

**THE CAUSES AND PREVENTION OF INJURIES OF LONG  
DISTANCE ATHLETES IN SOME SELECTED ADDIS ABABA  
CITY ADMINISTRATION ATHLETICS CLUBS**

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## **Abstract**

*Injury has been defined as body feeling that something wrong was happening (Deretke Clayton, 1981). One important element in determining the causes of injuries and prevention is having proper understanding of causes and ways of preventing as well as rehabilitation techniques. The long distance training requires prolonged hard working on the other hand the existence of biomechanical imbalance, too much running on the hard surfaces and training shoes contributes for injures in the bones, muscles, ligaments and joints in the acute and sever cases. The purpose was to find out and recommend the causes and prevention of injures in the long distance athletes. The area of the problems were scarcity of proper foot wear, absence of sport medicine professional, qualification of coaches, the training surfaces, prolonged training habits of athletes, and proper warm up and cool down, and stretching for flexibility increments and site conditioning and strengthen the ligaments and joints. The research methods selected for this study is descriptive survey research since the aim of the study is to describe facts. The primary sources of the data for the study long distance track athletes, the clubs coaches' club administrators and athletics professional as well as sport medicine physicians. And also the document analysis, IAAF coaching materials, important internet websites and provided important constructive topic under study. Questionnaires, interview, document analysis, discussion and observation were used in generating information from the respondents. These points raised as problem should be improved and understood by all stalk holders involved in the issues directly and indirectly to resolve the long distance athletes' injury in the course of training and races.*

# CHAPTER ONE

## 1. Introduction

This part of study deals with general background, statement of the problem, hypotheses, objectives of study, research equations, significance of the study, delimitation , limitation and operational definition of terms of the study.

### 1.1 Background of the study

The popularity of different sport activities has increased. A development has been considered beneficiary in many aspects for individuals as well as society at large. It serves as a major means for global peace and unity, a medium of cultural exchange among nations and discourages crime. But one of negative effects of this development, however, is increased number of sport injuries.

All athletes at different level to sustain injury depend on the sport medicine to asses and manage their injuries as soon as possible to return back as safely as possible when an athlete is injured, it is important that the athletes be rehabilitated to the activity level she/he was before injury with the least of re-injury occurrence and maintain high performance.

Athletics is a part of sport activity in which thousands of people throughout the world participate and in which many more million take an interest through certain media. Athletics is directly and indirectly a major industry involving high financial flow, athletes themselves securing material gain from competition. It is also a powerful political tool and considered by many nations to be a means of image building for many nations like Ethiopia. (Howard and Rose Mary Payne, 1981).

There is no free and pure sport competition than track and field, but it takes a lot of long, lonely hours to prepare for competition, and requires dedications, loneliness and hard work. (Walt Marusyn, 1978)

The track and field event consists jumping, throwing and running events .Among these, long distance event is one in which is popular in the track events. It includes 5,000m, 10,000m and marathon races.

Long distance runs are acquainted with Ethiopian in race and win in the world since Olympic champion participation. Many athletes have strong will to race and win the competition in different contests.

In most of training method for all running events indicated that long distance running prior to the start of the season is part of a good, well balanced training program.

Skeleton is arrangement of levers, which produces force for movement through involvement of muscles, bones, ligament and joints.

A long distance event by nature requires prolonged training throughout 365 days. The extensive repetitive movement of muscles, bones, ligaments and joints produce friction tear and wear of tissues, load weight on one side of a body and sudden change of motion on the body lever system. It affects the normal functioning of those organs, and creates damage, feels pain and injured different parts of body totally or partially, disturbs the system, especially the lower extremities of the body.

The bone fractures, cracks and breakage, muscle strains, ligaments strains, corns and blisters of foote, shine splits of legs, knee and ankle injuries are expected from the long distance events of its intensity, load and prolonged duration of training.

Most sport participants are not benefited economically but enjoy with their participation safely without having of injury and continue in the healthy life in their career of the job they attend. Sport professionals should encourage them those participants through awaking tackles like, injury and others.

The occurrence and rate of injury can be substantially decreased by proper preventive measures. Appropriate and adequate conditioning and the careful fitting of athletics gear and equipment according to individuals needs are pre-requisite to injury prevention. The improvement of training surface, facilities, and other equipments, careful treatment and consideration of injured athletes will assist in preventing further injuries. Inadequate conditioning is a contributing factor in high percentage of athletic injuries.

In the course of beginning training knowledge of bandaging, techniques, first aids and conditioning and reconditioning producers, checking the flexibility of joints tighten joints suspecting to muscle strains, tears, tendonitis and nerve pinch syndromes; loose jointed are more prone to develop ligaments problems and dislocation are important in minimizing the risk of injury.

The physical examination would serve as a screening device that permits physically and psychologically fit in all aspects to enter into athletics training and competition. The various cardio vascular, neurological, orthopedic and respiratory irregularities may aggravated by athletic participation and lead to injury.

The focus of this study, is the causes and prevention of injures in the long distance athletes, which is the one among factors that affect the performance of athletes. To maintain the pick performance requires understanding and prevention of injures.

## **1.2 Statements of the problem**

Athletics demands a lot long loneliness, dedication and hard working in order to compete and win the race in ever-changing technology and advancement of training science continuously. Actually, every activities has its own risk, injury is one that hinder the performance of athletes in different stages. Ethiopian is very popular in long distance athletics events since many years ago. Many athletes attempt to participate and win the race without considering his/her

level of fitness, training qualities, and understanding of risk of injuries associated with it.

The country has no equivalent coaches to train athletes as their numbers, and sport medicine professional to examine athlete's current status and future, and aware the potential risk of injuries as well as advice how and when it occurs. In addition, help athletes to be treated and rehabilitated, and back to pick performance.

The existing problems concerning to the causes and prevention of injuries in the long distance events are the following:-

1. Athletes and coach's poor understanding in selection and wear of sport, especially shoes.
2. Coaches and athletes awareness in the training terrain and its impact
3. Lack of understanding of athletes' deformities, biochemical imbalance like leg and foot length difference, knocked knee and bowlegged athletes and taking corrective measures.
4. Late responding for feeling of pain and aggravating through intensive and extensive training of injury.
5. Absence of first aid treatment knowledge, bandage, RICE application and organized rehabilitation training treatment for injured athletes
6. Lack of the value of proper warm up and cool down, and stretching in preventing the occurrence of injuries.

### **1.3 Basic Research Questions**

In order to design the popular identification methods of causes of injuries and how to prevent occurrence in the long distance track athletes the following questions were proposed.

- a. What would be the exact means to prevent the occurrence of injuries?
- b. What would be the possible cause of injuries?

- c. What to be done to minimize the potential causes of long distance track athlete's injury?
- d. How to identify the exact causes of injury?
- e. What would be the responsibility of coaches, athletes and team physician in the preventing the injuries of athletes?

#### **1.4 Hypothesis**

The problems of the causes of injuries in the long distance athletes in the Addis Ababa athletics clubs might be originated from the following issues:-

- A. Neglecting the impact of sport wears in causing injuries
- B. Absence of understanding on the deformities of athletes and its relation of causing injures
- C. Ignoring the training terrain irregularity influence in exposing for injuries
- D. Athletes believing in the extra training benefit and exposing them to the over-use injures.
- E. Absences of professional sport medicine expertise to aware and prevent, and treat the injured athletes.
- F. Little knowledge about the prolonged training and biomechanics of running how to causes injures.

#### **1.5 Objectives of the study**

##### **1.5.1 General objective**

The primary purpose of the study was to identify exposing factors of injury in the long distance athletes of Addis Ababa clubs and to recommend the prevention solutions to minimize the athletes' injury.

##### **1.5.2 Specific objective**

In order to address the peculiar causes of injuries in the Addis Ababa club athletes and to provide means to prevent in regarding to the above aim the following were specific objective:

1. To understand main cause of injury in the long distance athletes of Addis Ababa club.
2. To have information about how it is being managed
3. To understand who is the responsible in preventing and caring of injury.
4. To share the possible solution in preventing injuries
5. To provide information for further study
6. To aware the potential risk of injury existence and its relation with long distance.

### **1.6 Significance of the study**

The study would provide certain necessary information and enrich the athletes and coaches in awaring the potential causes of injury and preventive methods in the long distance athletes during prolonged training and races. In regarding to this, the following are significance of the study.

1. To share facts and investigations in preventing and possible causes of injures in the long distance athletes
2. To enrich and aware the coaches and athletes how the injures would be occurred and prevented
3. Awaring the causes of shoes, training terrain and prolonged training program for the occurrence of injures
4. To incorporate some new result of the findings into the prevention of injuries
5. To provide favorable suggestions that help in preventing injures

### **1.7 Delimitation of the study**

The study is delimited by the general objective as to what is the problem in preventing the cause of injures in the long distance track athletes and to suggest the favorable solutions on the prevention of injures in the specific case of Addis Ababa athletics clubs.

## 1.8 Limitation

In the course of conducting the study a number of limiting factors encountered, respondents had the tendency to hide in providing the exact response as what they are existing and attempt to keep secret of their clubs. In addition, the scarcity of time to assess different views to incorporate and keep the standard of the study.

## 1.9 Operational Definitions

The following terms were used throughout this study, for clarity of their meaning and usages of the terms are defined as follow:

**Athletes:** - are people who train for performance increment under the supervision of a coach in specific event and club.

**Biomechanics:** - is the study of the working interrelationship of a bones, muscles and tendons.

**Club:** - is an athletic organization that provides training and other benefits for the athletes

**Coach:** - is a person who trains an athlete to reach top performance.

**Federation:** is an organization that governs and directs different athletics clubs

**Injuries:** - are simply body tell that something wrong was happening (Derek Clayton, 1981)

**Long distance race (LDR):-** is an athletic event that includes 5000m, 10,000 m and marathon races.

**Skeleton:** - is an arrangements of levers, all moved by muscles.

**Sprain:** - is the partial or complete rupture of the ligaments holding a joint together.

**Strain:** - is an over stretching or rupture of a muscle or tendon

**Training:** - is a systematic process of repetitive, progressive exercise or work involving learning and acclimatization (Klafts and Amheim, 1980)



## CHAPTER TWO

### 2. Review of Related Literature

This section deals about the running forms of athletes, biomechanical imbalance, deformities, effects of shoes and training surfaces, and long distances training and its impact on the muscles, ligaments, joints and bones.

### 2. The First Key to Health and Balance

#### 2.1.1 Staying on Track

When mind and emotions have one set of goals and athletes' body has another, athletes are not in balance. A portion of athletes available physical energy is drained away, diverted from mind's objective. The conflict between mind and body leads to fatigue and fatigue leads to injury because the body doesn't care if you win a race.

Good health is matter of balance and integration in the four dimensions of your life. When you feel great, there is an abundant, ready energy in your physical body, a teasing joy in the heart, clarity in the mind and spirit, and a sense of union that is still best; you achieve the best results with the least amount of effort.

Sports and exercise are considered healthy outlets for emotional upsets such as anger or depression. However, sports and exercise can also become an obsession or replacement for other, less successful, parts of our lives. Any of the positive qualities that athletics require can become potentially harmful, just like any other imbalance. Perfectionism, controlling behavior, anxiety, willfulness, self-criticism, and impatience grow well in the fertile ground of negative addition (Dr. Steven Subotnick, 1980:5).

## **2.2.2 The four Phases of Running**

As (Dr. Steven Subotnick, 1980) there are four psychological stages of running which, are common to all athletes. The beginning runner, the casual runner racer, the obsessive runner racer, and the seasoned runner.

### **2. 1.2.1. Beginning Runner (Phase 1)**

Running is a form of adult play, which means that is voluntary and it is not seen as particularly productive although its health benefits are usually the motivating factor in the first run. Phase-1 beginning runners-run for fun, to reduce stress and to stay in shape.

### **2.1.2.2. The Casual Runner (Phase 2)**

The runner who occasionally races- serious, but not obsessed about running. Runs about 30 miles a week average and tend to run 5 to 7 miles a day. It will rarely train for a marathon. At this stage, runners enjoy the benefits of the runner's high and use running for stress reduction. With a healthy sense of proportion, you have no qualms about taking avocation or missing a week or two running. If injured, you follow instructions to cut down on mileage and are very cooperative in rehabilitative programs.

### **2.1.2.3. The obsessive Runner-Racer**

Runners are the obsessive-compulsive runner. At this stage, you are psychologically and physiologically dependent on the runner's high and the chemical released during the exercise. Runners devote at least 90 minutes a day to workout. Run under 8 minutes per mile.

Because runners have trained so hard, runners are prone to feel invincible, assuming that you are invulnerable to injury. Runners generally do not want to take responsibility for their injuries and blame doctors or even family members if do not recover rapidly. During recovery, they tend to become depressed, angry, and quarrelsome.

Runners' recovery is successful if they are given a strong program of physical therapy and rehabilitation, lots of reassurance and help with redefining goals. Runners are clearly addicted to sports, for better or worse runners' withdrawal depression is real. Frank Shorter, who has been labeled as "the man who invented the marathon" exemplifies the phases 3 runner with the statement quoted in the lore of running by Dr. Tim Noakes, "the personality – independent, introverted, single minded, self reliant. Self confident, distrusting that enabled that to excel as an athlete in full health, hindered that when that became an athlete in pain.

#### **2. 1.2.4. The seasoned Runner (Phase 4)**

Runner who has surpassed the pitfalls of phase -3. They have mellowed, become wiser, more in tune with the true needs of athlete's body, mind and spirit. Athletes are more interested in casual competition rather than intense racing. Athletes are satisfied with an 8 or 9 minute mile. At this stage, even if you do get an injury, listen to doctor's advice, follow recovery instructions well and philosophically accepting some limitations.(sports and exercise injuries,1980:6-9)

#### **2.2 Over-use Injuries**

Running more than five days a week increases the risk injury by fifty percent. This indicates/implies enemy important consideration for your training program. Too much of a good thing can be hazardous to athletes health.

Training is the process of adapting to stress. Training for peak performance is by definition, a razor's edge between disaster and great results. Therefore, if you are willing to train at the highest level of completion, then be aware of the increased risk of injury and don't be surprised or hard on yourself if it does occur.

