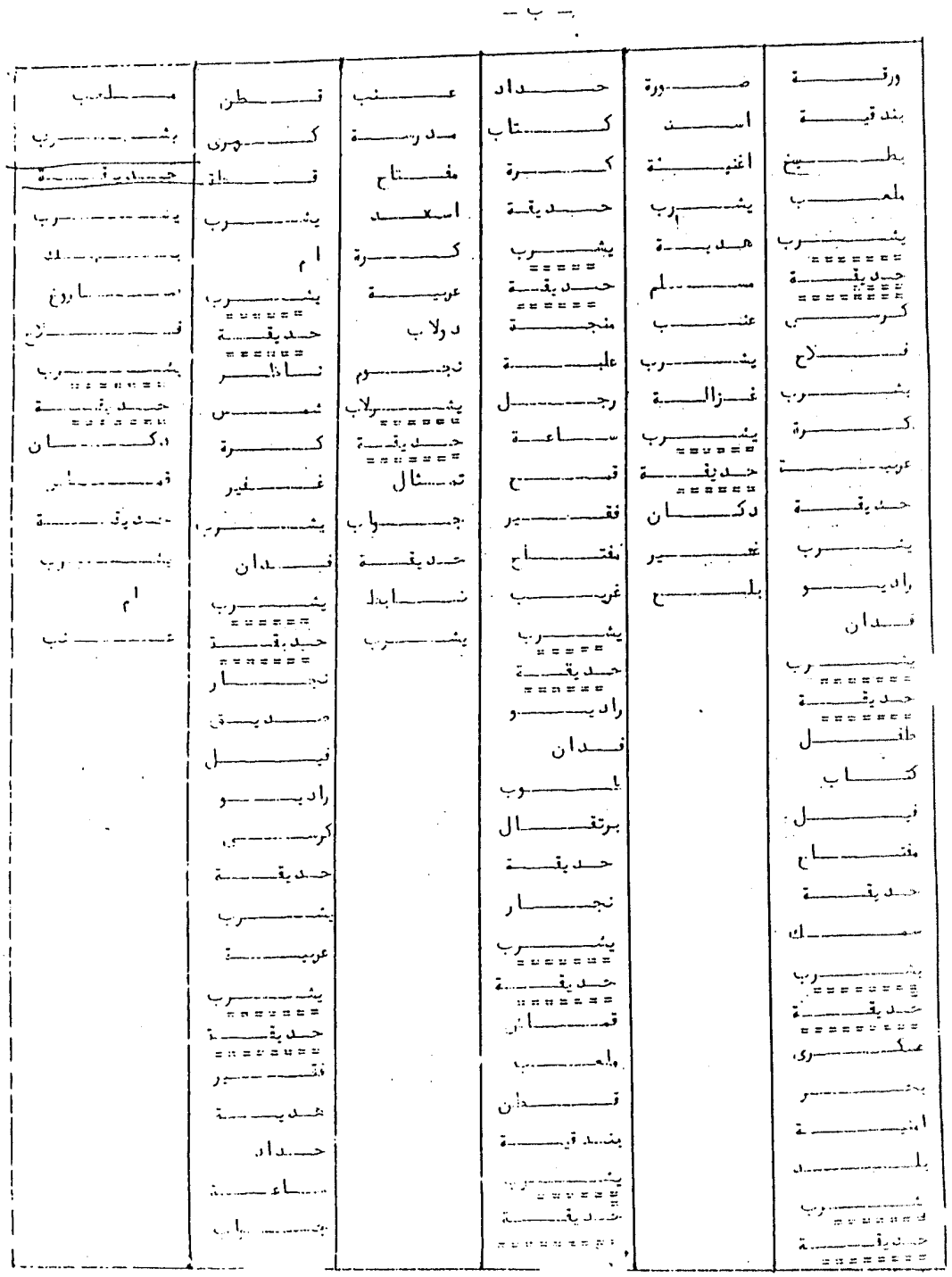
الجنس :ـ

اسم الفاحص :ـ



عدد الاستجابات الصحيحة :ـ

عدد الاستجابات الخاطئة :ـ



عدد الاستجابات الصحيحة

عدد الاستجابات الخاطئة

Appendix
Pediatric Symptom Checklist

هذه القائمة سوف تؤخذ من أولياء الأمور لقياس قدرة استيعاب التلاميذ وتحسينها
قائمة أدلة الاضطرابات السلوكية للأطفال

	من فضلك ضع (√) أمام ما يناسب طفلك	(لا)	في بعض الأحيان	في أغلب الأحيان
١	يعاني من آلام أو أوجاع			
٢	قليل الطاقة – بطيء الشعور بالتعب			
٣	عندما يكشف عليه الطبيب لا يجد سببا عضويا			
٤	كثير الحركة – لا يستطيع الصبر ساكنا			
٥	يتصرف كما لو كان موجها بآلة			
٦	يعاني من مشاكل مع مدرسيه			
٧	قليل الاهتمام بالمدرسة ودراسته وواجباته			
٨	كثير الغياب عن المدرسة			
٩	رسب أو حصل على ملحق دراسي			
١٠	يقضي أكثر وقته منفردا لوحده			
١١	كثير التفكير في نفسه وحاجاته فقط			
١٢	يتخوف المواقف الجديدة			
١٣	يعاني من ضعف القدرة على التركيز وإكمال أعماله التي بدأها			
١٤	كثير أحلام اليقظة			
١٥	سريع التهيج والتغضب			
١٦	يشعر باليأس أو الإحباط أو عدم التوفيق			
١٧	يعاني من اضطرابات تتعلق بالنوم			
١٨	كثير الشعور بالضيق والقلق والتوتر			
١٩	لا يستجيب لألعاب المتعة والمرح			
٢٠	غير سعيد وحزين بلا أسباب			
٢١	يتأذى ويتألم أو يتضرر لأقل الأسباب			
٢٢	يشعر أنه أقل مكانة من غيره			
٢٣	لا يتبع القواعد أو النصائح			
٢٤	لا يعبأ بالأصدقاء أو الصداقات وليس له أصدقاء			
٢٥	يتشاجر مع الأطفال الآخرين			
٢٦	يتندر أو يسخر من الآخرين			
٢٧	يعرض نفسه للمخاطر			
٢٨	يأخذ ما لا يخصه			
٢٩	يتصرف بطريقة لا تلائم سنه (أصغر من سنه)			
٣٠	يحب أن يلازم أحد والديه أكثر من ذي قبل			
٣١	يبدو أنه عديم الإحساس أو الشعور			
٣٢	لا يقدر أو يهتم بإحساسات الآخرين			
٣٣	يعتبر الآخرين هم سبب مشاكله الخاصة			
٣٤	كثير التحير والارتباك في تصرفاته			
٣٥	يميل إلى الأنانية ويرفض المشاركة			

صف مشاعرك ACDI

تأليف : د. أحمد محمد عبد الخالق

الاسم : العمر : شهر سنة

المدرسة : الفصل : الجنس : (ولد / بنت)

تعليمات : أمامك عدد من العبارات التى يمكن أن تصف الأولاد والبنات. اقرأ كل عبارة بعناية ، وحدد اذا كانت تنطبق عليك نادرا ، أو أحيانا ، أو كثيرا ، ثم ضع دائرة حول كلمة واحدة فقط مما يلى كل عبارة منها ، بحيث تصلك بدقة. ليس هناك اجابات صحيحة أو أخرى خاطئة ، ولا تفكر كثيرا ، وتذكر أن تضع دائرة حول الكلمة التى تصف مشاعرك عادة .