Over-use injuries are an accumulation of micro traumas-minis tresses that set stage. overusing the body, taxing it consistently with little time for rest and

integration of new achievements, takes a toll and ripens the conditions leading to injury. Suddenly, one morning or evening, you strain, sprain, or break something. Over use injury also means that there is susceptibility present in your tendons, ligaments, muscles, joints and bones that open the door for a variety of ills from runner's knee to a sudden trauma such as a broken leg. (Dr. Steven Subotnick, 1980:14)

### **2.2.1 Mental Attitudes that cause overuse injuries**

1. Pushing athletes to the limit, excessive competition with self or others (as in the week end only sports man who subjects himself to unprepared – for- stress)
2. Addiction to routine without regard to conditions such as hunger, illness, injury or sheer fatigue.
3. Putting unrealistic demands on yourself such as running when fatigued or ill, or returning to your regimen before an injury has had proper time to heal.
4. Using your sport as the only focal point in your life (getting your emotional needs met from only one source)

### **2.2.3 Training Errors**

Arthur Newton, one of the most phenomenal distance runners, said, “Nature is unable to make a really first class job of anything if it is hustled”. Sport of running, gradual, gentle training recognized as a key concept. Advocated setting a weekly, not a daily schedule since “you can't tell what the temperature, the weather or your own condition will be on any day.”

This technique of listening and responding to your body during training is the foundation of total fitness. (Dr. Steven Subotnick, 1980:10)

#### **2.2.2.1 Nine Rules of Newton's in lore of Running**

Beginning runners start too rapidly and train too hard, they emphasize speed rather than distance, religiously following a rigid training schedule without listening to their bodies. Then, when you become racers, they over train; they

race in training and run time-trails and race too frequently, they fail to train specifically, they do not rest sufficiently before races, and they ignore the importance of mental preparation for competition.

These errors are basis of many injuries. Alternating days of intense effort with days of rest or substitute activities such as swimming drastically reduces the risk of injury.

Another major training error is ignoring proper, balanced exercises for strength, flexibilities and balance. In some cases, vast amounts of repetitive training strengthen, for example, muscles on the back of legs, but leave thigh muscles in the front proportionately less strong. Muscle strength imbalance is a biomechanical weakness which leads to risk of injury. Before competing in a 10 km race, practice running a 10 Km race. Always practice and simulate the event you are going to do.

#### **2.2.4 Coaching Errors**

A coach is a powerful authority figure in any athlete's life, and psychological intimidation, real or felt, can make us negate our own true feelings. Don't be persuaded to participate in a sport or activity. Don't let your coach push you so hard that you feel over whelming fatigue. Be aware of a coach who only stress the physical aspects of training, or who only concerned about winning at all costs. Check the level of any program you start, if you have any history of risk factors (obesity, smoking, family heart attacks). (Dr. Steven Subotnick, 1980:12)

#### **2.2.5 Poor Equipment**

Poor equipment, in this case, shoes that inadequately controlled the foot, cause injury. Example, if your foot rolls towards the inside (pronation) without corrective device (foot orthotic), you risk a strain to the knee and upper leg losing the shock absorbency of the sole endangers athlete during running.

The mid sole of a shoe starts to fatigue between 500 to 750 miles of wear. If the liner is too compacted, it could be responsible for pain on the bottom of the foot near the heel or on the ball of the foot.

Tread mill analysis has shown that running bare foot results in better form than running in soft, sloppy shoes. Select shoes according to the types of activity athlete will be doing.

High top shoes give increased strength and control. If you have instability or muscle weakness in the ankle area, high-tops shoes offer increased support.

Another advantage of high tops, when running on uneven terrain, is the increased “communication”(proprioception) between nerves in the ankle and brain. Even though the high -top shoes increases your muscle strength in the ankle by only 10 to 15 percent (over- a low- top-shoe) this increase may be enough to prevent a sprained ankle. (Dr. Steven Subotnick, 1980:13)

## **2.2.6 Biomechanics Imbalance**

In addition to coaching and training errors or poor equipment, overuse injuries stem from imbalances or abnormalities in your skeletal structure. Misalignments in the athlete’s hip, thigh, knee, ankle or feet create maladaptations that, under the repeated movements of running become painful problems. According to the rule of three, minor imbalances in the pelvis, leg or foot are three times more significant during the stress of running than at rest. For instances, if one leg is  $\frac{1}{8}$  “shorter than the other, when athlete exercise, the body compensates to a degree equal to  $\frac{3}{8}$  “discrepancy. An imbalance of 3 degrees in the foot of anon-athlete is exaggerated to the equivalent of 9 degrees in an athlete. (Dr. Steven Subotnick, 1980:14).

## **2.2.7 Warning Signs of over-use Injuries**

### **2.2.7.1 Mental**

- ❖ Inability to concentrate , feeling scattered, agitated and unproductive

- ❖ Sleep disturbance (walking up in the middle of the night or trouble falling asleep).
- ❖ Rigidity in problem- solving ( choices are polarized- everything is either black or white , with no possibility of compromise)

#### **2.2.7.2 Emotional**

- ❖ Irritability
- ❖ Fault finding
- ❖ Feeling of defeat or ineptitude
- ❖ Paranoia , jealousy
- ❖ Depression
- ❖ Anxiety

#### **2.2.7.3 Spiritual**

- ❖ Extreme egotism
- ❖ Lack of concern with others
- ❖ Lack of relationship with self, others, and the world.
- ❖ Depression, irritability or anxiety after discontinuing a sport
- ❖ Little sense of identity beyond the sport
- ❖ Winning at all costs

#### **2.2.7.4 Physical**

- ❖ Stiffness and pain while exercising, if ignored, pain may continue after exercising, or may be present in normal walking. If ignored further, it eventually prevents participation in sport or normal activity
- ❖ A feeling similar to a low grade infection (no energy, easily fatigued)
- ❖ Frequent colds, flu, or cold sores, frequent biting of the lips, tongue or the inside of the cheek
- ❖ Low performance even with effort
- ❖ A resting pulse in the morning that is at least 10 beats faster than normal.  
(Steven Subotnick1980:16)

## **2.2.8 Acute Injuries which may warn of overuse injuries**

- Cuts, bruises, bleeding
- Swelling
- Inflammation
- Broken bones or fractures
- Strained muscles and tendons
- Sprained ligaments and joints
- Dehydration or heat exhaustion
- Cold sweats during exercise
- Dizziness
- Un-coordination

The biggest risk for you, the active person, is not the sudden accidental injury, but the condition of susceptibility caused by the wear and tear of small amounts of stress accumulated over time. Athletes are most likely to injury when athlete's judgment is impaired by mental and emotional blind spots such as egotism and exercising for false purposes. Training and coaching errors, poor gear, and biomechanical imbalances will expose to both long and short term problems (Steven Subotnick, 1980:16)

## **3. Biomechanics: Athlete, Athlete's body and Running**

Every act is a demonstration of the magic of biomechanical functions between our brains, our hearts, our bones and our muscles, and tendons. During a run, athlete bend ankle about 800 times every miles. If athlete weighs 150 lbs, you subject your foot bones, according to the sports "Rule of Three," to force of 450 lbs every time you come down on the ground. The force of your shin bone pressing on ankle bone can be more than 1500 lbs, Acceleration (running is responsible for the increased force under your feet.

If there is any misalignment in your legs – for example, shortness in one leg– your body compensates to balance you. Under repeated stress with no time for



gradual conditioning, tightened muscles and tissues begin to bruise and tear. Pain signals an area in danger. It is that simple. The body speaks the only way it can- with pain, tension, or ruptures. (Sports and exercise injuries, 1980:p17)

### **2.3.1 Normal Feet**

The flexibility, endurance, muscle tone and strength change silently and subtly to age from 10. Development is skeletal structure proceed quietly, according to a programmed schedule. The foot starts out loose and flexible, gradually tying pieces together until around the twentieth year. Little feet are soft and malleable, don't buy a child a small, rigid adult shoe which will restrict or distort normal growth.

Over the years, foot changes according to the types of shoes you wear, the exercise you do, and other factors like diet or disease. Heredity plays a big factor in the problems you may develop, too, so choose your parents wisely!

### **2.3.2 Anatomical Irregularities in the Foot**

#### **2.3.2.1 Short first toe (Morton's foot).**

The potential problem for runners with Morton's foot is that the short first metatarsal bones is too mobile and does not carry its full load. It shifts the weight to others areas, causing a variety of problems. A foot orthotic (an insert in the shoe) may help redistribute the weight and alleviate the pain.

#### **2.3.2.2 A dropped for foot**

"A dropped" fore foot, which means the ball of your foot is actually lower than heel. When you run with a dropped forefoot, you land on the ball of your foot first, then rock back on the heel. This stress the bones of the toes where they join the fore foot, creating excessive callused and straining the muscles on the bottom of the foot. This anatomical abnormality also strains the Achilles tendon during running and fast walking. The solution is to redistribute the weight with a heel lift or foot orthotic (insert) taking the pressure off the fore foot- where a giant callus may develop. (Sports and exercise injuries, 1980: 21)

### **2.3.3 Types of Arches**

2.3.3.1 Normal Arch:-50 percent of the population has an arch that leaves crescent-shaped space on the side. A straight line axis can be drawn between the middle to the rear foot and the tip of the second toe. A large, unsupported space is between the end of the fore foot and the toe prints.

2.3.3.2 Flat or low arch:-20-25 percent of the population has a collapsed arch; the whole under foot contacts the ground and is used for support. The foot is not on a straight axis, but turned outward. The remedy, in this case, is a custom – made foot orthotic to reestablish a normal arch. Feet change with activity and age with increased activity over time; your feet get longer and flatter as arches become lower.

2.3.3.3 High arch: - 20 – 25 percent of the populations has an arch so high There is no connection between rear foot and fore foot or the fore foot and toes, this foot is more rigid and poorly absorbs shock.

Sometimes the biomechanical misalignments and abnormalities are slight and very subtle, so that in every activity they really don't cause problem. For instance, a high –arch foot may appear high, but flatten with running. Evaluation of the arch in motion is often necessary to see what is really happening.

The pressure coming down on the foot, proportional to the amount of surface area, is highest on the high-arched foot. High– arched feet quickly and are least able absorb impact since they have so little contact with the ground. High arches are relatively rigid and rigidity does not allow for dissipation of the shock. Not only does a high arch get more shock, it is ill-equipped to handle it. The impact then is transferred to the bones of the ankle and shank.

Wearing high-heeled shoes creates a higher arch and can lead to toe problems such as clawed toes or pain on the top of the toes. To avoid cramps at night

after wearing high heels, stand against, the wall and stretch out your heel cords. Don't wear high heels, since they are very bad for feet.

What to do high arches. First, look for a shoe very cushioned midsole and a deep toe box. The toe box must be big enough to accommodate the increased thickness at the ball of the foot. This thickness is due to the higher arch, and the tendency for the toes to clam or Scrunch up (hammer toes). Another thing must do with high arches is to stretch the heel cord by exercising. Thirdly, orthos are necessary to increase shock absorbency and flexibility.

### **2.3.4 Feet Function**

#### **2.3.4.1 Normal Pronation and Supination**

When foot touches the ground as you run, it rolls inward (pronates) slightly in order to absorb the shock of impact. The shoes absorbed by pronation, is further dissipated as the arch of the foot flattens under your weight. Besides absorbing shock, this flattening (pronation) “unlocks” the foot and causes it to be a loose bag of bones, allowing it to adjust to the surface underneath. Normal pronating (i.e. non –excessive movement in ward), is necessary for you to stand and support yourself. Trouble comes either when you roll inward too much or roll in ward at the wrong time during contact.

When running foot is on the ground (mid-stance), it is balanced. This is necessary for maximum efficiency and safety. Once the foot is balanced, the foot has normal arch in preparation for the next movement which is “locking” (Supination). Supination enables the foot to become a lever which then propels you forward in to toe- off. The foot must lock (Supination) before the heel lifts off the ground so that stresses will pass straight out through the first and second toes. A flat, loose foot, like a wobbling bowl of Jelly beans has little propulsive ability. An overly-rigid foot (excessively Supination) during propulsion is unstable on the outside (laterally and susceptible to sprains. A rigid foot puts more pressure on the soft tissues, creating corns, calluses and blisters.

During running, foot on ground 250 mill seconds (1/4 of a second), walking foot on ground 750 mill second (3/4 of a second). Usually; you run two or three times faster than walk, and you are running, heel contact can be as little as 25 mille –seconds (1/10<sup>th</sup> of a quarter of a second).The muscles ability to respond (reflex) takes 35 milli-seconds. The shock, coming faster than the body’s ability to respond, cannot be absorbed.

In a few mill –seconds, the foot performs three functions

1. On contact with the ground, the foot must phonate enough to be loose, mobile, and adaptable to a possibly uneven surface
2. On mid- stance (When the foot is flat on the ground), the foot must be balanced and flexible, preparing to become a rigid lever for toe- off
3. On toe-off, the foot must suppurate to become rigid and propulsive

When you run or walk fast, your feet are closer together than when you stand, which puts more pressure on the outside of the heels. Being closer together also causes you to roll in more (pronation) in order to get your shoe flat on the ground Pronation of the foot causes internal rotation of the leg, knee, thigh and hip. It causes the knee to bend inward (knock-knees or genus valgum) This normal rotation in the knee to bend in ward (knock-Knees or genus valgum) This normal rotation in the Knee, Leg, or thigh is major contributor to Shin splits, runner’s knee, and hip strains and also cause low back pain.

- The body sub-Consciously compensates for discrepancies in alignment
- One way your body may attempt to level the shorter sides is by pulling the foot on the shorter side to the outside (over–supination).
- On other side your body may try to level the longer side by rolling it in too much (over-probation ), or keeping the Knee on the long side in a fixed position to shorten it
- With a small deformity of 1/8 inch your body may compensate by raising your arch. Since these compensating movements interfere with the normal biomechanical function, you are beginning to accumulate tiny amounts of

stress which can with ultimately create an over-use injury. (Sports and exercise injuries, 1980:25-27).

### **1.3.4.2 How to Balance athlete short leg**

- If there have a difference in leg lengths less than  $\frac{1}{4}$  but are experiencing no pain, then you don't need to do anything. If there have been having a pain in the legs or spine, try adding a heel pad in your shoes (This can be rubber, cork or felt)
- If there have a leg that is  $\frac{1}{4}$ " Short, put a piece of sponge rubber about  $\frac{3}{16}$  in your heel to add height.
- If there have a  $\frac{3}{8}$ " discrepancy, use a  $\frac{1}{2}$  pad. For do it- yourself padding or from sporting goods store.
- If you have a leg is  $\frac{3}{4}$ " too short, you will have to have a shoemaker built up the midsole of your shoe.
- If the shortage is more than  $\frac{3}{4}$  inch, you need to do more than Just pad He heel. So let us say you had a inch discrepancy, you would build up the heel 1 inch, build up the ball of the  $\frac{1}{2}$  and build up under the toes  $\frac{1}{4}$ "
- If you are a woman with a inch leg discrepancy, you can build up and heel of a high heel shoe  $\frac{1}{4}$ " and take off  $\frac{1}{4}$  on other heel, and no one will know the difference. (steven subotnick, 1980:29).