1 - أشعر بالسعادة	نادرا	أحيانا	كثيرا
2 - أشعر بالكسل	نادرا	أحيانا	كثيرا
3 - أنام جيدا	نادرا	أحيانا	كثيرا
4 - أجد صعوبة فى التركيز على دراستى ...	نادرا	أحيانا	كثيرا
5 - أشعر أننى لا قيمة لى	نادرا	أحيانا	كثيرا
6 - أحلم أحلاما مزعجة	نادرا	أحيانا	كثيرا
7 - أنا حزين	نادرا	أحيانا	كثيرا
8 - أنا واثق من نفسى	نادرا	أحيانا	كثيرا
9 - أشعر بالتعب	نادرا	أحيانا	كثيرا
10 - تركيزى ضعيف	نادرا	أحيانا	كثيرا
11 - أقلق أثناء نومى	نادرا	أحيانا	كثيرا
12 - لى أصدقاء كثيرون	نادرا	أحيانا	كثيرا
13 - أشعر بالضيق	نادرا	أحيانا	كثيرا
14 - أنا "سرحان"	نادرا	أحيانا	كثيرا
15 - أشعر بالوحدة (أننى وحيد)	نادرا	أحيانا	كثيرا
16 - أشعر أننى تعيس	نادرا	أحيانا	كثيرا
17 - الحياة حلوة	نادرا	أحيانا	كثيرا
18 - أشعر أننى فاشل	نادرا	أحيانا	كثيرا
19 - أشعر بالملل (أنا زهقان).....	نادرا	أحيانا	كثيرا
20 - أشعر بالغضب	نادرا	أحيانا	كثيرا
21 - أنا راضى عن حياتى	نادرا	أحيانا	كثيرا
22 - هناك أشياء كثيرة تضايقنى	نادرا	أحيانا	كثيرا
23 - أنا متشائم (أتوقع الشر).....	نادرا	أحيانا	كثيرا
24 - سنحدث لى أشياء سيئة	نادرا	أحيانا	كثيرا
25 - كثير من الناس يحبونى	نادرا	أحيانا	كثيرا
26 - أكره نفسى	نادرا	أحيانا	كثيرا
27 - أنا متفائل (أتوقع الخير).....	نادرا	أحيانا	كثيرا

23 items based on Global School-based Student Health Survey (GSHS)

Body perception and plan to do:

1. How do you describe your weight?

a. Very underweight

b. Slightly underweight

c. About the right weight

d. Slightly overweight

e. Very overweight

2. Which of the following are you trying to do about your weight?

a. I am not trying to do anything about my weight

b. Lose weight

c. Gain weight

d. Stay the same weight

3. During the past 30 days, did you exercise to lose weight or to keep from gaining weight?

a. Yes

b. No

Knowledge and Health Education:

4. During this school year, were you taught in any of your classes healthy ways to gain weight?

a. Yes

b. No

c. I do not know

5. During this school year, were you taught in any of your classes healthy ways to lose weight?

a. Yes

b. No

c. I do not know

6. During this school year, were you taught in any of your classes the benefits of drinking more milk?

a. Yes

b. No

c. I do not know

7. During this school year, were you taught in any of your classes the benefits of eating more fruits and vegetables?

a. Yes

b. No

c. I do not know

Dietary Behaviour:

8. During the past 30 days, how often did you go hungry because there was not enough food in home?

a. Never

b. Rarely

c. Sometimes

d. Most of the time

e. Always

9. During the past 30 days, how often did you eat breakfast?

a. Never

b. Rarely

c. Sometimes

d. Most of the time

e. Always

10. What is the main reason you do not eat breakfast?

a. I always eat breakfast

b. I do not have time for breakfast

c. I cannot eat early in the morning

d. There is not always food in my home

e. Some other reason

11. During the past 30 days, how many times per day did you usually drink milk or eat milk products?

a. I did not drink milk or eat milk products during the past 30 days

b. Less than one time per day

c. 1 time per day

d. 2 times per day

e. 3 times per day

f. 4 times per day

g. 5 or more times per day.

12. During the past 30 days, how many times per day did you usually eat vegetables such as tomatos, cucumber, spinach or egg plants ?

a. I did not eat salty foods

b. Less than 1 time per day

c. 1 time per day

d. 2 times per day

e. 3 times per day

f. 4 times per day

g. 5 or more times per day

13. During the past 30 days, how many times per day did you usually eat fruits such as apples, bananas, or citrus food?

a. I did not drink fruit juice during the past 30 days

b. Less than one time per day

c. 1 time per day

d. 2 times per day

e. 3 times per day

f. 4 times per day

g. 5 or more times per day

14. During the past 30 days, how many times per day did you usually drink carbonated soft drinks such as Coke, Pepsi, 6 up or Fanta?

a. I did not drink carbonated soft drinks during the past 30 days

b. Less than one time per day

c. 1 time per day

d. 2 times per day

e. 3 times per day

f. 4 times per day

g. 5 or more times per day

15. During the past 7 days on how many days did you eat at a fast food restaraunts such as McDonalds, Kentuky or Burger king?

a.0 days

b.1 day

c.2 days

d.3 days

e.4 days

f.5 days

g.6 days

h.7 days

Teasing ,physical abuse and serious injury:

16. During the past 12 months,how many times were you teased by an adult family member or by teacher?

a. otimes

b.1 time

c.2 or 3 times

d.4 or 5 times

e.6 or 7 times

f.8 or 9 times

h.10or more times

17. During the past 12 months, how many times were physically attacked by an adult family member?

a. otimes

b.1 time

c.2 or 3 times

d.4 or 5 times

e.6 or 7 times

f.8 or 9 times

h.10or more times

18. During the past 12 months, where did the most serious injury that happened to you occur?

a. I was not seriously injured during the past 12 months.

b.At home.

c. At school.

d. At work

e. On a playing field or court or in a gymnasium

f. On or near a road

g. In a park

h. Somewhere else

19. During the past 30 days, how many times were you teased by peers?

a. o times

b.1 time

c.2 or 3 times

d.4 or 5 times

e.6 or 7 times

f.8 or 9 times

h.10or more times

Physical Activity

20. How much time do you spend during a typical or usual day sitting and watching TV, playing computer games, talking to friends or doing other sitting activity such as Attari ,Play Station, playing cards ,playing chess or reading stories?

a. Less than 1 hour per day

b.1 to 2 hours per day

c.3 to 4 hours per day

d.5 to 6 hours per day

e.7 to 8 hours per day

f.More than 8 hours per day

21.During the past 7 days, on how many days did you walk or ride a bicycle?

a. 0 days

b. 1 day

c. 2 days

d. 3 days

e. 4 days

f. 5 days

g. 6 days

h. 7 days

22. During the past 7 days ,how did u you go to and from school each day?

a. walking

b. vehicle

23.During the past 7 days , how many times were you physically active for at least 60 minutes per day?

a o times

b1 time

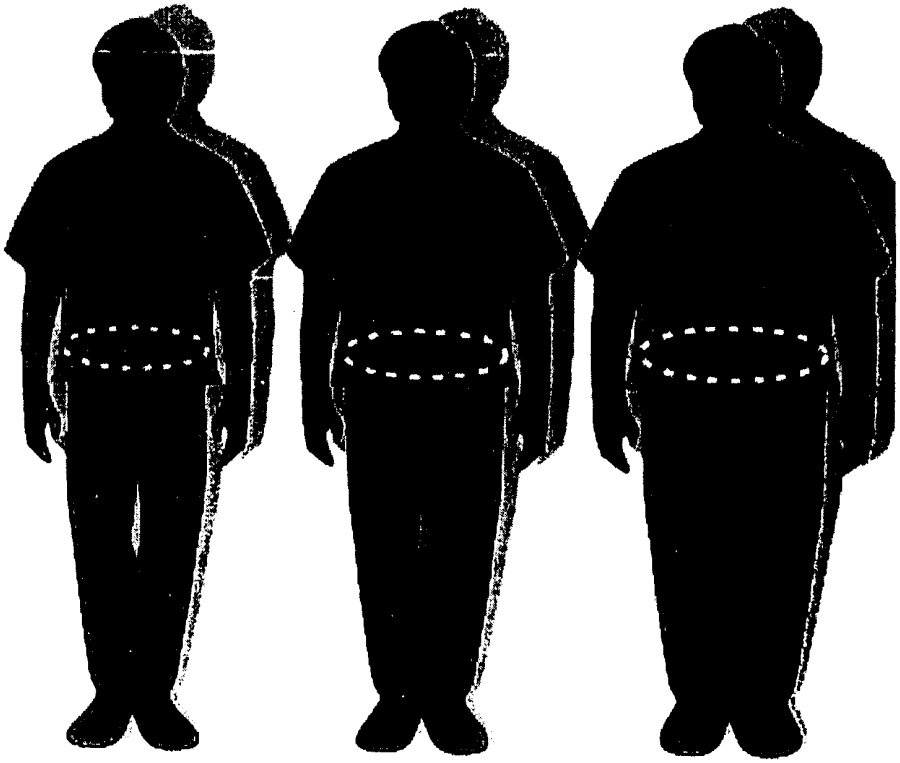
c.2 or 3 times

d. 4 or 5 times

e.6 or 7 times

f.8 or 9 times

h.10or more times



95.8	0.25	59.8	106.37	9.99	99.9	999.9	2	19.79
109.68	0.57	71.48	114.32	9.99	99.9	999.9	2	16
99.07	0.64	73.86	116.21	1.08	85.97	120.23	0	20
95.38	0.26	60.4	106.93	9.99	99.9	999.9	2	21.22
97.72	0.58	71.95	115.3	9.99	99.9	999.9	2	21.75
95.24	-0.99	16.01	83.8	9.99	99.9	999.9	2	16.37
101.05	-0.52	30.2	91.59	9.99	99.9	999.9	2	15.77
99.35	-0.16	43.48	97.21	9.99	99.9	999.9	2	17.78
108.36	1.51	93.49	139.83	9.99	99.9	999.9	2	21.45
102.78	0.23	59.02	105.73	9.99	99.9	999.9	2	17.54
96.98	-0.52	30.2	91.59	9.99	99.9	999.9	2	17.12
99.7	-0.03	48.63	99.44	9.99	99.9	999.9	2	17.59
99.33	0.45	67.46	111.41	9.99	99.9	999.9	2	19.9
96.27	-0.16	43.82	97.47	9.99	99.9	999.9	2	18.58
103	-0.31	37.71	94.91	9.99	99.9	999.9	2	15.81
103.38	-0.1	46.21	98.45	9.99	99.9	999.9	2	16.23
100.61	-0.68	24.74	88.88	9.99	98.9	999.9	2	15.56
96.27	-0.16	43.82	97.47	9.99	99.9	999.9	2	18.58
97.63	-0.65	25.93	90.09	-0.32	37.55	97.11	0	15.98
109.03	1.21	88.71	129.13	9.99	99.9	999.9	2	18.37
105.68	1.38	91.6	136.43	9.99	99.9	999.9	2	21.78
103.65	-0.13	44.89	97.82	9.99	99.9	999.9	2	16.23
101.61	0.89	81.37	123.56	9.99	99.9	999.9	2	21.33
104.05	1.23	89.12	132.58	9.99	99.9	999.9	2	21.79
95.21	0.05	52.09	101.39	9.99	99.9	999.9	2	19.9
95.21	-0.84	20.13	85.79	9.99	99.9	999.9	2	16.84

34	42	71	85	2	1	2	1	5	2	2	-0.85	19.73								
32	38	63	81	4	4	3	1	5	2	2	1.96	97.48								
36	43	70	96	2	2	2	1	4	1	2	-0.19	42.56								
31	45	75	88	2	2	2	1	5	3	2	-1.02	15.37								
32	44	76	90	1	2	1	1	6	4	2	-0.5	30.83								
32	37	74	86	3	3	4	1	5	2	2	-0.95	16.98								
38	41	62	76	2	2	2	1	6	3	2	0.21	58.51								
38	46	77	89	1	1	1	1	4	2	2	-0.14	44.32								
42	49	75	99	2	2	2	1	3	2	2	1.84	96.68								
40	44	67	87	2	2	2	1	5	1	2	0.57	71.64								
37	42	64	82	1	1	2	1	4	4	1	-0.62	26.88								
36	38	70	86	2	2	2	1	5	1	2	-0.06	47.52								
35	42	78	90	4	2	2	1	5	3	2	-0.14	44.58								
39	45	65	85	3	2	2	1	5	2	2	-0.75	22.57								
31	38	79	89	2	2	2	1	6	4	2	0.61	72.77								
31	38	71	78	2	2	2	2	5	1	2	0.69	75.39								
31	36	73	83	2	2	2	1	4	1	2	0.12	54.85								
33	39	73	82	3	3	3	3	3	3	2	-0.75	22.57								
32	38	70	83	2	2	2	1	5	3	2	-0.52	30.11								
35	41	74	86	4	4	3	1	5	3	2	1.98	97.64								
33	43	75	83	4	4	4	4	5	1	2	1.21	88.75								
33	38	70	80	4	4	4	4	5	2	2	0.78	78.2								
43	48	74	84	4	4	2	1	4	2	2	0.34	63.49								
36	44	73	88	2	2	2	1	5	1	2	0.88	80.51								
34	39	68	77	3	3	3	1	5	1	2	-1.02	15.42								
31	39	68	75	4	4	4	1	6	2	2	-1.02	15.42								

129	3	2	5	10	1	121	35	133	65	53	22	43								
130	3	2	5	9	9	117	36	150	73	53	22	41								
131	3	2	5	9	10	118	37	136	66	53	22	43								
132	3	2	6	11	11	143	44	144	69	54	26	44								
133	3	2	6	11	10	142	47	147	74	55	23	46								
134	3	1	6	11	11	143	33	142	71	52	21	36								
135	3	1	6	11	8	140	35	149	73	53	21	38								
136	3	2	6	11	11	143	40	150	75	54	22	45								
137	3	2	6	11	10	142	57	163	87	53	27	55								
138	3	1	6	11	7	139	40	151	75	53	23	44								
139	3	1	6	11	8	140	35	143	73	53	23	42								
140	3	1	6	11	8	140	38	147	74	53	23	44								
141	3	1	6	11	9	141	43	147	78	53	25	45								
142	3	1	6	11	10	142	38	143	71	53	23	45								
143	3	1	6	11	10	142	37	153	78	54	24	41								
144	3	1	6	11	9	141	38	153	68	52	22	40								
145	3	1	6	11	11	143	35	150	65	53	22	42								
146	3	1	6	11	10	142	38	143	70	52	23	44								
147	3	1	6	10	6	126	30	137	65	53	22	40								
148	3	1	6	10	6	126	43	153	73	53	24	45								
149	3	2	6	11	5	137	53	156	68	53	25	46								
150	3	2	6	11	5	137	38	153	65	54	23	42								
151	3	2	6	11	5	137	48	150	75	53	25	44								
152	3	2	6	11	4	136	51	153	65	54	24	44								
153	3	2	6	11	4	136	39	140	70	54	23	43								
154	3	2	6	11	4	136	33	140	70	55	23	44								

98.38	1.33	90.9	133.48	9.99	99.9	999.9	2	24.11
94.62	0.53	70.16	113.25	2.17	98.49	133.07	0	22.05
97.62	1.12	86.87	128.25	9.99	99.9	999.9	2	23.78
94.28	0.91	81.83	122.81	9.99	99.9	999.9	2	24.15
97.72	1.23	89.05	130.55	2.48	99.34	139.46	0	23.64
99.06	1.44	92.52	136.15	9.99	99.9	999.9	2	24.26
97.3	0.66	74.49	116.59	9.99	99.9	999.9	2	21.7
97.85	1.43	92.3	137.65	9.99	99.9	999.9	2	25.68
94.84	1.18	88.18	131.28	9.99	99.9	999.9	2	26.02
104.65	2.11	98.27	155.54	9.99	99.9	999.9	2	25.64
102.69	1.23	89.12	132.58	9.99	99.9	999.9	2	22.37
107.16	2.09	98.15	155.02	9.99	99.9	999.9	2	24.22
95.1	1.61	94.65	142.52	9.99	99.9	999.9	2	28.27
98.08	0.81	79.11	121.35	9.99	99.9	999.9	2	22.68
93.07	0.58	71.95	115.3	9.99	99.9	999.9	2	23.98
98.45	0.85	80.33	122.51	9.99	99.9	999.9	2	22.68
95.38	1	84.22	126.38	9.99	99.9	999.9	2	25.08
93.23	0.36	64.22	109.19	9.99	99.9	999.9	2	22.26
93.9	0.47	67.9	111.73	9.99	99.9	999.9	2	22.45
95.36	-0.81	20.97	87.31	0.09	53.61	101.31	0	15.87
101.64	-0.29	38.47	95.27	9.99	99.9	999.9	2	15.53
91.18	-2.02	2.15	66.25	9.99	99.9	999.9	2	13.82
107.08	0.76	77.73	119.35	9.99	99.9	999.9	2	17.59
94.7	0.14	55.71	103.65	1.5	93.35	123.1	0	19.53
101.99	0.27	60.55	106.79	9.99	99.9	999.9	2	17.35
96.88	-0.85	19.63	86.03	9.99	99.9	999.9	2	15.59
103.2	-0.1	46.15	98.49	9.99	99.9	999.9	2	15.23
103.51	0.6	72.47	113.33	0.2	57.92	103.14	0	17.35
98.01	0.4	65.49	108.97	1.15	87.42	116.12	0	18.66
103.1	0.19	57.54	104.8	9.99	99.9	999.9	2	16.6
108.99	0.87	80.9	118.67	-0.72	23.73	92.18	0	16.17
106.93	1.47	92.9	135.85	9.99	99.9	999.9	2	19.56
106.54	0.44	66.99	110.26	9.99	99.9	999.9	2	16.2
107.26	0.57	71.72	113.41	9.99	99.9	999.9	2	16.44
102.49	0.3	61.95	106.95	0.01	50.26	100.1	0	16.84
113.82	1.93	97.33	144.47	9.99	99.9	999.9	2	18.49
101.42	0.26	60.19	105.95	0.15	55.95	102.32	0	17.08
101.02	0.45	67.21	110.19	0.51	69.37	107.72	0	17.85
103.44	0.39	65.23	109.93	9.99	99.9	999.9	2	17.36
105.79	1.12	86.94	127.61	9.99	99.9	999.9	2	18.85
105.07	1.51	93.49	134.84	1	84.13	116.5	0	20.25
97.44	-0.74	22.94	89.05	-0.4	34.43	96.53	0	15.59
106.54	0.98	83.63	122.86	9.99	99.9	999.9	2	18.05