### **2.3.5 Biomechanical Action (Body parts aligned in motion)**

#### **2.3.5.1 Running check**

To check your form, run with a friend Have he/she watch you in front and back to see how you run, how your feet hit the ground and general form. If one foot is doing something different than other foot, you have a problem.

#### **2.3.2.2 How to much pronation Affects the knees**

Excessive rolling of the foot to the center rotates the ankle bone (talus) which transfers in ward motion to the shank, creating a screwing motion against the knee joint which was not designed for that motion.

This kind of problem occurs in the marathon runner. The pain would begin when an increased run over 50 miles a week. When such problem happened orthosis for the inside of his shoe and recommended knee exercises. And run uphill to strengthen the inner thighs (quadriceps.)

### **2.3.2.3 Too much Rotation at the Hips**

Athlete may inborn with rotational imbalances or tightness about hips. These cause otherwise healthy feet to compensate abnormally (toe in or toe out) and hurt. For example, normally, when knee cap is facing forward, you should be able to rotate your knee either in or out with flexibility at the hip. If Athlete do not have that flexibility, stretch out the hips with exercise.

### **2.3.2.4 Misalignment that cause knee pain**

Varus means simply that a part of the body faces toward the midline. Valgum means that a part of the body faces away from the midline.

A) Tibial varum or valgum:- Bowlegged stance, since the lower leg bone (tibia) is pointing towards the midline (varus), we call this condition tibia varum. Conversely, when tibia points away from midline, this is tibia valgum or called Knock knees. These two abnormalities put abnormal pressure and stress on connecting parts, which eventually cause problems with repetitive use.

These two misalignments can be caused by congenital deformities or acquired through injury, or occur temporarily (functional misalignment) as you run. Functional varus happens in running, even though your legs do not have anything wrong anatomically, because your legs are closer to the midline of the body.

Remember that your feet get closer together when you run; therefore, running and fast walking create bow-legged effect. Women, who typically have a wider pelvis for child bearing purposes, have more tendencies for functional varus in running because they must bring their legs into a greater degree than slimmer-

hipped people. Most people are a bit bow-legged and have tibial varum when walking.

- B) Fore foot varus:- shank of the leg may have tendency to turn in or out. These two abnormalities. Fore foot varuses cause foot to be too mobile, with excessive pronation (rolling inward). It leads to bunions, hammer toes, neuromas, plantar fasciitis and even heel spurs. It also leads to shin splints and runner's knee and may be associated with hip or low-back pain. This is the most common foot imbalance, and is often implicated in walking and running problems. These feet will need corrective foot orthoses.
- C) Fore foot valgus:- The opposite of fore foot varus is fore foot valgus. This stiff foot with a callus on the ball of the foot, bent or clawed toes (hammer toes) and a high arch. Problems include metatarsal stress fractures, sesamoiditis and plantar fascial strains.
- D) Rear foot varus:- This is abnormal leg with the heel bone perpendicular to the ground and the metatarsal heads perpendicular to the heel. However, varus tendencies can appear in this area, too. In order for the inward turning heels (varum) to reach the ground, the arch must collapse, creating a tendency of instability excessive pronation. This causes pain or injury commonly associated with pronation, and at the back of heel or Achilles tendon strains. The remedy for this is rear foot control with a strong shoe counter.
- E) Rear foot valgus:- rear foot valgus (outward turning heels) forces the foot to pronate to the extreme. The valgus creates a low arch on the inside of the foot and the tendency for flat-footedness. These heels will be helped by strong shoes with a deep, firm heel cup, and heel stabilizer foot orthotics. The rear foot valgus foot is associated with pain at the outside of the ankle and foot (sinus tarsi syndrome) and inner arch cramps and strains. (Sports and exercise injuries, 1980:27-33).

#### **2.2.4 Running Form**

Good Form of run, the runner is erect, not leaning with his head or bending back. Arm, shoulders or neck should be relaxed keep your hands loose, using

no extra energy in clenching the fists, and holds slight down-ward angle at your forearms. Wear layered clothing according to the temperature and of course, proper shoes. Running on a soft, level surface is best because it reduces shock of impact.

Poor form creates stress. For example if the runner is bent-over, swinging his arms too much, elbows too sharply flexed, and hands tightly clenched. This kind of form will be much more fatigued athlete of the run. The right arm controls the left leg and vice-versa (steven subotnick, 1980)

#### **2.2.4.1 Arm Swing Creates stress**

Swing arms back and forth across your chest with your legs stationary. Feel how the pelvis rotates on the spine in proportion to the amount of arm swing swinging arm parallel- is much more effective aerodynamically as well as less stressful on the pelvis. With cross-chest arm swinging, create feeling pain at the small of the back

#### **2.2.4.2. Uphill and downhill stress to the pelvis and hips**

uphill runner is titling his/her pelvis forward which limits his/her ability to swing his/her hips forward and puts greater stress on the muscles of the lower back. Downhill runners tilts his relives backward, causing low back pain especially if he/she already has too much curve in the spine (lordosis) (Sport and exercise injury,1980:37)

#### **2.2.4.3 Foot plant**

Over striding (when foot lands in front of your counter of gravity) wears out the heel of your shoe and creates more foot slap. When under stride; and the foot Lands behind the Center of gravity, you wear out the toe of your shoes.

#### **2.2.4.4 Other factors Affecting Biomechanical Function**

Speed, asphalt and concert. The faster you go the more impact shock hits your bones and joints. To make matters worse, the faster you go the less time your



foot is on the ground. As pace increases you are running more on the balls of your feet, and this can cause problems there and in the toes. Common problems are inflamed nerves (neurmas), calluses, and metatarsal stress fractures.

You need to protect feet if the work out on hard surfaces like pavement synthetic track. Because these hard surfaces don't have a chance to flex naturally like on grass or the jungle floor.

The fastest running ground is grass or level dirt road without holes looks or hidden rocks. Running on grass can sometimes cure stressed feet. Do not run in the sand because your heel sinks down and pulls on the Achilles tendon.

Hills are good; running up hills is safety for two reasons. Impact shock and weight distribution. First, the impact shock for uphill running is only two times body weight, whereas level running is three times body Wight and down-hill running is four times body weight. Secondly, uphill running shifts your weight forward onto the ball of the foot, causing you less jarring shock. So run uphill, walk down hill.

Fatigued muscles don't absorb as much shock. When you have proper contact your instate of balance above the foot. Muscles, therefore, absorb as well as produce energy, thus protecting bones and Joints. (Sports and exercise injuries, 1980:34-37).

#### **2.2.4.5 Shoe-wear check for Biomechanical stress**

If your shoes are wearing out along the outside area you are probably bowlegged and have a high arch. In addition the wear on the outside, you sprain your ankle a lot (Adapted from sport exercise and injures).

### **2.4. Training for Runners**

#### **2.4.1 What can do to achieve total fitness**

Exercise for strength, flexibility and endurance

- ❖ To test the current Level of flexibility
  - Stand up straight, feet together
  - Bend slowly from the waist, knees straight. Touch floor with finger tips
  - If you can't touch the floor, you need some form of stretching exercise such as yoga. Do at least 30 minutes of yoga or stretching three to four times a week to remain flexible.
- ❖ To test your abdominal tone and strength
  - Lie on the floor with knee bent and feet on the floor. Extend arms at sides
  - Try to raise your chest off the floor, keep waist on the floor for safety, hold for a count of 5. If you have trouble doing the raises, you need to develop abdominal muscles. Do 5 curls, brief rest 5 curls, rest, 5 curls.

Exercise non-stop for at least 20 minutes a day (cardiovascular exercise).

**Assess your current level of endurance with this 12 minutes walking test**

<b>Rating</b>	<b>Distance covered in 12 minutes</b>
World class	over 2miles
Excellent	1 ½ to 2 miles
Good	1+0 1 ½ miles
Fair	¾ to 1 miles
Poor	½ to ¾ mile

- Run 20 – 40 minutes a day, 3 to 5 days a week (about 10 to 20 miles)
- Drink ½ gallon of water a day
- Keep your weight in reasonable range
- Eliminate smoking
- Moderate alcohol consumption
- Release unhealthy stress and poor attitudes (steven subotnick, 1980)

**2.4.2 Training Tips for Runners**

If athletes are under 30: check with doctor if you have cardiac condition, hypertension, weight problem, heavy smoking habit, diabetes, high blood cholesterol level, breathing problems irregular pulse, joint or back problems, family or personal history of any heart problems.

**Over 30:-** conductor before starting any vigorous exercise program. You examine should include a review of medical history, electro cardiogram, blood pressure, serum cholesterol and discussion of your Jogging or running program.

**Over 40:-** see doctor before starting any vigorous exercise program. A stress test with electronic devices recording heart beat and other body functions may be recommended by doctor.

- ❖ Women-walking, Jogging or running during menstruation may help alleviate cramps. It can be also helpful during pregnancy when done under a physician's supervision (sport and exercise injuries, 1980:296).

#### **2.4.1.1 Warm up -Cool down**

Do not cutting down the warm up or cool-down time, you risk more injury by cutting back on the warm-up.

If you absolutely can't do the warm up, then do 10 minutes of medium to brisk walking before you start running. But be sure to finish the run with 9 minutes of stretching.

If you don't do flexibility exercise, you're not eventually prepared for over stretching. Be aware that the longer you run, the tighter you are going to get, which limit the range of motion of the joints and Ligaments. Your stride will shorten, and your running will be less efficient.

The purpose of warm up- exercises is to prepare the body for the demands of running or playing a fast paced sport by raising the temperature and increase blood flow to the muscles. A good warm up provides:-

- Increased blood flow to muscles
- Higher state of oxygen exchange between blood and muscles
- More oxygen pleased within muscles
- Higher metabolic rate

- Faster nerve impulse transmission
- Decreased muscle relaxation time following contraction
- Increased speed and force of muscle contraction
- Increased muscle elasticity
- Rehearsal effect (the body practices muscular patterns to be used later)

### **2.4.1.2 Pre-warm up**

- Pre-warm up your muscles and increase breathing by doing one of the following for 3 to 5 minutes:
  - Running in place
  - Walking up and down stairs
  - Free form dancing
  - Do 15 minutes on an exer cycle (adapted from stretching, Anderson)

### **2.4.1.3 Cool -Down**

Allowing heart beat to gradually lower to 120 beats per minutes or less helps prevent excessive pooling of blood in the lower extremities, reduces muscle soreness, and promotes faster removal of metabolic wastes such a lactic acid.

Stretching after a strenuous work out is essential for maintaining flexibility, and even important than warm up. All muscles perform better when stretched to 110 percent of their normal length. (The science of sports injury prevention and management, 1977).

### **2.4.3.1 What to look for in Running Shoes**

If the shoes fits you, wear it (Steven Subotnick ,1980) If the shoes fits you, and fits you for any biomechanical problem you may have for example, excessive rolling in of the foot, and is appropriate to the kind of running you do, then buy it. Running is a unidirectional sport, the foot goes forward, straight ahead, and the foot goes sideways as well as forward. Running shoes is designed for unidirectional exercise.

### 2.4.3.1.2 Consider your Running Habits

#### Running Surface:

- Road Running- Good impact properties essential
- Wet roads- traction important particularly for racing
- Trails and uneven surface - Good tread pattern, good rear foot control

#### Competition:

- Average runner- needs heavier, more stable shoes not, racing flats.
- Elite runner- Needs lighter, more flexible shoe

#### Environment:

Hot and humid – Breathability (permeability to wear vapor) is important. Broad mesh within thin permeable lining would be good. Air Circulating insert an advantage.

Cold weather - Get water proof uppers with no vents. May also need additional insert to insulate foot from cold sole.

### 2.4.3.1.2 Look at your Feet, Legs, and body weight

First determine if you have a normal, flat or high arched foot.

**A-high arched foot:** - is rigid foot with little flexibility and little ability to dissipate shock. Most likely, need custom-made arch support.

- **A Flexible high arched foot:** - is subjected to tremendous pressures during running. Arch supports of shoes are not going to help much. Need additional insert that take shape of the foot provide support.
- **A Flat foot:**- may help or none at all. It lies flat on the ground and pulls the rear foot into pronation, create stress on muscles and bones

### 2. 4.3.1.3 Size and Shape of your foot

Straight lasted- shoes are good for flat or low arched feet

C- shaped-Lasted -Shoes are helpful if you toe- in.

Board or stiff – lasted -Shoes are good for very flexible feet

Slip – Lasted Shoes- are good for a high arched to rigid foot.

#### **2. 4.3.1.4 Injury History**

**Knee injury:-** pain around the knee cap seems most likely to be shoe related

**Heel Spur Syndrome:-** If there is a pain underneath the front edge of the heel bone whenever pressure is exerted, you need a shoe with good rear foot impact absorption. Shoes that provides resistance to twisting along axis.

**Shin Splints:-** If you pronate excessively, you work the tibial muscles harder therefore, a shoe which controls rear foot motion is important.

**Stress Fractures: -** when shin splints are allowed to progress untreated there is a danger of developing a stress fracture on the front bones of lower legs.

**Achilles Tendinitis:** Achilles tendon problems could be the differences in the heel and fore foot height among various shoes your wear to run during the previous training.

**Ankle sprains:-** If you habitually sprain your ankle (don't have runners knee) wear shoe with flared heels to make foot placement more stable (Dr. Steven Subtonick 1980).

#### **2. 4.3.1.6 Running Habits**

**Terrain:-** Big Considerations should given in choosing running shoe. If You run on roads and Concrete, be sure to choose a shoe for its impact properties (that is, if you don't care about the relatively heavier weight). If you run irregular surfaces, and have at tendency to sprain ankle, high heel counters and flared heels help stabilize you over rough terrain.

**Temperature: -** Nylon mesh with abroad knit is best for high temperatures and humidity. However, if there is impermeable lining, it will prevent cooling effect.

**Support:** - while the fore foot of the shoe needs flexibility for push off, your shoes must provide firm support from the front part of the arch to the heel. If you are Small and don't weigh a lot, don't buy shoes that are really stiff because you will have trouble toeing off you will pull your Achilles tendon when you force your foot to bend.

**Heel lift:** - A Shoe's heel lift should be between ½ inch and ¾ inch higher than the front of the shoe. This increases the shock absorptive ability of the sole as well as preventing straining of the Achilles tendon. The heel should be curled a bit to help you forward in to your stride offer heel- strike.