41	47	79	91	2	3	2	1	5	1	2	-0.34	36.87
38	41	67	84	2	2	1	1	5	1	2	-1.12	13.17
37	47	81	90	3	3	3	1	7	5	2	-0.48	31.51
39	40	74	92	3	3	3	3	4	1	2	-1.18	11.85
43	45	80	92	3	3	3	1	10	7	2	-0.48	31.51
42	46	94	97	3	3	2	1	5	2	2	-0.19	42.31
45	51	77	95	2	1	2	1	8	6	2	-0.55	29.19
40	50	84	103	3	3	4	3	6	4	2	-0.46	32.22
43	45	83	93	3	3	2	1	5	2	2	-1.1	13.52
47	54	85	103	2	2	2	1	5	3	2	1.03	84.79
36	43	78	88	3	3	3	1	5	1	2	0.57	71.6
43	47	81	101	1	1	2	1	4	3	1	1.55	93.99
40	44	81	99	3	2	3	1	5	1	2	-1.06	14.37
38	41	78	92	3	3	2	1	5	1	2	-0.42	33.77
38	41	78	97	3	3	2	1	5	2	2	-1.52	6.39
38	41	82	99	2	2	3	1	5	1	2	-0.34	36.82
34	42	82	99	3	3	1	1	5	1	1	-1.02	15.37
34	41	78	84	2	2	1	1	5	3	2	-1.36	8.71
38	42	82	86	3	3	3	3	5	1	2	-1.22	11.05
23	30	63	83	1	2	1	1	5	3	2	-0.94	17.4
23	29	59	69	4	4	3	3	5	1	2	0.33	62.96
20	27	51	84	1	2	3	3	6	1	2	-1.8	3.56
20	29	68	80	4	4	4	1	5	1	2	1.43	92.4
24	30	69	80	4	1	1	1	4	3	2	-1.07	14.2
37	42	65	83	4	4	4	4	5	3	2	0.4	65.59
33	36	58	78	4	4	4	1	5	1	2	-0.63	26.41
37	39	62	78	4	4	4	1	4	1	2	0.65	74.13
35	41	65	82	2	2	2	1	5	3	2	0.8	78.92
35	41	63	82	3	2	3	2	4	2	2	-0.45	32.5
36	43	65	80	2	2	2	2	5	2	2	0.63	73.45
30	34	70	78	1	1	2	1	6	5	2	2.09	98.15
22	33	80	85	3	3	3	3	5	1	2	1.4	91.99
36	38	65	83	3	3	3	3	4	2	2	1.47	92.88
41	43	67	82	3	3	3	1	6	3	2	1.63	94.84
36	38	55	73	3	3	2	1	5	3	2	0.56	71.36
43	48	76	87	4	3	2	1	7	5	2	1.12	90.1
38	42	64	80	2	2	2	1	5	1	2	0.32	62.56
40	43	67	86	4	4	3	3	3	1	2	0.23	59.17
35	41	64	81	2	2	3	1	5	1	2	0.7	75.68
37	43	72	88	4	4	4	1	5	1	2	1.17	87.94
36	43	71	88	2	3	3	1	7	5	2	1.14	87.37
36	40	58	77	2	2	2	1	6	4	2	-0.58	28.25
39	47	74	88	4	4	2	1	5	3	2	1.47	92.88

86	2	1	6	11	6	138	50	144	80	56	25	50
87	2	1	6	11	5	137	42	138	67	51	25	43
88	2	1	6	11	10	142	50	145	73	56	26	50
89	2	1	6	11	6	138	46	138	65	53	23	42
90	2	1	6	11	2	134	47	141	70	54	26	50
91	2	1	6	11	6	138	51	145	73	53	27	49
92	2	1	6	11	9	141	45	144	72	52	26	42
93	2	2	6	11	6	138	54	145	70	55	27	49
94	2	2	6	11	5	137	51	140	71	54	29	52
95	2	2	6	11	11	143	64	158	62	57	29	54
96	2	2	6	11	4	136	51	151	75	54	25	45
97	2	2	6	11	8	140	62	160	75	53	27	51
98	2	2	6	11	8	140	57	142	70	54	27	46
99	2	2	6	11	9	141	49	147	71	54	28	45
100	2	2	6	11	10	142	47	140	71	54	26	51
101	2	2	6	11	8	140	49	147	71	55	26	41
102	2	2	6	11	11	143	52	144	73	55	27	47
103	2	1	6	11	11	143	43	139	70	53	26	47
104	2	1	6	11	11	143	44	140	73	54	25	42
105	3	2	4	9	4	112	26	128	65	51	22	36
106	3	2	4	9	9	117	30	139	68	53	19	36
107	3	2	4	10	6	126	23	129	64	51	18	33
108	3	2	4	9	10	118	38	147	72	50	23	40
109	3	2	4	9	10	118	33	130	62	51	21	23
110	3	2	4	9	10	118	34	140	70	52	22	37
111	3	2	4	10	0	120	28	134	65	54	22	40
112	3	2	4	9	3	111	29	138	70	54	21	36
113	3	1	4	9	7	115	34	140	70	53	22	40
114	3	1	4	9	8	116	33	133	65	53	23	41
115	3	2	4	9	9	117	33	141	71	53	23	42
116	3	1	4	9	2	110	34	145	73	53	22	42
117	3	2	5	9	3	111	40	143	75	52	24	45
118	3	1	5	10	1	121	35	147	73	54	22	42
119	3	1	5	10	1	121	36	148	73	54	22	42
120	3	1	5	9	10	118	33	140	71	53	21	41
121	3	1	5	9	11	119	45	156	65	55	23	44
122	3	1	5	9	11	119	33	139	70	53	23	38
123	3	1	5	9	10	118	34	138	69	54	22	44
124	3	2	5	9	10	118	35	142	71	53	21	44
125	3	2	5	9	4	112	38	142	73	53	26	42
126	3	1	5	9	11	119	42	144	73	53	25	44
127	3	1	5	10	0	120	28	134	67	53	20	41
128	3	1	5	10	1	121	39	147	73	51	23	42

98.01	3.61	99.8	187.38	6.53	99.8	199.6	2	33.08
101.19	2.12	98.31	152.77	9.99	99.9	999.9	2	25.8
94.95	1.68	95.32	141.66	4.33	99.8	165.09	0	27.17
96.44	4.08	99.8	207.53	9.99	99.9	999.9	2	40.03
100.74	2.23	98.7	155.95	9.99	99.9	999.9	2	26.94
95.46	2.62	99.56	169.14	9.99	99.9	999.9	2	33.23
98.65	1.69	95.42	142.5	9.99	99.9	999.9	2	25.8
91.22	0.97	83.36	124.43	9.99	99.9	999.9	2	26.49
100.31	2.14	98.37	153.9	9.99	99.9	999.9	2	27.03
101.42	2.12	98.3	153.31	9.99	99.9	999.9	2	26.12
99.33	2.92	99.8	173.59	9.99	99.9	999.9	2	31.01
104.91	3.01	99.8	175.26	9.99	99.9	999.9	2	27.77
103.83	1.83	96.6	146.08	9.99	99.9	999.9	2	22.81
99.29	0.98	83.63	122.86	1.75	95.97	126.24	0	20.78
99.4	1.31	90.55	133.72	9.99	98.9	999.9	2	23.1
98.71	1.32	90.7	133.38	2.19	98.58	139.75	0	23.05
99.8	1.01	84.39	125.63	1.39	91.74	126.91	0	21.31
102.83	2.08	98.13	147.22	2.33	99	136.5	0	22.96
103.78	1.44	92.51	136.68	9.99	99.9	999.9	2	21.52
97.69	0.78	78.33	117.77	1.9	97.11	126.68	0	20.35
102.43	0.99	83.78	122.18	0.95	82.92	114.72	0	19.15
105.49	1.95	97.46	150.32	9.99	99.9	999.9	2	23.14
97.25	1.07	85.78	127.03	2.33	99	139.44	0	22.61
98.33	0.9	81.47	122.9	9.99	99.9	999.9	2	21.63
103.32	1.77	96.13	137.37	1.75	95.97	126.24	0	20.78
97.98	0.82	79.36	120.68	1.68	95.34	129.44	0	21.16
99.09	0.99	83.82	124.25	1.71	95.63	128.99	0	20.92
98.7	0.83	79.68	121.15	1.43	92.3	126.73	0	21.09
103.83	1.32	90.7	133.38	9.99	99.9	999.9	2	20.83
104.94	1.94	97.39	142.61	1.55	93.92	124.62	0	21.13
95.26	0.49	68.72	111.31	2.08	98.13	128.24	0	20.4
100.5	0.9	81.47	122.9	9.99	99.9	999.9	2	20.7
102.53	2.13	98.36	149.48	2.48	99.34	139.46	0	23.64
100.48	1.46	92.8	135.14	2.11	98.25	133.52	0	22.63
102.97	1.52	93.62	138.45	1.5	93.37	124.82	0	21.7
98.86	0.56	71.16	113.27	1.71	98.87	124.81	0	20.3
99.96	1.09	86.32	125.21	1.75	95.97	128.24	0	20.78
102.23	1.13	87.08	126.73	1.18	88.06	118.98	0	20.33
104.37	1.79	96.32	141.77	1.5	93.37	124.82	0	21.7
106.9	2.27	98.84	152.66	9.99	99.9	999.9	2	22.21
101.47	1.11	86.74	126.01	1.36	91.3	121.34	0	20.41
98.08	1.37	91.53	136.21	9.99	99.9	999.9	2	25.45
98.45	1.42	92.25	137.52	9.99	99.9	999.9	2	25.45