### **2. 4.3.1.7 Orthotics**

Ortho means straight, upright and correct. An orthotic is a biodynamic device that fits in to shoes to accomplish two things:-

- To insure that the foot moves correctly through various phases of running or walking (include heel contact, foot contact, and toe off).
- To support the foot, encouraging it to find the best position as it moves, it enables the foot to Communicate and align with rest of the body. The body is then balanced above the foot in mid-Stride as well as when the foot is on the ground (Steven Subotnick, 1978).

### **2.5. Basic First Aid**

First aid treatment for most sport injuries is summed up by the short hand term, RICE – rest, ice, compression and elevation.

#### **2. 5.1 First aid for leg, Ankle, Foot and Heel Injuries**

- Rest:- Avoid all pain causing activity after an injury
- Ice: - for any injury, apply a refrigerated towel or an ice pack (make one by putting ice in a plastic bag) wrapped in a towel. Ice is help full for controlling bleeding and numbing pain. Ice treatment reduces pain and swelling.

- Elevation:- keep your foot higher than your hip or heart probe leg on a pillow or soft chair. To minimize swelling, don't sit or stand with foot on the floor.
- Compression or pressure:- sprains become swollen in the beginning to restrict movement and prevent further damage from motion. For ankle injuries, apply an ace bandage, extending from your toes to just below your knee. (The science of sports injury prevention and management, 1977)

### **2.5.1.1 Sunstroke, Heat Exhaustion**

Signs of heat exhaustion:- a muscle cramp in the leg or backside may be the first sign of a heat problem. Other signs are nausea, vomiting, dizziness and fainting. Continuing to run with any of these symptoms may lead to a stroke as the body's regulators are no longer able to cope. If the core temperature rises more than 2<sup>c</sup>, permanent physical or mental damage can occur.

Medical support given in cases of heat exhaustion or stroke

- Drink water or fluids immediately
- Lie down
- Cover with blankets if cold and clammy
- Call doctor
- Take a dose of homeopathic in every fifteen minutes

Best remedy for sunstroke and heat exhaustion, always thirsty, nervous exhaustion, over sensitive to light and noise, worse extreme cold, the typical person is quiet type.

### **2. 5.1.2 Taping Instructions**

Taping and strapping is a valuable form of external support for an injured toe, foot ankle and knee. Taping can be used as a flexible cast to limit motion and protect a healing area.

Knowing how to tape and what to tape requires skill and experience taping can be used to support a weak arch, to provide stability for pronating foot, and to provide support form weakened mussels, tendon and ligaments. Taping can also protect vulnerable joints.



In addition to providing strength and support, taping also increases sense of balance. The skin under tape conveys information to the brain quickly-increasing the ability to respond to uneven terrain or sudden changes of direction. Tape on an injured parts tends to heighten awareness of the injury-increasing the sense of protection to that area (Steven subotnick, 1978).

### 2. 5.2.1 Alternative Treatments

The path of freedom: - Instead of blaming yourself, you acknowledge that you have some responsibility in the events leading up to the injury.

All of us have beliefs and attitudes, thoughts and feelings, choices and decisions which are the raw materials with which create what well “ reality” as an individual, you shape these energy patterns with your imaginations desires, and expectations. (Steven Subotnick 1978:100-101).

#### The Path of freedom

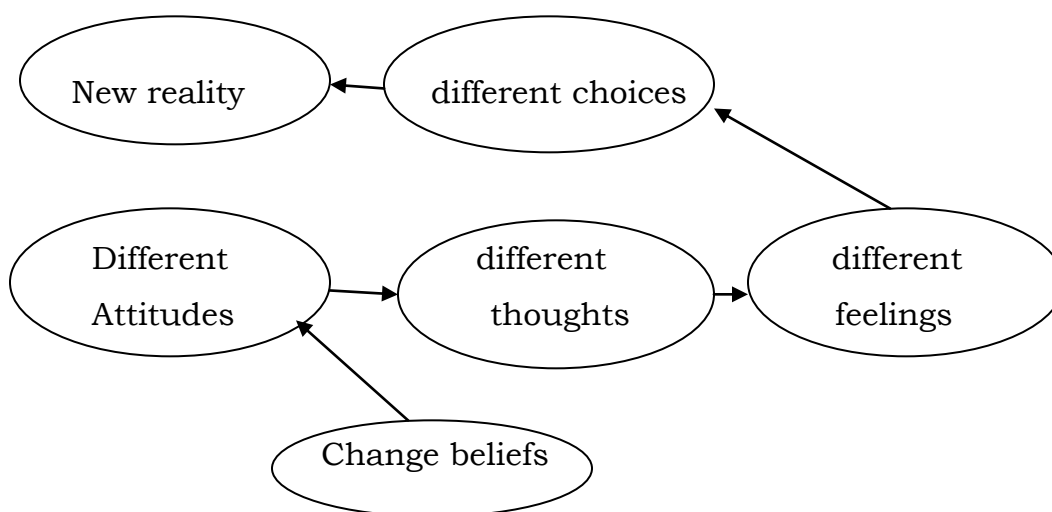


Figure 1. Adapted from sports and exercise injuries, 1978

### 2. 5.3 Sport Massage

The healing power of sports massage is becoming increasingly more popular in the competitive world of sports.

Sport massage is given either before or after an event. Therapists say that the massage warm up connective tissue, increasing blood supply. After the event, a massage alleviates some of the soreness and cramping resulting from the micro trauma done to muscles, helping to prevent an accumulation of damage that may lead to over- use injury.

First of all, the goal is to keep the highly trained athlete as close to peak condition as possible without going over the edge in to over-use injury. It is particularly effective for muscles used over and over again. Therapists recommend its use in running (back of legs and thighs).

Therapists use compression to spread the muscle fiber and increase circulation, trigger point therapy to apply direct pressure to sensitive points in the gluteal and hamstring muscles, and cross fiber friction to loosen muscles in the sideways direction (exercise and sport injuries, 1978:112).

#### **2. 5.4. Therapeutic Yoga**

Biomechanical muscle imbalance resulting from old injuries or poor training may be corrected under the guidance of trained yoga practitioner.

#### **2. 5.5 Mind and Energy work**

There is a growing movement toward developing methods of healing using subtle energy chronic conditions from old injuries and acute sports injuries can be helped enormously by psychic healing (Adapted from sport exercise and injures, 1980).

### **2.6 Foot Injuries**

Foot has twenty-eight bones, three arches, various muscles and ligaments, and a tendon named after Achilles, the greatest Greek warriors foot functions both as an adaptable and rigid structure as it moves in running and walking.

Ligaments bind the foot bones together. The planter ligaments extends from heed above to the basses of mid foot and metatarsal bones the spring ligaments

,extending from the heel to the navicular, is very important it supports the whole inside arch . (Adapted from sport exercise and injuries, 1980).

### **2.6.1 Stress Fractures of Foot Bones**

Stress fractures are microscopic cracks in the bones caused by the buildup of small amounts of stress. A bone in the leg or foot weakened by repeated stress is liable to bend and snap.

A stress Fracture is almost always preventable. Fatigue creates the fertile ground for stress fracture to occur. Since stress fractures result from overuse, pain may begin after an increase in activities. Pain of a stress fracture usually begins with as light tenderness around a bone. With repeated exercise, especially on hard surfaces, the pain increases. If athlete continues to run through the pain of a stress fracture, you risk breaking the bones completely.

In order to heal from stress fracture of the foot rest from high impact activities such as running, aerobics and switch to low- impact activities like swimming and conditioning exercises.

Pain on top of foot (stress fracture of the metatarsal) on the second or third metatarsal is the most likely bone in the foot to get a stress fracture. Pain redness or swelling on the top of the foot especially with excruciating pain when the bone is pressed is good indicator of injury.

During recovery, run on grass or soft surfaces, check the cushioning of your shoes; make sure shoes are not compressed in the midsole.

### **2.6.2 Pain on the bottom of the Foot (Ligaments strain)**

This injury may be result of a sudden twist or running over and around rocks or holes in your path. These strains also occur from repeated over stretching or after wearing ill fitting shoes, especially shoes that are too flexible. Ligament pain can be quite intense and may last for a period of months.

### **2. 6.3 Sudden Pain at the arch (Middle of the Foot)**

If your elderly and experience this sudden tearing sensation while doing exercise running or race walking. Arch collapsed if the rupture is not treated (Steven Subotnick, 1978).

### **2.6.4 Toes Toenails and Heels**

Black toenails are caused by too short-shoes where toenails jam against the end of the shoe-especially when running downhill .the toenails are black because of a blocked -up hemorrhage under the nail.

### **2.6.5 Corns on the top and sides of Toes**

Hammer toes those bent and clutched toes that have been stuffed in too-short shoes develop corns on the joints from constant pressure and friction. Acorn is a protective hardening of skin that is painful when irritated.

If you have above spur, you will need minor surgery. These corns and spurs are usually caused by high-heel shoes.

### **2.6.6 Cracks on Heels Fissures**

Deep cracks on the heels called fissures are often accompanied by callus runners usually get these cracks on the heels in dry, cold weather as result of too dry skin. It is helpful to rub hand cream in to the heels. (Steven Subotnick,1980).

### **2.6.7 Hammer Toes**

These toes are bent and claw-like being scrunched up in shoes that are too small or high heeled correcting hammered toes is often part of the treatment for pain in the ball of foot .wearing roomy shoes sandals and well made shoes will help treated with sponge rubber pads across the top of the toes inside the shoe. (Steven Subotnick, 1980).

## **2.6.8 Skin Conditions**

Troublesome skin conditions of the foot included blisters, warts and athlete's foot as well as dryness, excessive sweat, very smelly feet (bromhidrosis) and hot feet (Steven Subotnick, 1980:160-170).

## **2.7 Heel Injuries**

Inadequate cushioned shoes like flat which bring on heel problems when worn on streets and sidewalks. Our body rehabilitated the vigors of running of fast walking on hard surfaces (chronic repetitive stress).

Another contributing factor to heel injury is tight muscles which don't absorb shock well. Bones become more easily damaged. It is important as we get older to do more flexibility exercises this is particularly true for older women who have not exercised regularly in early life. The risk of osteoporosis increases over time with lack of exercise and poor diet.

### **2.7.1 Stress Fractures of the Heel**

Stress fracture pain is most intense on the sides of the heel rather than on the bottom. The only cure for stress fracture of the heel is rest (Steven Subotnick, 1980). Physical therapy with ice whirlpool together with stimulation decreases pain and may hasten healing for initial pain and swelling take.

### **2.7.2 Pain on the Bottom of the Heel (plantar Fasciitis)**

The pain is on the bottom of the foot near the heel. The fascia, (tough, fibrous tissue), attaches at the heel bone and extends to the heads of the metatarsal bones. A strain in this area could be caused by changes of shoes or activity.

The uric acid also causes the heel problem out of exercises. The heel probably hurt when walking or running and upon standing after a period of sitting down.

The most important measures for treating plantar fasciitis are to rest the foot, tape it, or insert orthotics in to shoes. Taping serves to keep big toe from moving.

### **2.7.3 Heel Spur on the bottom of the Heel**

A spur on the bottom of the heel occurs when the calf muscles are tight, creating excessive strain on the plantar fascia (the band of tissue on the bottom of the foot which is part of the Achilles tendon). With heel pain, it is important to stretch the calf muscles and to use physical therapy such as electrical stimulations or ultrasound.

To treat heel spur on the bottom of heel, ice for relief for of pain 10 + 15 minutes. If ice does not make it feel better, use hot compresses or a towel-covered heating pad (set to low, never high). If the pain is severe homeopathic injections given by your doctor.

### **2.7.4 Spurs on the back of the Heel pump bump (Retro calcaneal exostosis)**

The enlargement may also have emerged after being irritated by the back of your shoe. The popular name, “pump bump” comes from wearing “pumps” that cut in to the Achilles tendon. A weak or flat arch that trols inward, may contribute to the friction at the heel.

To treat pump bump with first aid apply ice for 10 to 15 minutes, massage the area, if ice does not make it feel better, use hot compresses or towel -covered heating pad.

Avoid ruining, wear a backless shoe, if the counter of your running shoe is extremely firm, and you have large pump on the heel.

### **2.7.5 Pain in the Heel cord (Achilles Tendinitis)**

Pain in the lower back of the leg, just above the heel, is Achilles tendinitis. Tendinitis means that the tendon is either degenerated or partially torn. The tendon is actually a cord inside a tube (sheath), and is not extremely elastic

when it over stretches, it is pain full. Tendinitis can result from sudden stretching. (Sport exercise and injures).

As DR. Steven Subotnick, and Dr Tim Noakes, author of the lore of running, deep massage breaking up the adhesions between the tendon sheath and the tendon (he is expert in sport medicine and marathon runner and had not wanted to have surgery for the Achilles degeneration. (Adapted from the science of sport injury prevention and management, 1977).

## **2.8 Ankle Injuries**

The ankle joint is a simple hinge, but its structure is fairly complex. It is composed of the lower ends of the two shin bones, the tibia and fibula, which form a dome over the talus bone the talus in turn, sits over the heel-bone (calcaneous). Sideways movement is prevented by the bone design and ligaments.

Ankles, besides giving you ability to adapt to uneven surfaces also produce propulsion and absorb shock. If you have a stiff ankle from injury or from over-taping for a sport, your shin bones can be damaged by unabsorbed shock, as can your foot or even low back.

### **2.8.1 Ankle strains and sprains**

#### **2.8.1.1 The differences between Strains and Sprains**

**Ankle strains:** - is an injury between muscle and tendon or tendon or tendon and bone. It often occurs in conjunction with a sprain is a potentially more severe injury which wrenches the ankle. Three grades of ankle strain.

1. Over- stretching of the tendon or muscle
2. Partial tear of a tendon or muscle
3. Complete tear the tendon or muscle, this requires a cast or surgery.

**Ankle sprains:** - there are two types of ankle sprains (and strains), depending on whether you twist the inwards (inversion) or outwards (aversion).

**Inversion:**-is common ankle injury, joints turning inwards inversion sprains tear the outside ligaments of your ankle. The most likely cause of twisting is stepping unexpectedly on an object like stone or rock.

**Eversion:** - is another type of ankle injury is an out ward turning of the ankle. It usually occurs on slippery surfaces, an in high speed activities. If the feet are flat there is tendency of eversion sprain. First aid treatment for injuries to the legs, ankles, and feet is summed up by short- hand term RICE.

External aids for supporting feet and legs: - are tape, ankle braces, thigh top running shoes & casts.

Resuming your running:- begin to build up your running very slowly rest days between running days. Run if possibly on grass or soft surfaces stop immediately if pain occurs.

Repeated strains and sprains: - a tear in the ligaments (connecting tissues between bones, not properly treated may leave you with chronic instability and weakness of the ankle which causes you to twist ankles frequently. Walking or running on uneven ground is especially dangerous for you. Repeated injuries damage a joint and cause arthritis.

Ankle sprain with associated tendon strain, as Sheldon Roberts, would occur on the old distance runners. . (Sport exercise and injuries, 1980).

## **2.9 Lower Leg Injuries**

The two bones of the lower leg Tibial and Fibula. The tibia, the main weight bearing bone, is the hard ridge you feel in front of the leg. It has little protective muscle or fat covering and is vulnerable to trauma and to overuse injuries like stress fractures.

In the back of the leg, the largest muscle of the calf (gastrocnemius) lies just behind the knee and run down the back of the leg.



There are several important tendons in lower leg. There are hamstring tendons- those hard cords you feel in the back of the knee- and adductors, which pull the thigh-bone inward. The patellar tendon at the end of the thigh muscle (quadriceps) straightens the knee, and is attached to the bump on the knee. The Achilles tendon is very thick and powerful. It is connected to the middle of the back of the heel and separated from upper part of bone by a small sac of fluid which allows friction-free movement.

Many of foot movement involve coordinated action between different groups of tendons. Lower leg tendons are protected by an enclosing sac of synovial fluid to ensure free movement.

The lower leg can be injured in the four main areas:- The front (anterior), the back (posterior), and the inner (medial) and outer (lateral) sides.

### **2.9.1 General pain in front of the Shin**

Most sport injuries are results of accumulation of long term stress, sometimes pain internal or medical problems. If shin pain develops gradually cause could be circulatory disease, referred back pain or bone tumor. The pain is more likely caused by over use injury.

The muscles in the front of the leg may be weak and need strengthening. Avoid running down hill and do not over stride check your shoes for excessive wear in the back of the heel which indicates over striding which is common with shin splints in the front of the leg.

### **2.9.2 Shin Splints (front and inside of Lower Leg)**

Shin splints, called tendinitis, mean pain in the lower leg which worsens during exercise or running.

The tendons or muscles in the shin may fray, much like an old rope. They often heal with gristle-like, inflexible scar tissue. The pain worsens when you run on

hard surfaces, run too fast for the conditioning of your muscles or run too far for endurance level of training.

The common causes of medial shin splints are:

- Over- pronation ( inward turning of the foot when running)
- Over striding
- Running on hard surfaces
- Changing from a relatively softer running surface to a harder surface
- Mileage in creases
- Seasonal training when competitive athletes go into the track
- ❖ Posterior medial shin splints of ten experienced in the long distance runners ( when mileage increases) (Steven Subothick)

### **2.9.3. Shin pain from Tibial Stress Fractures**

Stress fracture is annuals related to an increase or change in an activity involving repetitive movement and impact. You may be susceptible to this injury if you're running style is biomechanically faulty, for example, if you run your foot inward as you run.

Stress fractures are a result of increased work load on unprepared muscles and bone, it is necessary to strengthen and stretch anterior, posterior, medial and lateral lower leg muscles to prevent injury. The RICE is common treatment aids for leg injuries in the acute and before the arrival of doctor. (Sport exercise and injures,1980).

### **2.10 Knee Injuries**

The knee is one of the largest joints in the body, and one of the biggest problems for runners and athletes. It is extremely vulnerable to traumatic injuries as well as to overuse injuries. About 30 percent of all running injuries occur in this joint. The knee consists of three major components: Thigh bone, shin bone and knee-cap.

The knee cap (patella) a loose bone formed in the lower end of the quadriceps muscle group, sits atop the juncture of the thigh and shin bone. It slides over the thigh bone condyle during knee movements. Between the knee cap and the thigh bone is a fluid filled gap.

Another fluid filled gap exists between the thigh and the shin bones. This gap actually consists of two compartments, one on the inner side and one on the outer side of the knee. The inner gap called the medial meniscus; the outer gap is the lateral meniscus. The two menisci are rubbery, elastic pads that buffer the junction of the two joint surfaces.

A special type of cartilage called articular is found only in bone ends that meet to form moving joints and covers the bone surfaces in the knee. Articular cartilage is a functional part of the bone structure and is different from the knee cartilage (menisci). Articular cartilage is like Teflon once damaged it doesn't repair itself. The cartilage will never be as good as it originally was, even with surgery. The joint capsule, the covering which encloses the joint, is lined with another kind of lubricating (synovial) membrane.

The ligaments and tendons play a big part in the control and stability of the knee. When you walk or run, the knee is stabilized by strong ligaments attached on either side. Ligaments in the back protect the knee, but do not function as major stabilizers. Within the knee joint two strong ligaments (the cruciates), cross-cross each other to hold joint together. Once the cruciate ligaments are injured the knee is unstable and will not support weight. The patellar tendon is the only tendon on the front of the knee there are many more tendons on either side of the lower part of the knee.

The knee was built to operate with backward and forward motion, exactly like a mechanical hinge. However, because it is a part of the large structure of the entire upper and lower legs, the knee not only functions as a hinge permitting bending and straightening, but also allows the foot to rotate in a twisting movement when the knee is bent.

The power full hamstring muscles in the back of the thigh do the main work of bending the knee.

The iliotibial band gets a lot of use in repetitive movements it is cushioned with fluid filled sacs (bursas) become inflamed in overuse injuries.

## **2.10.1 Injuries to the front of the Knee**

### **2.10.1.1 Knee-cap (patella) pain- runner's knee**

Runner's knee is the most common form of knee injury. It means pain on the front of the knee. Runner's knee happens to new runners as well as to the veteran marathoner. It can even happen to exercise walkers.

The pain feel when you run and latter in the day after run. Squatting and kneeling, of course, make it worse, and the knees will probably feel worse running downhill or walking down stairs.

The susceptible causes of runner's knee pain would emerge from the way of the running form, the shoes he/she wear, dramatically increment of mileage, and the surfaces of you run or a lot speed work.

### **2.10.1.2 Self test for runner's knee**

To determine what might be causing your knee pain, have a friend watch you while you run checking the foot lands under a bent and flexed knee, which is more susceptible to instability.

Runner's knee can be treated fairly simply as long as you work on correcting the weakness or imbalance that are pulling your knee out of alignment.

### **2.10.1.3 What to do for runner's knee**

- ❖ For temporary relief ice- apply an ice pack wrapped in a towel for 10 minutes.
- ❖ Rest from painful activities
- ❖ Elevate the knee and keep the leg straight

- ❖ Apply an ace bandage for pressure extending from your toes to adjust below knee.
- ❖ Physiotherapy
- ❖ Heel lifts –If knee is caused by one leg physically shorter than other
- ❖ Orthoses
- ❖ Tracks – If the knee problem happened avoid running on indoor tracks that makes foot turn inwards constantly.
- ❖ Rehabilitative exercise
- ❖ Run uphill, but avoid downhill as much as possible and decrease miles of work by 25 percent, if the cause is mileage increase related.

### **2.10.2 Knee cap Dislocation**

In severe knee-cap dislocation, the pain severe under such circumstances wrap the knee in an ice towel and go to hospital and keeping knee absolutely still. Sometimes, the knee- cap slips out of place on recurring basis; it may slip out as you run or as you run up stairs.

### **2.10.3 Pain on the outside of the Knee**

Pain along the outer side (lateral) of the thigh (iliotibial band syndrome). This pain almost always indicates an over use injury, stemming from repetitive knee movements. It often follows a mileage increase in runners or cross country runners. It worsens walking down stairs or bending the knee.

### **2.10.4 Pain on the outside of the back of the Knee (Tendinitis of Biceps Femoris)**

Straining these tendons happens with excessive sprinting or long time over use from running on the banked roads. Pain is felt on the outside of the knee, right above the outside knee bone (the head of the fibula).

### **2.10.5 Pain on the outside of the Knee after a Twist or fall (Lateral- collateral ligament strain)**

This injury happens commonly after a fall when you are running or even waking fast. Pain on the outside of the knee will hurt more if you sit with the painful knee crossed over your other knee (with the foot of the painful knee resting on top of the opposite knee).

For lateral-collateral ligament strain, use basic first aid. If you still have pain after a few days, see an orthopedist.

### **2. 10.6 Pes Anserinus Bursitis**

This is a pain on the inside of the knee from too much running with a foot or leg imbalance. A fluid filled sac has become inflamed.

### **2. 10.7 Pes Anserinus Tendinitis**

This is an over use injury in the inner knee tendon caused by excessive hill running or excessive speed with biomechanical abnormalities in the leg or foot. This sometimes confused with medial meniscus tear, be sure your doctor differentiates the two. Following the treatment steps below should bring a rapid recovery. (Steven Subotnick, 1978: 258-260).

### **2.10.8 Pain and Swelling behind the Knee**

Pain and swelling behind the knee can follow tendinitis, tendon strain pain in the back of knee occurs from staining the muscles which insert there, usually the calf muscles or hamstrings could be strained from taking too long astride, running down hill, running too fast, or too much jumping. Treatments consist of decreasing flexion (bending) gentle stretching of the calf and hamstrings, massage, physical therapy and homeopathic remedies for tendinitis.

## **2. 10.9 Tendinitis of the Hamstrings (Gastronomies, Soleus or Popliteal)**

This pain in the back of the knee is caused by excessive running or by a strain. For tendinitis in the back of the knee rest and reduces your bending and flexing activities

a while stretch out your calf muscles in the back of the leg. Try hot, cold or contrast baths.

## **2. 10.10 Pain with the Knee Joint**

Running can cause a tear in the inner fibro-cartilage (menisci) between the end of the thigh bone (femur) and the end of the shin bone (tibia). Damage is more common following a sever twisting injury or pain.

With this injury, you may feel instant pain and will not even be able to move the knee or bear weight on it. Swelling may start either immediately or few hours later. The sign of a torn cartilage is the feeling that the knee is “locked” if you shake it gently, it seems to release with a click. The locking feeling means that a torn part of the cartilage is jammed between the shin bone and the thigh bone. . (Sport exercise and injures,1980).

## **2.11 HIP, PELVIS, AND GROIN INJURIES**

### **2.11.2.1 Hip Structure and Function**

The hip flexor muscles are the main muscles which pull the thigh bone forward when you walk. All forward movements involve them, as does the movement of lifting the legs up while in a lying position. Hip flexor muscles also pull your lower back forward when you sit up from a lying position.

### **2.11.2 Pain in the Hip Flexors**

This pain is caused by excessive hill running or running on slippery surfaces Feel pain in the hip flexors while working forward especially up stairs or when press leg against resistance. To treat hip flexor pains apply ice or heat.

### **2.11.3 Snapping Hip (Bursitis in the Greater Trochanter)**

This injury is definitely caused by over use of the hip muscles, creating friction around the fluid filled sacs (bursas) in the hip. The bursas become thick and impede the tendon that slides over them, causing a snapping sound. Race walkers get greater trochanteric bursitis due to the excessive rotation and swinging of the leg at the hip. Beginning runners who cross either legs over when running may get this pain. Women with a wide pelvis may be susceptible to this malady when they begin a running program with no correction for their biomechanical imbalance.

### **2.11.4 Hip Pointer**

An injury known as a hip pointer is a bruise (contusion) on the rim of the pelvic bone (iliac crest). A hip pointer can also be caused by muscle pulls from track and road racing as well as other sports. A severe pull could cause some detachment of muscle fibers from the pelvic rim. The abdominal and oblique muscles attach to the inner margin of the iliac crest, and the muscles of the thigh attach to the outer margin.

Therefore, if you have tight over used muscles in the abdomen or in the groin there can be pain.

### **2.11.5 Stress Fractures of the Hip**

When training is suddenly increased to a new goal, even slightly raised from an already massive total, accumulated micro trauma may lead to a fatigue stress fracture of the hip or pelvis.

This injury is becoming more frequent as ordinary people take up running marathons.

A stress fracture in the hip feels like a pain deep in the groin. The pain may interrupt running. Bone scan can be sure for stress fracture.



### **2.11.6 Pain in the Groin**

Any pain in the groin should be thoroughly checked by doctor since there are a multitude of possible causes. Injuries in the groin area are sometimes a result of slipping when running on slippery roads, straining tendons and muscle as you try to keep your balance. Another possibility for cause of pain in the groin is excessive running on hard surfaces with poorly cushioned shoes. Repetitive stress in running or cycling can also cause inflammation of the front the pubis (osteitis pubis) which occurs commonly in male athletes aged thirty to forty.

### **2.11.7 Groin Strain**

A groin strain is different than osteitis pubis because the damage involves muscles, ligaments and tendons, instead of cartilage. The groin can be strained from a sever over stretching in single sudden injury, or from accumulation of stress. You may have been running on wet and slippery ground or slipped on a patch of ice and contracted your groin muscles to stop yourself from falling. Athletes who play soccer and foot ball or compete in track and field events can pull a groin muscle. Sprinters, as well as marathoners also are at risk for groin strain. For immediate relief of the pain of groin strain, apply ice packs or heating pad, and see doctor. (Athlete injury assessment, 1994).

## **2.12. Lower Back Injuries**

### **2.12.1 Structure and function of Lower back Injuries**

It is built of five bony vertebrae; the lower spine (lumbar) is the lowest part of the bock. It stands ready to perform a vast variety of functions among them waking, lifting twisting, jumping...etc. the important parts of the lumbar spine are the five vertebrae bones with their soft tissue discs, the ligaments, and the muscles.

### **2. 12.2 Low Back Injuries and Sciatica**

Low back strain is often associated with biomechanical imbalances of the feet and legs short leg syndrome can create problems in the back as can feet that

have unequal arches. A short leg absorbs more stress when running and accentuates distresses in the low back and hip. On Biomechanics, 1/8 inch limb length discrepancy is during running comparable in effects to a 3/8 inch actual deformity at rest. The increased strain is transmitted to the low back.

Sciatica means that the sciatic nerve is inflamed. This large nerve originates in the low back, exits the spinal column, travel down the inner part of thigh and leg, and finally ending at the tips of the toes.

Hill running creates substantial problems for sensitive low backs going uphill lightens the buttocks (gluteal) muscles , going downhill produces over striding and increased shock.

- Yoga could best possible solutions for back pain and continued health and vigor.
- Deep tissue massage is very helpful in reducing tension in the painful muscles.
- Exercise for strengthening the back and abdominal muscles as pain decrease.

### **2.12.3 Stress Fractures**

If there have prolonged pain and swelling in the back, you may have a stress fracture in the spine. A stress fracture in the vertebrae could occur with hard running or falling. A bone scan will usually show it a stress fracture is present. As with all stress fractures, rest and avoidance of painful activities is essential for four to six weeks and with under care of a doctor for this condition. (Sport exercise and injuries, 1978: 290– 293).