35	44	99	101	4	4	4	1	6	3	2	-0.44	33.13
28	47	86	99	3	3	3	3	4	2	2	0.25	59.92
28	43	83	96	2	3	2	1	4	2	2	-1.07	14.29
36	58	99	125	3	3	3	1	3	1	2	-0.77	21.98
32	44	89	100	2	3	2	1	6	1	2	0.15	56.06
32	55	88	115	3	3	3	3	4	2	2	-0.98	16.35
40	50	78	100	2	2	2	1	6	4	2	-0.27	39.22
39	43	75	87	2	2	1	1	7	4	1	-1.76	3.9
45	50	81	93	3	3	3	3	5	2	2	0.06	52.48
42	46	79	99	3	3	3	3	5	3	2	0.29	61.5
41	49	94	103	3	3	2	1	6	1	2	-0.14	44.58
41	52	96	103	1	3	2	1	5	2	2	1.02	84.62
20	34	80	86	3	3	3	1	4	1	2	0.77	78.06
22	31	71	82	3	3	2	1	6	3	2	-0.16	43.7
17	37	80	86	3	3	3	1	6	1	2	-0.12	45.17
21	39	79	87	1	1	3	1	4	1	2	-0.26	39.74
27	37	72	83	1	2	4	1	5	2	2	-0.04	48.39
28	38	76	89	1	2	1	1	6	2	2	0.64	74
23	33	77	87	3	3	3	3	5	3	2	0.76	77.78
22	30	69	81	1	2	1	1	6	3	2	-0.53	29.94
22	31	71	82	1	2	2	1	5	1	2	0.56	71.06
30	43	74	97	1	2	1	1	4	1	2	1.11	86.72
31	36	74	90	2	2	2	1	7	4	2	-0.56	28.92
36	41	77	93	1	2	2	1	12	11	1	-0.34	36.77
33	45	78	89	3	3	2	1	5	2	2	0.77	77.98
34	42	67	82	4	4	3	3	5	2	2	-0.41	34.17
37	42	64	82	4	2	4	1	5	1	2	-0.18	42.66
36	40	71	85	3	3	3	1	5	1	2	-0.26	39.63
39	42	66	80	4	3	3	1	6	3	2	0.77	78.06
38	44	74	88	2	2	2	1	4	1	2	1.14	87.23
36	47	70	88	3	3	2	1	5	1	2	-1.07	14.31
24	31	72	89	3	3	3	1	3	2	1	0.1	54.02
29	48	78	85	1	2	1	1	4	1	2	0.57	71.58
30	43	81	87	1	1	1	2	6	5	1	0.11	54.19
38	43	80	94	2	3	1	1	6	1	2	0.65	74.37
38	41	63	80	2	2	2	1	5	2	2	-0.7	24.32
38	42	62	81	2	2	2	1	8	6	2	-0.01	49.62
38	42	65	81	2	2	2	1	4	1	2	0.5	68.99
41	43	72	88	2	2	2	1	5	3	2	0.98	83.62
40	45	76	87	2	2	2	1	4	1	2	1.55	93.97
37	45	64	84	1	2	1	1	6	5	2	0.33	62.89
26	40	78	91	2	1	2	1	5	3	2	-0.42	33.77
29	40	84	94	3	3	2	1	4	1	2	-0.34	36.82

43	1	1	5	10	7	127	63	138	70	54	29	52
44	1	1	5	11	2	134	55	146	80	53	27	52
45	1	1	5	11	2	134	51	137	70	54	27	47
46	1	2	6	11	8	140	83	144	75	57	32	65
47	1	1	6	11	7	139	59	148	81	55	29	51
48	1	2	6	11	7	139	67	142	65	56	31	64
49	1	1	6	11	9	141	55	146	81	54	28	48
50	1	1	6	11	11	143	49	136	65	53	29	46
51	1	1	6	11	10	142	60	149	74	53	27	53
52	1	1	6	11	7	139	58	149	72	55	26	49
53	1	1	6	11	9	141	67	147	74	56	29	52
54	1	1	6	11	5	137	65	153	74	55	30	56
55	2	2	4	9	9	117	46	142	78	57	25	44
56	2	1	4	10	1	121	39	137	80	53	24	44
57	2	2	4	10	1	121	44	138	75	52	26	47
58	2	2	4	9	9	117	42	135	78	50	27	48
59	2	2	4	9	10	118	40	137	80	56	26	47
60	2	1	4	9	9	117	45	140	82	53	28	45
61	2	2	4	9	11	119	44	143	85	53	28	46
62	2	1	4	9	9	117	36	133	77	53	23	34
63	2	1	4	9	8	116	37	139	81	53	24	46
64	2	2	4	10	2	122	50	147	79	55	24	42
65	2	2	4	9	9	117	40	133	64	55	24	42
66	2	2	4	10	0	120	40	136	64	54	26	45
67	2	1	4	9	1	109	39	137	68	53	26	44
68	2	2	4	9	9	117	38	134	65	52	23	45
69	2	2	4	9	4	112	37	133	70	54	22	42
70	2	2	4	9	11	119	39	136	65	53	24	41
71	2	2	4	9	9	117	42	142	75	52	22	42
72	2	1	4	9	5	113	42	141	71	53	26	49
73	2	1	4	10	0	120	35	131	67	52	24	48
74	2	2	5	10	0	120	40	139	70	53	24	42
75	2	1	5	10	0	120	47	141	75	52	29	45
76	2	1	5	10	6	126	45	141	77	54	28	45
77	2	1	5	10	5	125	45	144	75	53	25	43
78	2	1	5	10	4	124	37	138	72	[illegible]	22	37
79	2	1	5	9	11	119	39	137	70	53	22	42
80	2	1	5	10	3	123	41	142	73	52	22	38
81	2	1	5	10	1	121	45	144	72	52	24	49
82	2	1	5	10	0	120	48	147	78	54	25	45
83	2	1	5	10	1	121	40	140	70	53	23	41
84	2	2	6	11	9	141	55	147	75	54	27	51
85	2	2	6	11	8	140	55	147	76	56	28	49

HAM		WAP	WAM	WIZ	WHE	FLAG	EMI
96.79	1.72	95.73	140.42	3.85	99.8	155.13	0	25.08
111.46	3.86	99.8	197.87	9.99	99.9	999.9	2	26.91
108.6	3.6	99.8	176.12	2.34	99.05	138.69	0	24.11
95.06	1.32	90.7	133.38	3.69	99.8	156.67	0	24.85
103.17	2.27	98.84	156.07	9.99	99.9	999.9	2	24.33
91.1	1.5	93.27	138.26	9.99	99.9	999.9	2	28.34
100.81	2.49	99.36	154.22	3.57	99.8	151.94	0	24.69
95.39	1.53	93.64	137.91	4.04	99.8	160.14	0	25.24
101.7	1.87	96.9	142	2.38	99.13	136.24	0	22.58
90.5	2.17	98.5	148.03	8.01	99.8	191.27	2	29.56
98.36	2.86	99.79	159.96	5.12	99.8	168.18	0	26.63
104.69	5.84	99.8	237.73	9.99	99.9	999.9	2	35.71
97.19	5.65	99.8	236.23	9.98	99.8	259.28	2	40.86
105.17	3.88	99.8	181.28	3.76	99.8	158.12	0	26.4
96.76	1.63	94.86	135.82	3.72	99.8	149.5	0	23.67
103.39	4.18	99.8	190.23	4.87	99.8	174.26	0	28.88
105.05	3.04	99.8	174.62	9.99	99.9	999.9	2	26.16
101.95	2.1	98.2	153.63	9.99	99.9	999.9	2	25.15
94.3	1.59	94.36	139.62	4.68	99.8	167.55	0	26.25
105.12	3.31	99.8	179.19	9.99	99.9	999.9	2	26.4
97.4	2.26	98.81	148.72	4.56	99.8	160.71	0	25.44
97.24	1.67	95.24	142.84	9.99	99.9	999.9	2	25.79
96.88	1.62	94.7	141.34	9.99	99.9	999.9	2	25.62
97.97	1.56	94.09	139.79	2.74	99.7	149.74	0	24.69
90.76	0.72	76.47	118.53	9.99	99.9	999.9	2	24.57
95.68	1.19	88.22	131.23	9.99	99.9	999.9	2	25.2
96.7	1.13	87.16	129.9	9.99	99.9	999.9	2	24.49
91.18	1.13	87.18	129.73	9.99	99.9	999.9	2	27.22
99.67	1.98	97.61	152.28	9.99	99.9	999.9	2	27.21
104.41	2.92	99.8	176.79	9.99	99.9	999.9	2	28.44
98.95	3.01	99.8	178.58	9.99	99.9	999.9	2	31.63
96.7	1.96	97.47	151.55	9.99	99.9	999.9	2	28.57
96.05	1.66	95.15	143.64	9.99	99.9	999.9	2	27.31
109.13	2.88	99.8	175.9	9.99	99.9	999.9	2	26.04
93.93	1.34	90.98	135.31	9.99	99.9	999.9	2	27.03
102.87	2.53	99.44	165.93	9.99	99.9	999.9	2	27.11
99.38	1.94	97.37	151.16	9.99	99.9	999.9	2	27.11
100.86	3.84	99.8	194.53	5.37	99.8	188.62	0	32.79
102.27	2.75	99.71	166.56	3.35	99.8	155.34	0	27.01
96.57	2.12	98.29	155.98	9.99	99.9	999.9	2	29.76
93.9	1.17	87.94	129.04	3.8	99.8	155.32	0	25.24
93.99	1.33	90.83	131.64	4.24	99.8	157.55	0	25.06