### **2.13 LONG DISTANCE**

New training methods for all running events indicate that long distance running prior to the start of the season is part of a good, well balanced training program. Hard training was required to become a top-long –distance runner.

Long – distance runner must work out 365 days a year. Most coaches feel a special fondness for long–distance runners, if only because of the hard and

often lonely work they do. Distance men go on and on, and it is really hard for most people to believe how many miles they cover during a season. Adverse training conditions rain, snow, cold- do not deter these runners.

The distance, desire, dedication, and determination are important to remember during training sessions but a number of other factors come in to play for today's long men. The distance runner should try to do his/her endurance running on grassy surface whenever possible. Changing surfaces may create pain in the legs, knees calves and ankles in addition to shin splints the pain of tight.

Muscles in the shin;- there are exceptions to this rule some runners can train on roads or concrete surfaces without suffering of any of the above problems.(Gerald. Martino, Walt Marusyn, Bill Madden, 1978:37 -41) track & field the sports play book .

In running hills the distance runner should begin (or in most cases, pacing) downhill as well as uphill.

Before any track and field completion, good stretching exercises are a must. It is mandatory that the runner feel loose on his road runs or hill running and toe touches, sit-ups and other stretching exercises help to give the runner the flexibility he needs before setting out.

Distance runners today are increasingly aware of quick in the middle of a race and especially at the end, and thus they do vote equal amount of time to fartlek training and speed work (Gerald Martino, 1978: 38).

Distance men should attempt to do the bulk of their running in the cooler times of the day (early morning, later afternoon), because fatigue sets in soonest in hot weather. However, some runners like to get in one hard work out during hot weather to become conditioned to it, especially if an he/ she has race in hot weather.(Track and field the sports play boll,1978).

### **2.13.1 Neurophysiologic Mechanisms Endurance**

Endurance is the ability to continue work. This is limited by the factors. The willingness to work on in spite of the pain of fatigue and the capacity of the homeostatic mechanism to make rapid and extensive adjustments within the functioning organism.

The process of learning to endure the pain of fatigue is necessarily an uncomfortable one. The athlete exposes himself almost daily to the dull aches of muscular effort and burning anguish of laborious breathing (Laurence E. MoreHouse, 1958:25-28).

#### **2.13.2.1 Warming up**

The process which elicits the acute physiological changes that prepare the organism for strenuous physical performance is known as “warming up”. Warming up improves performance and prevents injury in vigorous activities by two essential means.

**1<sup>st</sup>** – rehearsal of the skill before competition commences, fixes in the athletes new muscular coordinating system the exact nature of the impending task. It also heightens his kinesthetic senses.

**2<sup>nd</sup>** The rise in body temperature facilitates the biomechanical reactions supplying energy for muscular contractions elevated body temperature also shortens the periods of muscular relaxations and aids in reducing stiffness. As a result of these two processes there is an improvement in accuracy, strength and speed of movement, and an increase in accuracy, strength and speed of movement, and an increase in tissue elasticity which lessens the liability of injury .The value of warning up exercise to improve performance in endurance events. (Laurence E. More House, 1958:30).

### **2.13.3 Kinesiological Factors in Athletics**

Athletic performance is in large part a dynamic expression of the design of the human body. Variation in body configuration are related to the efficiency of its response to the demand placed upon it by various physical activities by a applying this principles the coach can more accurately guide the aspirant in the selection of sports actives best rested to the candidate's special physical characteristics. (Sills and Everett).

#### **2.13.1 The Characteristics of Ectomorphy Athletes.**

They are linear, fragile, delicate body, thin bones, slight muscles small head, long , slender neck, to und shoulders, relatively long thorax , weak upper arms and thighs, thin and dry skin, Insufficient strength is a handicap to Ectomorphs in the performance of physical tests Ectomorghs are superior.

Distance runners and cross country runners are grouped under the ectomorphy classification categories (The science of Track and Field athletics, 1981).

### **2.14. Massage**

When an athlete suffers a blow or a strain, his automatic response is rub the traumatized area. From this the art of massage arose -Galen the first team physician, laid great stress upon its importance in athletics training. He wrote that massage before exercise opened the pores, liquefied the excrements in the skin and softened the solids. The purpose of massage after exercise was to prevent and remove fatigue.

Scientific studies of massage use drawn conches ion about the use and effect of the massage and summarized as follows:-

1. The initial response of the body to massage is opening by the capillaries and arterioles of the stimulated area this occur through stimulation of vessel walls or stimulation of sympathetic nervous system.

2. Massage increase in the number of circulating red blood corpuscles & thus in the amount of hemoglobin in peripheral capillaries.
3. A local increase in temperature of the massaged area occurs that credited to vaso-dilatation. Blood Pressure and heart rate are not affected.
4. It accelerates absorption of substance in the synovial fluid of the joints and in the intercellular fluids in the subcutaneous tissues.
5. There may be an increased volume of urine offer massage
6. Exercise is followed by the production of lactic acid. This cannot be produced by mechanical stimuli. It improves circulation to relieve fatigue following exertion. (The sciences of sports injury prevent and management, 1977).

### **2.14.1 Reduction of Health Hazards in Athletics**

### **2.14.2 Injuries and Fatalities**

Injuries anticipated in any form of maximal exertion practically every sport carries with it some degree of risk, the types and nature of injuries received being characteristic of the activity. In the study of Robbins described fatalities of track athletes in twenty years of study of distance runners learned two fatalities one resulting from an occlusion of left internal carotid artery and other from virus hepatitis.

### **2.15. Responsibilities**

Two basic principles govern the treatment of injured athletes. First, a player must not be permitted to return to competition if this exposes him to more serious injury.

Second, a player must not be kept out of competition any longer than is necessary. The obligation for implementing these principles is shared by four individual's team physician, the trainer, the coach and the athlete himself.

**Team physician:** - make decisions regarding athletes fitness, the team physician needs to know not only the nature and extent of the injury or other defect but also physical demand.

### **2.15.1 The responsibilities of Team Physician**

1. Obtain a medical history and conduct a physical examination for each candidate for all athletic team. Accident prevention starts with elimination of candidates who are physically or mortally unfit to participate in activities /training and competition exclude from competition any one with swollen glands, elevated temperature, dizziness, skin infection, anemia, cardiac defect, epilepsy or other similar disqualifying condition.
2. Personally attend athletic events in which the injury hazard is high of person any condition.
3. Supervise the trainer in his administration of injury prevention, first aid and rehabilitation procedures. Trainer may render first aid in absence of the physician.
4. Specifically instruct the trainer regarding the procedures to be followed in physical therapy, corrective therapy or other treatment.
5. Examine injured athletes & give written approval to the coach for their return to competition.
6. On request, counsel coach, trainer or athlete regarding conditioning staleness, exercise, nutrition, protective equipment and similar issues.

### **2.15.2 The Trainer's Responsibilities**

1. Close observe all members of athletic team for symptoms that suggest referral to team physician.
2. Administers first aid to injured athletes.
3. Use taping bandaging & other protective techniques to prevent injuries or recurrence of injuries.
4. Utility techniques of corrective therapy and physical therapy, under the direction of the team physician.
5. Carry out instructions regarding routine procedures in treatment of athletic injuries.
6. Maintain records of injuries, treatment given and outcome.
7. Supervise conditioning exercises,

8. See first aid kit, stretchers, blankets, or other equipments.

### **2.15.3 Coach's Responsibilities**

1. Maintain control of the athletic squad at all times
2. Teach techniques, exercises, and skills necessary to prevent accidents.
3. Close supervision of athletes during and offer practices.
4. Remove athletes who appear to be injured, excessively fatigued.
5. Insist on properly fitted equipment see the athletes have proper protective clothing for cold or wet weather.
6. Control weights of athletes maintain and utility overwork staleness or other undesirable conditions.

### **2.15.4 Athletes –Responsibilities**

1. Obey all safety rules & regulations use prescribed ankle wraps, and other protective equipments.
2. Carry out conditioning or rehabilitation programs which are presided for him /her.
3. Report all injuries, no matter how minor, to the coach and trainer. (The scientific bas of athletic training, 1958).

### **2.16. Principles of Safety conduct in Athletes**

1. Every prospective athlete is given thorough medical examination prior to the first day of practice.
2. A sufficient conditioning period is required prior to completion.
3. Fundamental skills are thoroughly learned before the advance movement.
4. Athletes are properly warmed up before being sent in to practice
5. An injured athlete is immediately withdrawn from practice or competition.
6. Insurance is carried to provide adequate means for paying the medical care of injured athletes.



7. The length of practice sessions number of days between practice and total competition are restricted to prevent over – fatigued and injury.
8. The pre- season training period devotes attention to exercise specifically designed to strengthen the muscle groups most liable to injury in that particular event (s). (As Thomas, Quigley, 1978).

## **CHAPTER THREE**

### **METHOD AND PROCEDURE**

This part of the study consists of methods and procedures of data collection, sampling and sampling techniques, instruments and procedures of data collection and methods of data analysis.

### **3. Research Design and Methodology**

#### **3.1 Research Methodology**

The research methods selected for this study is descriptive survey research since the aim of the study is to describe facts and explaining on the existing condition of the issue under discussion. The problems of injuries occurrence in the long distance race of Addis Ababa Athletics clubs.

#### **3.2 Source of data**

The primary sources of data for this study were, long distance athletes, Addis Ababa clubs long distance coaches, administrators of the clubs, long distance athletics professionals and federation sport medicine physicians as well as the documents filed in the clubs and sport medicine physicians. The internet relevant books, IAAF manual and journals and other important issues had constructive inputs under the study of injures in the long distance race athletes.

#### **3.3 Sampling and Sampling Techniques**

##### **3.3.1 Samples**

The studies of the specific research followed samples were selected using both probability and non probability which were random samples and purposive sampling. In Addis Ababa there are about 18 active clubs, which are currently participating in the long distance race of yearly city champions. Among those, 12 clubs were selected, which are Entoto, Biru-Tesfa, Geta-zero, yengew-Tesfa, Ethiopia Banks, Meklakeya, EELP, Maramya, Kiray-Betoche, Tegen, Negash

and Omedela. All long distance race coaches and club administrator and all injury experienced, and 16% long distance athletes as well as Federation sport medicine physicians and Athletics Federation professionals were involved in providing the data of the study.

### **3.4.2 Instrument of Data Collection**

In the course of this study the following data collection instruments were used. Questionnaires, interviews, discussions and document analysis were implemented. The questionnaires designed in open and close ended, interviews that in structured and unstructured manner as well as documents that held by the clubs and federation medicine physicians analyzed deeply and carefully

### **3.4.3 Procedure of Data Collection**

In conducting this study the following procedures were used in collecting data. In the beginning attempt to assess relevant information from what have been done and focused on the muscle-skeleton injuries.

In the next stage, before distributing the prepared questionnaires to the respondents it was examined through pilot test in the coaches and athletes. After having pilot test, the questionnaires and interview questions translated into Amharic and made some structural change for avoiding ambiguity. In administrating the questionnaire the assistant were oriented on how to distribute, approach respondents and collect filled questionnaire. Interview was held at the respondent's station or offices.

### **3.4.4 Method of Data Analysis**

The required information was extracted from documents, opinion collected through questionnaires and interviews. The data obtained were structured, organized and presented using descriptive statistics of frequency and percentage to suit analysis and infer conclusion. Quantitative and qualitative measurements were used. Based on the findings the conclusion arrived, recommendations are suggested as finding results.

## CHAPTER FOUR

### 4. FINDINGS, INTERPRETATION AND DISCUSSION

This part deals about findings and interpretation of data, and discussion of the findings based on the data collected.

#### 4.1 FINDINGS AND INTERPRETATION OF DATA

The information gained from long distance runners, coaches, club administrators and athletics professionals and orthopedist. The questionnaires for long distance runners and coaches, and interviews, discussion with club administrators as well as document observation, data are tabulated and interpreted as follow as:

##### I. RESPONSES OBTAINED FROM LONG DISTANCE ATHLETES

###### Q1. Do you have any bone fracture and injury in your family?

No	Option	% age
1	Yes	25
2	No	30
3	Abstained	45

Table1. Family injuries of bones

According to the table above 25% of the respondent replied that have their family members have bone injures experiences, whereas, the other 45% doubt about whether they have such experience or not, the remaining 30% had no bone injuries from their family members.

###### Q2. What do you say about your sport wears, like, shoes, socks, shorts and other materials provided from your club?

No	Option	% age
1	Very comfortable	0
2	Satisfactory	35
3	Poor	65

Table2. Status of sport wear

As the table above shown 65% of the respondents indicated that their sport wears provided form their club are poor, and 35% satisfactory but none them respond very comfortable.

**Q3.How do you feel your training and competition shoes?**

No	Option	% age
1	Always comfortable	0
2	Sometimes comfortable	16
3	Always discomfort able	84

Table3. Conformability of shoes for training and competition

As the data collected replied that 84% the athletes respond that their shoes are not comfortable and 16% of them feel comfort sometimes with their shoes.

**Q4. Do you understand that your shoes and injury has relationship when doing the long distance training and competition?**

No	Option	% age
1	yes	24
2	no	48
3	Abstained	28

Table4. The relationship of the shoes and injury

The table above indicates that only 24% of the respondents understand the shoes impact on the occurrence of the injury. The 48% of respondents replied no understanding about the shoes causes for injury, and them 28% of the stay abstained about the relationship of shoes and injury.

**Q5.Why do you prefer the long distance event?**

No	Option	% age
1	To enjoy with it	18
2	To have incentives	62
3	Others force	20

Table5. The reasons for joining the events

The above table data shows that around 62% of athletes join the event to seeking incentives or rewards 20% of them had no their our plan to join, the

remaining 18% of them had joined the event because of the events joyfulness for them.

**Q6. Are you well treated in gaining the basic needs, specially the food as the event training requires?**

No	Option	% age
1	Yes	31
2	No	69

Table6. Access food as training demands

As the above table data revealed that 69% of the athletes respond they have not got sufficient meal as the training requires. The remaining 31% of athletes respond as they have access of food but the level differs. Among them 31%, the only 20% them got the excellent access, 50% of them indicated satisfactory and the remaining 30% replied poor access for sufficient food as the long distance athletics training requires.

**Q7. Had you ever been experienced the injury? Which one among the following?**

Almost all of the athletes responded, they had injures in their long distance training and compotation career. Many of them indicated that injures they happened was shin splints, Knee injury, Achilles tendon, low back pain, heel, foot injuries ,ankle and pelvis joint. Among them heel, Achilles tendon, low back pain and foot injures are popularly indicated. Some of them responded the pelvis joins, especially women athletes. Many athletes respond the injuries above three. The Achilles tendon, Foot injures, heel and leg pain indicated as the recurrent injury. The foot pain is indicated as acute injury as athletes shown. The low back pain responded ad the mild injury type of the athlete.

**Q8. Do you have any pain on either side of your leg, foot, ankle or knee during running?**

No	Option	% age
1	Yes	32
2	No	68

Table 7. Feel pain on one side of leg, foot, ankle or knee

The respondent shown that about 32% of long distance members have one side pains, whereas the remaining 68% replied that they had no such experience. Many of them indicated that they have leg problems.

**Q9. Do you do warm up and cool down and stretching before and after exercise properly?**

No	Option	% age
1	Yes	43
2	No	57

Table8. Doing proper warm up, cool down, and, stretching

As replied answer indicates 43% only respond that they do but the remaining 57% of them do not do the exercise properly. Even though they respond that they do properly, they do not have deep knowledge about the value of warm up and cool down and stretching exercise.

**Q10. How do you do warm up and cool down and stretching exercise?**

No	Option	% age
1	General exercise always only	26
2	Specific exercise always	24
3	Specific exercise sometimes	25
4	General and specific exercise always	35

Table9. Doing the kind of warm up cool down and stretching exercise

As it has indicated in the table above, 65% the athletes are not doing well, only 35% of athletes do the activities properly as the respondent indicated.

**Q11. Where do you do the training mostly?**

No	Option	Rank
1	Hard surfaces	1 <sup>st</sup>
2	Hill	2 <sup>nd</sup>
3	Road	3 <sup>rd</sup>
4	Asphalt	4 <sup>th</sup>
5	Track	5 <sup>th</sup>
6	Grassy surfaces	6 <sup>th</sup>
7	Gymnasium	7 <sup>th</sup>

Table10. Training places of athletes

The collected data shown that the sequence of the place of training indicated that hard surfaces, Hill, road and asphalt are popular for many of them and ranked 1<sup>st</sup> to 3<sup>rd</sup> order. Track, gymnasium and grass surfaces are indicated rarely, which are shown least ranked as their training volumes.

**Q12. When do you do your daily training mostly?**

No	Option	% age
1	Morning Only	25
2	Evening Only	8
3	Midday Only	0
4	Both morning and Evening	67

Table10. Time of training schedule

As the above table results revealed that 67% them answered, they do their training exercise two times a day, morning and evening, the remaining 33% of them respond the they attend either morning or evening training program. Among these of 33%, only 8% of them attend the evening training and 25% do their regular training program only in the morning.



### Q13. How long do you do your training?

No	Option	% age
1	2 Hours	17
2	2&1/2 Hours	12
3	3 Hours	28
4	3 to 4 Hours	43
5.	Less than2 Hours	0

Table11. Length of training schedule

The result of the data collected indicates that 43% of the athletes respond they have experience of attending the training above 3 hours, 17% of athlete do they regular exercise for two hours only, and 12% of them for 2 ½ hours only. In general, 29% athletes do training for about 2 and 2 ½ hours, and 28% for three hours and 43% for 3 to 4 hours of athletes have training they accustomed for about 3 to 4 hours in daily programs

### Q14. Do you have extra training habits beyond coaches' program?

No	Option	% age
1	yes	72
2	No	28

Table12. Extra training habits of athletes

As the above table results indicated that 72% of the respondents reflect, they have habits of training beyond coaches' plan, where as 28% of them strictly follow the coaches' plan.

Among the athletes respond for extra training habits by themselves believe that, doing extra training would favor for their better improvement of performance, and some indicated that they have mistrust on the coach's training program as well as misunderstanding o the effect of training principle on the improvement of performance.

## II. RESPONSES OBTAINED FROM COACHES

### Q1a. Educational Background of Coaches

No	Option	% age
1	MA	0
2	BA	6
3	Diploma	18
4	Certificate	41
5	Experience	35

Table13. Qualification of coaches

According to the above table only 24% of coaches are diploma and degree holders, the remaining 76% of coaches are low in qualification except coaching certificates and experiences.

### Q1B. Years of coaching experiences

No	Option	% age
1	0-2 years	55
2	3-5 years	27
3	Above 5 years	18

Table14. Experience of coaches

According to the above table, 55% of coaches are two and below years of experience of coaching long distance events, 27% of them are three to five years in training long distance athletes, the remaining 18% of coaches experience above 5 years in training long distance athletes.

**Q2.** Do you have specification for athletes in the course of screening regarding the cardiovascular cases and biomechanical imbalance and bone breakage history of athletes of his/ her families?

No	Options	%age
1	Yes	6
2	No	94

Table15. Screening specification of athletes regarding to their health status

According to the provided data shows 94 % clubs had no such limitation setted for athletes in the course of joining the club, where as 6% had setted criteria for screening as the coaches' answer indicated.

**Q3. Is there any record of athletes about the personal and medical details before and after joining in your club?**

No	Options	%age
1	Yes	14
2	No	86

Table16. Personal and medical details of athletes' record

The provided data indicates 86% of the clubs had no experiences of filing the records of athlete's medical details, and the remaining 14% of them have personal and medical records of athletes.

**Q4. What are the common or repetitive type of injuries in the long distance athletes you observed in your club? Please list them**

As the data obtained from coaches indicates that foot injuries, back pain, heel, Achilles' tendon, shin splints, knee pelvis joints leg bone fractures are mentioned by some coaches.

**Q5. What would the causes for injures as your understanding? Please list them**

As interview of coaches response implies that the causes might be related to the prolonged work of training ,lack of proper sporting wears such as shoes, lack of proper warming up, cool down and stretching the major muscles and fine that carry the training load, working the training on the hill, hard surfaces, roads and asphalt places, the athletes misunderstanding of training principles and attempting to train by themselves in addition to the coaches program, absences of medical staffs that support in the day to day training and development of athletes about their injures what they have and what would

have in the future (potential risk of injury) based on their biomechanics of running , deformities of their limbs and aware athletes and prevent injuries.

**Q6. Did you observe the deformities of your athletes in the course of training? If you say 'yes' what are they?**

No	Options	%age
1	Yes	62
2	No	38

Table17. Deformities of athletes observed

As it has indicated above, 62% of coaches observed that the existence of deformed athletes in the Biomechanics of running, the other 38% of coaches responds that had no experience of observation or understanding of deformities of athletes in their club.

The types of deformities as replied answer indicates that only 50% the “yes” respondent point out, the deformities like knocked knee and bowed legs, differences in length of legs and foot.

**Q7. Had you observed the deformities like knocked knee and bowed legs? If you say 'yes' what precaution measure did you take?**

No	Options	%age
1	Yes	20
2	No	80

Table18. Existence of knocked knee and bowed leg athletes

As the data provided indicates that around 20% of interviewed coaches respond that they observed but not take any measure decision for precaution of athletes from injury, but around 80% coaches respond that no understanding about knocked knee and bowed leg existence in their clubs.

**Q8. How do you see the sporting wear of your athletes?**

**Are they available or provided as required and needs of athletes in case of size, shape and weight that fit for each athletes?**

No	Options	%age
1	Yes	23
2	No	77

Table18. Availability and comfortability of sport wears

According to the table above the data obtained from coaches concerning to the sport wear,77% of coaches answered lack of sport wears that required for comfortable training and competition, where as 23% of coaches respond that comfortable sportswear access for each athletes as demanded by long distance athletes.

These of 77% of club coaches' response implied that lack of proper wear would expose the athletes for injury.

**Q9. Where are you train your athletes mostly in volume of training?**

No	Option	Rank
1	Hard surfaces	1 <sup>st</sup>
2	Hill	2 <sup>nd</sup>
3	Road	3 <sup>rd</sup>
4	Asphalt	4 <sup>th</sup>
5	Track	5 <sup>th</sup>
6	Grassy surfaces	6 <sup>th</sup>
7	Gymnasium	7 <sup>th</sup>

Table19. Training surfaces of athletes in training volume.

Among the respondents most of them indicated that hard surfaces, asphalt, hill and road that stood 1<sup>st</sup> to 4<sup>th</sup> as their training places in volume of training. The

remaining places, grassy surfaces, and gymnasium stood the least as their training places.

**Q10. Had you come across the athletes would train by themselves beyond your training program?**

No	Options	%age
1	Yes	67
2	No	33

Table19. Athletes habit of doing extra training

As the data collected show 67% of coaches had in formations about their athletes that do their training beyond their program, the remaining 33% respond that they had no such experiences on their athletes.

The coaches that respond about their athletes extra training noticed that it affect the training program and distorts the improvement of the athletes' performance and create stress on the athletes and it might causes injury.

**Q11. As you are long distance coach, what do you recommend to prevent injury?**

As the coaches' responses indicated that they recommend to do the following:

- Athletes should do the warm up and cool down, and stretching properly before and after exercises.
- Coaches should follow the proper training principles in improving performance without harming athletes beyond their capacity
- Athletes should have check their medical status and aware of themselves, and see doctors if pain happens in any way
- Athletes should have proper wear, especially the shoes as it creates of his/her training comfortable
- Avoid extra exercise habits by athletes

- Aware to avoid any pain of athletes immediately as pain feels through orthopedists or sport physicians.

### III. RESPONSES OBTAINED FROM CLUB ADMINISTRATORS

**Q1. Do you think that the club has enough coaches and medical staff that could manage the long distance event athletes in coaching and preventing injury?**

As the data collected indicates that 86% of the clubs has no sufficient medical staffs, and have a few coaches that engaged in the long distances events. Even some clubs indicated that they have no medical staff that manages injury of athletes.

**Q2. Are they the medical staffs equipped well in materials, and skills as well as experience in managing and preventing athletes injury?**

As the data collected indicates that in the most clubs there is no sufficient equipment and the existing manpower are also unskilled to treat and prevent the injury of long distance athletes.

**Q3. Is there insurance coverage for athletes for serious medical treatment?**

No	Options	%age
1	Yes	0
2	No	100

Table20. Insurance coverage of athletes

As the above data indicates that 100% of athletes has no chance to get medical treatment, if the injures goes beyond the clubs capacity to treat.

**Q4. How do you see about your athletes wear related to injury?**

No	Options	%age
1	Excellent	0
2	Very good	13
3	Satisfactory	2
4	Poor	58

Table21. Athletes wear related to injury

According to the above table results indicated 58% of athletes wear shows poor, 29% indicated satisfactory and the remaining, 13 % indicates very good availability of athletes wear.

**Q5 Do you have records of personal and medical files of each athletes in your club?**

No	Options	%age
1	Yes	12
2	No	88

Table 22 personal and medical files of athletes

As the table above indicates that 88% the clubs had no personal and medical records of athletes, the only 12% of clubs do have records of athletes regarding to personal and medical details of athletes, but they do not updated continuously and used for injuries treatment.

**Q6. Do you think that your athletes could get basic needs, especially food as the training required?**

No	Options	%age
1	Excellent	0
2	Very good	15
3	Satisfactory	20
4	Poor	65

Table23. Basic needs availability for athletes as the training required.

As the table above reveals that 65% poor capacity for food, 20% of clubs respond satisfactory access for food as training demands and the remaining



15% respond their athletes have very good capacity for their athletes regarding to the food as training demand requires.

#### **IV. RESPONSE OBTAINED FROM FEDERATION OFFICIALS**

##### **Q1 .What are the common injuries observed in the long distance athletes?**

As the athletics professionals indicated the following injures concerning to the long distance athletes:

- Foot injures
- Heel injury
- Achilles tendons
- Low back pain
- Shin splints
- Groin injuries
- Knee injuries
- Pelvis joint injures
- Leg bone fracture

These indicated above injuries are common in long distances athletes, and Achilles tendon, groin injuries, low back pain and pelvis joint observed repetitively in the marathon runners, and pelvis joint injuries also observed in the long distance women athletes as athletics professionals indicate

##### **Q2. What would such injuries in the case of adds Ababa clubs?**

According to the athletics professionals respond that it is similar to that indicated in the question number one.

##### **Q3. What could be done to prevent these injury problems?**

As the athletics professionals answer pointed out that the following preventive points. According to athletics professionals answer, the Biomechanical imbalances, deformities, misalignments, knocked knees and bowed legs are common, to prevent them understanding the existing such points and treat accordingly by the help of sport medicine professionals, and do proper warming up and cool down and stretching strictly follow training principles as long distance event required.

##### **Q4. What are the causes of long distance injury in the Addis Ababa clubs?**

As the answers obtained from athletics professionals that the causes of long distances athletes' injury might be based on the following.

- Naturally existing biomechanical imbalance, deformities of legs, misalignments when that do not handled properly and expose for prolonged running exercise
- It might be because lack of comfortable shoes that fit the athlete's foot and alignments.
- Exposing athletes for prolonged training beyond the capacity and development of athletes.
- Training surfaces expose athletes for injury, because by nature long distance running requires prolonged training and repetitive pressure on the major muscles, joints and bones.

**Q5. Do you feel that Addis Ababa clubs long distance runners trained or coached properly and cultivated as required in all ages of development?**

According to the answer revealed that the Addis Ababa clubs long distance runners training might not be as the long distance training principles requires, because the qualification of coaches, the training, understanding of athletes may distort the training and development of athletes, this would hinder the athletes development. In addition, the excessive load of training, the training materials, the training places, deformed Biomechanics imbalance and misunderstanding of its effect on athletes, expose athletes for injuries.

## **4.2 DISCUSSION OF THE FINDINGS**

### **1. The appropriate wears of athletes, especially shoes that fit the athletes for training and races.**

As it has shown in the table 2, 65% of athlete's response replied that their shoes are not fit for training. In the table3, 84% of respondents shown that shoes create always discomfort. In other words, 76% of athletes have not understanding in relation between the shoes effect on the injury as table4.

As the coaches response replies that one of cause of injury is the shoes, (foot wear). As Table 18, indicates that 77% of respondent shown there is no

sufficient availability of foot wear or shoes that provided for athletes as the coaches response.

On the other hand the club administrators indicated as table 21, 58% of respondents replied that scarcity of foot wear that fit the athlete's feet for training. And also the athletics professional and sport medicine physician pointed out that shoes is one factor that affect athletes healthy training and expose for certain injuries.

## **2. The training places and its impact in causing the athletes injures**

As the Q11 of athletes' response revealed that, most of the training performed in the hard surface, road, hill and asphalt stood in primary stages.

On the other hand coaches answered that the training surfaces of athletes is one that is susceptible for causing injuries as indicated from Q5 responses. The indicated places that would favor to injure are hill, road, hard surfaces and asphalt training.