BIOFEST	BITROCHA	WAISH	HIPS	PATERNAL	PATERN1	MATERNAL	MATERN1	FAMILY_N	BIRTH_OR	SINGLE_P	HAZ	THAP
26	34	81	94	1	2	1	1	5	2	2	-0.72	23.68
29	35	97	107	4	4	3	3	3	1	1	2.32	98.97
27	39	79	95	1	3	2	3	6	1	2	2	97.72
18	32	70	87	3	3	2	1	5	3	2	-1	15.89
26	32	72	92	4	4	4	1	5	3	2	0.64	73.92
32	33	78	90	3	3	2	1	5	1	2	-1.8	3.58
27	32	84	89	2	2	2	1	5	3	2	0.19	57.4
24	30	79	80	1	2	1	2	5	3	2	-0.93	17.58
23	37	74	92	2	2	2	1	6	2	2	0.39	65.06
23	32	78	90	2	2	2	1	5	2	2	-2.18	1.46
25	34	78	94	2	2	2	1	6	3	2	-0.38	35.15
28	38	97	114	2	2	2	2	6	1	1	0.95	82.9
23	31	78	91	4	4	4	1	4	1	2	-0.57	28.41
26	38	85	99	3	3	3	3	4	1	2	1.21	88.6
23	34	74	85	3	3	2	1	6	4	2	-0.75	22.76
30	47	88	101	2	3	2	3	4	1	2	0.78	78.35
27	38	80	93	2	2	2	1	4	2	2	1.02	84.64
29	42	78	91	4	4	3	1	5	3	2	0.39	65.32
23	33	73	82	2	3	2	3	4	2	2	-1.15	12.46
29	43	81	94	1	2	2	1	5	2	2	1.04	85.08
26	36	81	99	2	3	2	1	5	3	2	-0.6	27.34
27	41	81	91	3	3	3	3	4	1	2	-0.56	28.8
27	42	76	92	2	3	2	1	4	1	2	-0.63	26.41
32	43	77	98	2	2	2	1	4	1	2	-0.41	34.1
28	40	72	84	3	3	3	3	4	1	2	-1.87	3.05
26	37	79	99	3	3	3	1	5	3	2	-0.9	18.5
23	33	72	90	2	2	2	1	7	3	2	-0.69	24.54
23	36	82	98	2	2	3	1	4	1	2	-1.81	3.49
28	39	90	101			3	3	3	2	1	-0.07	47.24
28	33	88	100	3	3	3	3	5	2	2	0.91	81.92
29	41	94	105	4	4	3	1	4	1	2	-0.21	41.5
30	41	76	96	3	3	2	1	6	6	2	-0.69	24.54
25	36	83	93	2	3	3	1	5	2	2	-0.82	20.71
28	36	88	103	3	3	4	1	6	3	2	1.9	97.16
27	35	54	93	3	3	2	1	6	3	2	-1.27	10.29
30	35	94	97	1	1	1	1	5	1	2	0.59	72.13
27	33	96	101	3	3	4	4	5	2	2	-0.13	44.77
33	42	99	108	3	3	3	1	6	1	2	0.19	57.34
31	45	90	101	2	3	2	1	5	3	2	0.5	69.01
31	44	81	100	2	3	1	1	6	3	2	-0.73	23.29
29	38	78	93	4	4	3	3	5	2	2	-1.3	9.73
30	42	78	94	2	1	1	1	6	3	2	-1.33	9.14

SERIAL#	GROUPS	SEX	CLASS	AGE	AGE	AGE	AGE	COMP	WEIGHT	HEIGHT	WEIGHT	HEIGHT	WEIGHT	HEIGHT	WEIGHT	HEIGHT
1	1	1	4	10	2	122	45	134	70	54	29	44				
2	1	2	4	9	10	118	63	153	85	60	31	54				
3	1	1	4	9	1	109	50	144	90	56	28	43				
4	1	2	4	9	9	117	42	130	70	56	25	44				
5	1	2	4	9	5	113	47	139	75	54	29	47				
6	1	2	4	10	0	120	45	126	65	56	28	46				
7	1	1	4	9	4	112	45	135	70	53	27	47				
8	1	2	4	9	6	114	42	129	65	54	28	23				
9	1	1	4	9	8	116	43	138	70	53	26	50				
10	1	1	4	9	6	114	44	122	68	53	26	43				
11	1	1	4	9	0	108	45	130	70	55	27	44				
12	1	2	4	9	3	111	70	140	75	55	32	55				
13	1	2	4	9	1	109	68	129	68	53	27	47				
14	1	1	4	9	0	108	51	139	70	56	31	52				
15	1	1	4	9	5	113	40	130	70	54	28	42				
16	1	1	4	9	3	111	55	138	70	56	31	50				
17	1	2	4	9	4	112	52	141	74	56	27	47				
18	1	2	4	10	0	120	50	141	73	56	27	44				
19	1	2	4	9	7	115	43	128	69	55	24	49				
20	1	2	4	9	0	108	51	139	67	55	27	47				
21	1	1	4	9	3	111	43	130	63	52	27	46				
22	1	2	4	10	1	121	47	135	67	53	28	47				
23	1	2	4	10	0	120	46	134	63	55	27	43				
24	1	2	4	9	11	119	45	135	66	54	25	44				
25	1	2	4	10	1	121	39	126	62	51	23	43				
26	1	2	5	10	11	131	48	138	70	55	29	48				
27	1	2	5	11	0	132	48	140	72	54	28	41				
28	1	2	5	10	8	128	46	130	65	54	26	47				
29	1	2	5	11	3	135	58	146	75	54	30	52				
30	1	2	5	10	10	130	64	150	80	57	33	53				
31	1	2	5	10	6	126	62	140	70	56	30	57				
32	1	2	5	11	0	132	56	140	72	57	30	39				
33	1	2	5	10	10	130	52	138	67	55	31	53				
34	1	2	5	11	0	132	65	158	71	57	30	55				
35	1	2	5	11	0	132	50	136	65	52	27	50				
36	1	2	5	10	5	125	57	145	73	55	28	49				
37	1	2	5	11	2	134	57	145	73	56	32	53				
38	1	1	5	10	11	131	68	144	73	54	32	54				
39	1	1	5	10	7	127	56	144	72	57	29	50				
40	1	2	5	11	4	136	60	142	74	55	29	44				
41	1	1	5	11	1	133	46	135	71	55	29	47				
42	1	1	5	10	4	124	43	131	67	52	28	44				

الملخص العربي

تزايد الاهتمام بالسمنة لدى الأطفال لاعتبارها مشكلة عالمية. ويمثل هذا الوباء الخطير قلق على الصحة العامة نظرا للأثار الصحية الضارة المرتبطة به وبالإضافة إلى الآثار الصحية الضارة, فإن هناك مجموعة متزايدة من الأدلة التي تشير إلى توابعه الضارة المؤثرة على التكييف النفسي في مرحلة الشباب. وهذا يشمل, ولكن ليس على سبيل الحصر، الاكتئاب, السخرية منهم بناء على كمية زيادة الوزن, والعزلة الاجتماعية والتمييز, والتي ثبت أنها تؤدي إلى تأثيرات سلبية على احترام الذات في مرحلة الشباب.