## **3. Knowledge of coaches and their attitude towards understanding of injuries and its causes as well as preventions**

As the table 13 indicates that 76% of the coaches are low in academic qualifications. On the other hand, the coaches experiences concerned 55% of coaches are under 2 years of training and experiencing injuries of athletes

In line to this, only 21% of coaches respond for Q5, about the causes of injuries and 79% of coaches did not answer. And also 81% coaches abstained from responding the repetitive types of injuries that had occurred.

## **4. The warm up and cool down and stretching exercise value in minimizing occurrence of injuries**

As the table 8, responses of athletes indicates that 57% of athletes do not properly do warm up and cool down as well as stretching exercise. Table 9 results shown that, only 24% of athletes do the general as well as specific

warm up and cool down as well as stretching exercise. It implies that the athletes lack the value of the activities, and exposing them for certain type of injuries.

**5. Coaches and team physicians understanding, in setting certain criteria for athletes to entry requiring to health as bone breakage background and prevent and care of athletes**

As the athletes' response implied that at table1, there is 25% athletes indicated the families experiencing bone breakage.

At the table 15 indicates that 94% of coaches have no limitation setted for athlete's entrance to the training in regarding to the selection of muscle-skeleton injuries care and prevention. On the other hand only 18 % of coaches put their suggestion in preventing insurance.

According to the club administrators response indicated that 86% has no sufficient team physicians that manages injury in their clubs. And also the insured athletes 100% not are secured in setting medical treatment from the clubs as indicated in the table 20.

Table22 shows 88% of clubs had no medical records that would support in caring and treatment as well as in rehabilitation.

**6. The athletes biomechanical imbalance, running form and their deformities and potential risk of injuries**

Table 7 indicates that 68% athletes respond that during training they feel pain on the either side of their body.

As the table 17 shows 62% coaches observed that the existence of deformed athletes even though the number matters.

In regarding to the knocked knee and bowed legs as implied in the Q7 the coaches observed that around 20% athletes has such problems in their clubs.

The athletic professionals and sport physicians reflected that take care of biomechanical imbalance during training and races as physical examination requires, and they are certain in existence in many clubs because of its natural probability in occurrence

#### **7. Popularly occurring injuries in long distance athletes and its cause relationship.**

As Q7 of athletes answer shows that the indicated types of injuries are shin splints, knee injuries, ankle injury, Achilles tendon, low back pain, heel, foot injuries and pelvis joints injuries are indicated. Q4 answered by coaches also indicated that foot injures back pain, heel, Achilles tendon, shin splints, knee, pelvis joint and leg bone fractures are mentioned.

#### **8. The long distance training duration, difficulties, feeding requirement and athletes preference of the discipline**

As the table 5 responses of athletes has shown 62% of athletes joint the discipline has strong ambition to have a material gain or incentives in response Table 6 implied that 69% of athletes shown that has no sufficient availability of nutrition as the training load and duration requires.

A 67% of athletes response according to table10 revealed that they have both morning and evening training programs, which is in the hard cold time for athletes.

According to table11, 71% of athletes answer they have three and above hours training program per day, among them 43% are experienced above three hours of daily training.

Another athletes experience as table12 indicates that 72% of them respond that they have extra time training beyond the coaches' daily program. The coaches' experience as indicated in the table 19 shows 63% of their athletes has shown extra training habits without order of coaches.

## CHAPTER FIVE

### 5. SUMMARY, CONCLUSION AND RECOMMENDATION

This part of the study content includes the summary, conclusion and recommendations of the study.

#### 5.1 SUMMARY

The concern of the study is to investigate the issue and find out the problems of causes of injuries and prevention in the long distance track athletes in the Addis Ababa athletics club, different issues are raised and have been further discussed, and these are the following.

1. The foot wear has not get attention in causing injuries by coaches and club administrators except providing shoes as protocol of wear for training and races.
2. The clubs are not established in organized manner to manage and prevent injuries.
3. Athletes awareness in regarding to values of warm up and cool down, and stretching in making their joints flexible and agile is poor.
4. The understanding of coaches and physicians in correcting the biomechanical imbalances, running forms, and deformities of athletes and preventing athletes from injuries is limited.
5. Absence of setting criteria for entrant and capturing of detail records of athletes during the beginning and continuous updating information expose athletes to be victim and aggravate injuries.
6. The prolonged training of athletes on the hills, hard surfaces, roads and asphalt areas without preventive foot wear would favor to be injured.
7. The prolonged training creates over-use injuries on the joints, ligaments, bones and muscles. The long training duration, insufficient nutrition and the athlete's extreme eagerness in improving performance put pressure physiologically as well as emotionally and lead to injures.

8. The coaches low academic qualification, clubs lack awareness in possessing team physician and poor understanding of the injuries occurrence would play role in its aggravation of injuries.
9. The repetitive motion of running movement would create friction, load on bones, and pressurize joints, fracture, sprains and strains of different parts of body, this lead injury of ankle, knee, heel and pelvis joints.

## **5.2 CONCLUSION**

The following conclusions are driven from findings of the study.

1. The athlete's foot wears create discomfort, it can cause blisters, corns and a bruise during running creates friction and cuts, if not well cushioned.
2. The lacking of awareness of athletes in proper warming up, and cool down, and stretching would lead to joints inflexibility and result in like muscle sprain and strains of ligaments.
3. The clubs are not well organized as to manage the athletes injuries required, the absence of team physician would hinder the prevention of injuries and late rehabilitation as well as aggravate acute injuries because of ignoring feeling of pain, and continuing training and race.
4. Identifying the biomechanical imbalance, distorted running forms, athletes deformities and taking corrective measures is limited because of lack of awareness of coaches and absence of team physician before aggravated by training.
5. The yearlong training on the hills, hard surfaces, road or concrete, asphalt and on the other terrible places without appropriate cushioning of foot and leg with the necessary wears as places required, expose to be victimize for different types of injuries. And need the sport physicians and awareness of all team mate to prevent athletes from injuries
6. The repetitive motion of movements during training create friction, over load bones, dislocate joint, strain and sprain muscles and ligaments, unless those

parts strengthen prior to such extensive training lead to shin splints, bone leg fractures, knee injuries, ankle injuries, back pain, heel and foot injuries.

7. The excessive prolonged exercise, lack of necessary nourishment that subsidizes the loss nutrients would affect muscles strength, and create over use injures of joints, ligaments and bones in different parts.

### **5.3 RECOMMENDATIONS**

Based on the finding of the causes and prevention of injuries in the long distance track athletes in the Addis Ababa clubs, the following possible solutions are suggested in hoping that the problems would be resolved.

1. The proper foot wear, shoes is one factor among others, athletes shoes as much as possible cushioned and fit, the foot as well prevent excessive friction of foot during exercise.
2. The qualification of coach should be improved so as to have in providing the training load and understanding the injuries existence, because injury is one factor that affects the athletes performance.
3. As much as possible the clubs should get team physician's advice in managing and preventing injuries through different mechanism as capacity permits.
4. Identifying the Biomechanically imbalanced athletes, deformed (knocked knee and bow-legged), and running forms of athletes. Address them through orthopedist examinations and treat them by padding, taping and other mechanisms in correcting the size and position as required before joining the training program.
5. Actually the long distance training requires the work of hill training, asphalt, hard surfaces & road places. The potential causes of risk of injuries is high in the heel, ankles, knee, Achilles tendon and the like, especially it is advisable for 5km. and 10km. to train on the grassy, non rocky and soft surface.
6. Enrich the knowledge and practice of First Aid, bandage, RICE application and organized rehabilitation techniques for coaches, athletes and all teammates would minimize injury of athletes.



7. The extensive long distance training causes repetitive change of direction of motion, create friction one on other because of overlapping during running; prior strengthening of carrying muscles, joints, bones and ligaments are possible solutions in minimizing heel injuries, knee and ankle injuries, as well as shin splints and foot joint injuries.

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## APPENDIX I

### 1. QUESTIONNAIRES FOR THE ATHLETES

This questionnaire paper is designed for collecting data in order to identify the causes and prevention of injuries in long distance runners (athletes), your answers is vital in the research findings, and your are kindly requested to fill by putting (√) on space provided and by writing on the blank spaces provided

***Thank in advance!***

- I. Personal details of Athletes
  - a. Age -----
  - b. Sex -----
  - c. Weight -----
  - d. Height -----
  - e. Body index (optional)-----
  - f. Training age -----
  - g. Long distance you events(s) participate -----
1. Do you have any injured family member (s) like bone fracture or breakage?  
 Yes     No     abstained
2. What do you say about your sport wear, such as shoes, shorts, socks and other necessary training materials?  
 Very comfortable  
 Satisfactory  
 Poor
3. How do you feel your training and competition shoes?  
 Always Comfortable  
 Some times Comfortable  
 Always discomfort able

4. Do you understand that your shoes and injury has relationship when doing Long distance training and competition

Yes  No  Obtained

5. Why do you the long distance events?

To have enjoy with it

To have incentives

Because of others forces

6. Are you well treated in gaining the basic needs, especially the food as the event training requires?

Yes  No if you say 'yes'  Excellent  Satisfactory  Poor

7. Head you ever happened the injury? Which one among the following?

	<b>Acute</b>	<b>Mild</b>	<b>Sever</b>	<b>Once</b>	<b>Recurrent</b>
<input type="checkbox"/> Ankle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Knee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Hamstring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Heel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Achilles tendon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Spin /back pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Pelvis joint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Leg bone fracture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Lower back pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Shine splints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Foot Injuries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other injuries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Do you have any pain on one side of your leg, foot, ankle or knee during running?      Yes      No If you say 'yes', please specify it

---

---

9. Do you do warm up and Cool down exercise, and stretching before and after exercise?     Yes     No If You say 'yes' please specifies its value

---

---

10. How do you do the warm-up, cool down and stretch?

- General exercises always only
- Specific exercises sometimes
- General and specific exercises always

11. Where do you do the training mostly? Please put 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> etc. on the space belong to it as volume of your training.

- Asphalt
- Track
- Hill
- Hard Surfaces
- Grassy surfaces
- Road /Concrete surfaces/
- Gymnasium

12. When do you do your daily training mostly?

- Morning only
- Evening only
- Midday only
- Morning and Evening

13. How long do you do your training daily?

- 2 hours                       3 hours
- 2 ½ hours                       3-4 hours

14. Do you have extra exercising habits beyond the coaches' program?

Yes       No      If You say 'yes' why do you do?

Mistrust on coach

Believe on extra training favor for better improve performance

Misunderstanding of training principles

***Thank in advance!***

## APPENDIX II

### 2.1 QUESTIONNAIRES FOR COACHES

This questionnaires and interview questions would be answered by long distance coaches only.

1. Back ground of coach

A. Educational background

- MA
- BA
- Diploma
- Certificate
- Experience only

B. Years of coaching experience

- 0-2 years
- 3-5 years
- Above 5 years

2. Do you have specification for athletes in the course of screening regarding to cardiovascular cases and biomechanical imbalance and bones breakage history of athlete or his/her family?

Yes  No

3. Is there any record of athletes about the personal and medical details before and after joining in your club?

Yes  No

4. What are the common ore repetitive type of injuries in the long distance athletes you observed in your club? Please list them

---

---

5. Had you observed the deformities like knocked knee and bowed legs?

What precaution measures did you take? \_\_\_\_\_

---

6. Where are you train your athletes mostly in volume of training? please put 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, etc on box

- Asphalt
- Hill
- Road
- Track
- Hard surfaces
- Grassy surfaces
- Gymnasium

7. Had you come across, the athletes would train by them selves beyond your training program? Yes  No If it is 'yes' How it affect he athletes and training program? Please specify your view

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***Thank in advance!***



## 2.2 INTERVIEW QUESTIONS FOR COACHES

1. What would the causes for injuries as your understanding? Please specify them \_\_\_\_\_  
\_\_\_\_\_
2. Did you observe the deformities of your athletes during the course of training?  Yes  No if you say “yes” How could these causes injury? Please explain  
\_\_\_\_\_  
\_\_\_\_\_
3. How do you see the sporting wear of your athletes? Are they available or provided as required and needs of athletes in case of size, shape and weight that fit for each athlete  Yes  No If you say ‘No do you think that would create problem on athlete? Please specify  
\_\_\_\_\_  
\_\_\_\_\_
4. As you are long distance coach, what do you recommend to prevent injury, Please briefly explain  
\_\_\_\_\_  
\_\_\_\_\_

***Thank in advance!***

## APPENDIX III

### 3. 1 QUESTIONERS FOR CLUB ADMINISTRATORS

This questionnaires and interview questions would be answered by Club Administrators only.

1. Is there insurance coverage for athletes for serious medical treatment?  
 Yes  No
2. How do you see about your athletes wear Concerning to injury?  
 Excellent  
 Very Good  
 Satisfactory  
 Poor
3. Do you have records of personal and medical files of each athlete in your club?  Yes  No if you say “yes are they updated continuously and used for injuries treatment?
4. Do you think that your athletes could get basic needs especially food as the training principle required?  
 Excellent  
 Very good  
 Satisfactory  
 Poor

***Thank in advance!***

### 3.2 INTERVIEW QUESTIONS FOR CLUB ADMINISTRATORS

1. Do you think that the club has enough coaches and medical staff that could manage the long distance event athletes in coaching and preventing injury? please specify

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2. Are they the medical staff equipped well in materials, and skill as well as experience in managing injury and prevention of athletes? Please explain briefly

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***Thank in advance!***

## APPENDIX IV

### 4. QUESTIONNAIRES FOR FEDERATION OFFICIALS

1. What are the common injuries observed in long distance runners?

Please list them

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2. What would such injuries in case of Addis Ababa athletics clubs?

Please explain

---

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3. What could be done to prevent injury problems? Please mention them

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4. What are the cause of the long distance injury in Addis Ababa athletics clubs? Please explain

---

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5. Do you feel that Addis Ababa athletics clubs long distance runners trained or coached properly and cultivated as required in all ages of development? Please explain your view regarding to injury

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***Thank in advance!***

# Appendices

Addis Ababa University School of Graduate studies

## **DECLARATION**

This thesis is my original work, has met been presented for degree in any other university and that all sources of material used for the thesis have been duly Acknowledged

Name

Alebel Tarekegne

Signature

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## **Approved by**

Wondumu Tadesse

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Advisor

Signature

Addis Ababa University School of Graduate  
Studies

This thesis has been submitted for examination  
with my approval as university advisor

Name

Wondumu Tadesse

Signature

\_\_\_\_\_

Date of submission

June, 2011