ربما أكثر من النتائج النفسية, مثل عدم الثقة بالنفس والاكتئاب, بسبب المخاوف الناجمة عن زيادة الوزن فهي قد تؤثر على جوانب أخرى من حياة الأطفال, مثل الأداء الأكاديمي, ويحتمل أن تكون أكثر خطورة النتائج الاجتماعية السلبية في على المدى الطويل. وجدت أن الدراسات حول الأطفال الذين يعانون من السمنة المفرطة بالمدارس الابتدائية يعانون بقدر كبير في انخفاض معدل الذكاء, الأمر الذي يؤثر على أدائهم في المدرسة.

اوحت الأبحاث في الآونة الأخيرة بأن تأثير كتلة الجسم على السلامة الجسدية قد يختلف حسب الخصائص الاجتماعية والديموغرافية. وعلى وجه الخصوص، العناصر الاجتماعية المؤثرة على العوامل النفسية كنوع الجنس والأصل/والعمر.

الهدف من هذه الدراسة

الهدف من هذه الدراسة هو استكشاف العلاقة بين السمنة والتكيف النفسي والاجتماعي واحترام الذات,على الأطفال الذين يعانون من السمنة في المدارس الابتدائية الذين تتراوح أعمارهم بين 9-11 سنوات قبل سن البلوغ, ويتم مطابقة الأطفال وفقا لسنهم ووضعهم الاجتماعي والاقتصادي, ونوع الجنس ؛مع دراسة الحمية والأنماط الغذائية وعلاقتها بالسمنة والسلوكيات النفسية للأطفال.

العينة و طرق البحث:

العينة: اشتملت الدراسة على154 حالة من الأطفال الذين تتراوح أعمارهم بين (9-11) سنوات, وهذا حتى يمكن أن يتجاوب، الأطفال مع الاختبارات الإدراكية و لإمكانيه متابعة تحصيلهم الدراسي تم اختيار الاطفال من مدرسة أبو بكر الصديق بمنطقة الدقي بالجيزة بعد عمل مقياس وزن و طول لجميع الأطفال و اختيار العينة وتقسيمها إلى ثلاث مجموعات :

المجموعة (أ) والمجموعة (ب) ومجموعة ضابطة باستخدام مؤشر كتلة الجسم (مؤشر كتلة الجسم) الذي يعرف بأنه الوزن بالكيلوغرام مقسوما على مربع الطول بالأمتار (**kg/m2**). مؤشر كتلة الجسم أكثر من و / أو يساوي 85 %. يعتبر زيادة في الوزن ومؤشر كتلة الجسم أكثر من و / أو يساوي 95%. يعتبر بدانة.

المجموعة الأولى : 54 يعانون من السمنة المفرطة أي مؤشر كتلة الجسم أكثر من و/ أو يساوي 95%

المجموعة الثانية : 50 طفلا يعانون من زيادة الوزن أي مؤشر كتلة الجسم أكثر من و / أو يساوي 85 %

المجموعة الضابطة: شملت خمسين طفلا مع مؤشر كتلة الجسم الطبيعي في نفس المدرسة.

مواصفات الانضمام للعينة:

- الأطفال ما بين 9-11 سنوات في المرحلة الرابعة إلى السادسة الابتدائية.
- السمنة غير المرضية كل من الجنسين سواء بنين أو بنات.
- الأطفال قبل سن البلوغ (البلوغ يؤثر على التكيف النفسي والاجتماعي).

مواصفات الاستبعاد من العينة:

- السمنة الوراثية.
- الأطفال الذين يعانون من الأمراض المزمنة مثل (الداء السكري. الروماتيزم وأمراض القلب الخلقية.. الربو الشعبي وأمراض الرئة المزمنة وارتفاع ضغط الدم)
- الأطفال المتخلفين عقليا.

الأساليب:

- توضيح للآباء والسلطات المدرسية أهداف الدراسة. والفوائد المرجوة من المشاركة في الدراسة مع منحهم نتائج التحقيقات عندما تكون متاحة.

الوضع الغذائي:

- يتم تقييمه من خلال قياس الوزن والطول, و محيط الذراع, محيطات الخصر والفخذ. التقنيات مع استخدام معالم القياسات التي أوصى بهاTanner.

- الوزن بالنسبة للسن (وزن / العمر), والطول بالنسبة للعمر (الطول/ العمر) وتحسب القيم وفقا لمعايير منظمة الصحة العالمية بمساعدةAnthro Plus Software ويحسب محيط الذراع / العمر, باستخدام القيم التي تقدمها Frisansho كمرجع.

البيانات الاجتماعية والديموغرافية:

- سجلت على حد سواء وظيفة الأب ووظيفة الأم ومستوى تعليمهما، وظروف السكن, وعدد أفراد الأسرة وترتيب الطفل في الأسرة.

التناول الغذائي:

- هو إجراء من أجل الحصول على المعلومات النوعية والكمية من بنود مختلفة من المأكولات والمشروبات التي يستهلكها كل طفل، وعلى مدار 24 ساعة السابقة.
- وتم حسابها باستخدام جداول الاستهلاك الغذائي الخاصة بمعهد التغذية في مصر، وذلك لحساب متوسط المتحصل اليومي لكل طفل من مجموع السعرات الحرارية والمغذيات (البروتين والدهون والكربوهيدرات) والمغذيات الدقيقة (الفيتامينات والمعادن). وقد حسبت هذه المواد الغذائية كنسبة مئوية من المواد الغذائية اليومية الموصى بها برنامج الفئات العمرية(RDA).

التقييم النفسي:

أولاً: الأداء المعرفي: تم تقييمه من قبل مجموعة الاختبارات النفسية التي تتناول الذكاء اللفظي وغير اللفظي, والذاكرة, والتعلم, وحل المشكلات, والانتباه. الأطفال اجروا الاختبار فى جلسة واحدة. مدتها(45-60 دقيقة) بشكل فردي في غرفة معزولة منفصلة في المدرسة. الاختبارات هي:

- **Raven's Coloured Progresive Matricees**

لتقييم الذكاء العام للأطفال

- **اختبار التيقظ السمعي:**

وهذا يقيس قدرة الانتباه, وهو مقياس لمدى كفاءة وتحديد المحفزات بإشارة في سياق غير المحفزات

- **اختبار الذاكرة:**

وهو مقياس لحرية استرجاع تذكر أشياء مرئية وتصنيفها وهذا يفيد في بعض الجوانب في تحديد قدرة الذاكرة عند الطفل.

ثانياً: المقياس العربي للاكتئاب عند الأطفال (ACDI):

يحتوي على27 بندا موحدة للأطفال المصريين مستوحاة مـن Kovcs & Kazdin و تقوم بتغطية أعراض الاكتئاب حيث يقوم الأطفال بمواجهة أنفسهم من خلال ثلاثة بـدائل أي نادرا, وأحيانا أو غالبا.

ثالثاً: قائمة مراجعة مشاكل السلوك (PSC):

هي أداة موثوقة جدا وصالحة لتقييم المشاكل السلوكية للأطفال ما بين 4-16 عاما من قبل الآباء والمعلمين مصممة لتسهيل التعرف على المشكلات المعرفية والعاطفية والسلوكية و تتكون من 35 بندا تم تصنيفها من خلال ثلاثة بدائل أي أبدا, وأحيانا أو غالبا.

رابعاً: صورة الجسد:

وذلك عن طريق عمل دراسة للثقة بالنفس و علاقتها بإستعاب الطفل لصورة جسده فـي حجم أفضل من المظهر الحقيقي له وهو لتقييم مدى احترام الذات.

الإنجاز الأكاديمي:

تم التقييم باستخدام متوسط دراجات نصف العام و متوسط دراجات أخر العام في اللغـة العربية والحساب لكل طفل,وهذا يعتبر مؤشرا جيدا على الأداء الأكاديمي والتعلم.

كما تم استخدام القائمة االتي تستخد مها منظمة الصحة العالمية لتقييم المخاطر الصحية التي يواجهها الاطفال

التحليل الإحصائي:

لدينا دراسات شملت تحليل التباين، student's test للمقارنة بين الوسائل, وارتباط بسيط ومتدرج الانحدار المتعدد, اختبارchi-squared والمخاطر النسبية (RR) البيانـات تمـت معالجتها بمساعدة SPSS-Pc البرنامج الإحصائي للعلوم الاجتماعية تم وضع النتـائج فـي جداول و تحليلها.

النتائج:

- هناك اختلاف كبير فيما يتعلق بقياس الوزن / العمر والطـول / الـسن ومحيطـات الوسط والذراع و الفخذ بين مرضانا والمجموعة الضابطة.
- لم يكن هناك علاقة كبيرة بين البيانات الاجتماعية والديموغرافية أي كـلا الوالـدين "الوظيفة ومستوى التعليم"، وظروف السكن, وأفراد الأسرة و ترتيب الطفل.
- في هذه الدراسة,المرضى لديهم معدلات ذكاء أقل من معدل ذكاء المجموعة الضابطة ضوابط ولكن لا توجد فوارق في الذاكرة.
- حققت الحالات ارتفاعا عاما في المعاناة من المـشاكل المتعلقـة بالـسلوك النفـسي والاجتماعي و هذا يشير إلى أن لديهم مشاكل نفسية تتعلق الاكتئاب، واحترام الذات.
- حققت الحالات كما كان أعلى الدرجات في قائمه مراجعة مشاكل السلوك للأطفـال و هذا يشير إلى وجود مشاكل في الإدراك والعاطفة والـسلوك بالمقارنـة بالمجموعـة الضابطة.
- أوضحت ارتفاع معدل انتشار السخرية تجاه مرضانا بالسمنة وزيادة الوزن بالمقارنة بالمجموعة الضابطة
- أوضحت دراستنا ارتباط زيادة مؤشر كتلة الجسم بزيادة عدد بنود المأكولات النشوية والدهنية وقلة المعادن والفيتمنات التي يستهلكها كل طفل, على مدار الـ24 سـاعة السابقة.

مستخلص

مقدمة:

تزايد الاهتمام بالسمنة لدى الأطفال لاعتبارها مشكلة عالمية. و وبالإضافة إلى الآثار الصحية الضارة، فإن هناك مجموعة متزايدة من الأدلة التي تشير إلى توابعه الضارة على المدى الطويل المؤثرة على التكييف النفسي و االاجتماعي في مرحلة الشباب.

الهدف من هذه الدراسة :

الهدف من هذه الدراسة هو استكشاف العلاقة بين السمنة والتكيف النفسي والاجتماعي واحترام الذات،على الأطفال الذين يعانون من السمنة في المدارس الابتدائية الذين تتراوح أعمارهم بين ٩-١١ سنوات قبل سن البلوغ، ويتم مطابقة الأطفال وفقا لسنهم ووضعهم الاجتماعي والاقتصادي، ونوع الجنس مع دراسة الحمية والأنماط الغذائية وعلاقتها بالسمنة والسلوكيات النفسية للأطفال.

العينة و طرق البحث:

العينة: اشتملت الدراسة على١٥٤ حالة من الأطفال الذين تتراوح أعمارهم بين(٩-١١) سنوات، وهذا حتى يمكن أن يتجاوب الأطفال مع الاختبارات الإدراكية و لإمكانيه متابعة تحصيلهم الدراسي.تم اختيار الاطفال من مدرسة أبو بكر الصديق بمنطقة الدقي بالجيزة بعد عمل مقياس وزن و طول_ لجميع الأطفال و اختيار العينة وتقسيمها إلى ثلاث مجموعات(ا،ب،ج).

طرق البحث: *الوضع الغذائي*: يتم تقييمه من خلال قياس الوزن والطول، و محيط الذراع، محيطات الخصر والفخذ. *البيانات الاجتماعية والديموغرافية*: سجلت على حد سواء وظيفة الأب ووظيفة الأم ومستوى تعليمهما، وظروف السكن، وعدد أفراد الأسرة وترتيب الطفل في الأسرة. *التناول الغذائي*: هو إجراء من أجل الحصول على المعلومات النوعية والكمية من بنود مختلفة من المأكولات والمشروبات التي_ يستهلكها كل طفل، وعلى مدار٢٤ ساعة السابقة. *التقييم النفسي*:تم تقييمة من خلال عدة اختبارات و هى،الاداء المعرفي، المقياس العربي للاكتئاب عند الأطفال، قائمة مراجعة مشاكل السلوك و صورة الجسد. كما تم تقييم *الإنجاز الأكاديمي* لكل طفل.

النتائج:

هناك اختلاف كبير فيما يتعلق بقياس الوزن / العمر والطـول / السـن ومحيطـات الوسط والذراع و الفخذ بين مرضانا والمجموعة الضابطة.لم يكن هناك علاقة كبيـرة بـين البيانات الاجتماعية والديموغرافية أي كلا الوالدين "الوظيفة ومسـتوى التعلـيم"، وظـروف السكن، وأفراد الأسرة و ترتيب الطفل. في هذه الدراسة،المرضى لديهم معدلات ذكاء أقل من معدل ذكاء المجموعة الضابطة ضوابط ولكن لا توجد فوارق في الذاكرة. حققـت الحـالات ارتفاعا عاما في المعاناة من المشاكل المتعلقة بالسلوك النفسي والاجتماعي و هذا يشير إلى أن لديهم مشاكل نفسية تتعلق الاكتئاب، واحترام الذات. حققت الحالات كما كان أعلى الـدرجات في قائمه مراجعة مشاكل السلوك للأطفال و هذا يشير إلى وجود مشاكل في الإدراك والعاطفة والسلوك بالمقارنة بالمجموعة الضابطة. أوضحت ارتفاع معدل انتشار السخرية تجاه مرضانا بالسمنة وزيادة الوزن بالمقارنة بالمجموعة الضابطةأوضحت دراستنا ارتباط زيادة مؤشر كتلة الجسم بزيادة عدد بنود المأكولات النشوية والدهنية وقلة المعادن والفيتمنات التي يستهلكها كل طفل، على مدار الـ٢٤ ساعة السابقة.

الخاتمة:

تؤثر السمنه فى الطفولة على نتائج الاختبارات النفسية، مثل عدم الثقة بالنفس والاكتئـاب، وتؤثر على جوانب أخرى من حياة الأطفال، مثل الأداء الأكاديمي،كما وجد ان الاطفال الذين يعانون من السمنة يعانون بقدر كبير في انخفاض معدل الذكاء، الأمر الذي يؤثر على أدائهـم في المدرسة.

الكلمات الكاشفه :

السمنه-اطفال المدارس-النفسي الاجتماعى-الاداء المعرفي-الاكتئاب-الانجـاز الاكـاديمى-صورة الجسد.

شكر

اشكر السادة الأساتذة الذين قاموا بالإشراف وهم:

أ.د / عبلة جلال خليفة	أستاذ ورئيس قسم صحة الطفل – المركز القومي للبحوث.
أ.د / أحمد رؤوف أحمد	استشاري أمراض أعصاب الأطفال مستشفى الشرطة بالعجوزة.
أ.د / رحاب عبد القادر محمود	أستاذ طب الأطفال بقسم الدراسات الطبية للأطفال – بالمعهد.

ثم الأشخاص الذين تعاونوا معى البحث

وهم:

١-

٢-

٣-

وكذلك الهيئات الآتية:

١-

٢-

٣-

صفحة العنوان

اسم الطبيبة: هالة سعد عبد السلام حبيب

الدرجة العلمية: دكتوراة

القسم التابع له: الدراسات الطبية

أسم المعهد: معهد الدراسات العليا للطفولة

الجامعة: عين شمس

سنة التخرج: ٢٠١٠

سنة المنح: ٢٠١٠

رسالة: الدكتوراة

اسم الطبيبة: هالة سعد عبد السلام حبيب

عنوان الرسالة: (تقييم للتكيف النفسي في سمنة الطفولة لأطفال المرحلة الابتدائية)

أسم الدرجة: الدكتوراة

لجنة الحكم والمناقشة:

أ.د / عبلة جلال خليفة	أستاذ ورئيس قسم صحة الطفل – المركز القومي للبحوث.
أ.د / رحاب عبد القادر محمود	أستاذ طب الأطفال بقسم الدراسات الطبية للأطفال – بالمعهد.
أ.د / راندا كمال عبد الرؤوف	أستاذ طب الأطفال بقسم الدراسات الطبية للأطفال - بالمعهد.
أ.د / زينب محمد منير	أستاذ صحة الطفل بالمركز القومي للبحوث.

تاريخ البحث : ٢٤ / ١٢ / ٢٠٠٦

الدراسات العليا

ختم الإجازة:

أجيزت الرسالة بتاريخ:

١٩ / ٤ / ٢٠١٠

موافقة مجلس المعهد

٢٠١٠ / ٥ / ٢٦

موافقة مجلس الجامعة

/ / ٢٠١٠

معهد الدراسات العليا للطفولة
قسم الدراسات الطبية

تقييم للتكيف النفسى فى سمنة الطفولة لأطفـــال المرحلة الابتدائيـة

رسالة
للحصول على درجة دكتوراه الفلسفة فى دراسات الطفولة

مقدمة من
الطبيبة/ هالة سعد عبد السلام حبيب
ماجستير طب الأطفال

تحت إشراف

أ.د./ عبلة جـلال خليفة
أستاذ ورئيس قسم صحة الطفل
المركز القومي للبحوث

أ.د./ أحمد رؤوف أحمد
أستاذ طب الأعصاب للأطفال
مستشفى الشرطة

أ.د./ رحاب عبد القادر محمود
أستاذ بقسم الدراسات الطبية للأطفال
معهد الدراسات العليا للطفولة – جامعة عين شمس

٢٠١٠