PRODUCTION AND DESIGN YARN POLYOLEFIN BY SPECIFICATIONS MECHANICAL FOR SUITABLE END USE.

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ABSTRACT

Wheat flour, mung bean flour, chickpeas flour and dried skim milk were mixed with different levels to produce biscuits (protein-rich). Chemical composition, food energy, essential amino acids comparing to FAO/WHO reference patterns, protein efficiency ratio and biological value were evaluated. Organoleptic evaluation was done for all biscuit samples. It was noted that the highest amounts of protein was found in dried skim milk supplementation followed by mung bean and chickpeas flours (35.7, 31.7 and 21.83 g./100g.) respectively as compared with wheat flour (21.8g./100g.). As a result of adding dried skim milk, mung bean flour and chickpeas flour gave the higher protein value (108.92, 110.81, 115.96, 116.30, 119.82 and 123.60%) of samples No. 1, 3, 5, 2, 6, and 4, respectively comparing with control sample. On the other hand, the composition of the biscuits provided a good caloric values i.e. 396.70 to 399.10 K.cal /l00g.sample for the 3 and 4 treatments as a results of adding chickpeas flour 5 and 10% with dried skim milk 5%, respectively. It could be noticed that the concentration level of essential amino acids of fortified biscuit samples were increased and the percentage of total essential amino acids were raised (103.82 to 116.29%) as compared with control. The lowest level of covered the daily requirements of total essential amino acids was in control sample (76.90%) and increased to (89.44%) in sample No. 4 which contained (10% of mung bean flour and 5% of dried skim milk), also 112 g. from this sample covered the daily requirements of total essential amino acids. On the other hand, adding mung bean flour, chickpeas flour and dried skim milk, protein efficiency ratio and biological value were improved up to (111.20% and 104.22%) respectively. Evaluation of organoleptic test clearly indicated that a significant increase of taste, crispiness, color and acceptable of biscuit samples especially in 4 and 5 treatments (10% mung bean and 10% chickpeas flours. Finally, results indicated that addition of mung bean flour and chickpeas flour at different levels were optimal for preparation of biscuits.

الملخص

يعتبر تصميم وتصنيع هذه النوعية من المنتجات النسيجية عملية متعددة الجوانب تحتاج إلى الكثير من مصادر المعرفة المختلفة وتصب فيها كل منجزات العلم على اختلاف فروعه خاصة التكنولوجية والاقتصادية ولعل عملية التصميم تتميز لي حد كبير بأنها بنائية وليست زخرفية أو تشكيلية فقط وذلك تزاوج خواص المظهر والجوهر فى المنتج وتزامن عمليتي تصميمهما فى وقت واحد إنتاج خيوط البولي بروبلين الجراحية يجب فى المجال يجب بخواص بنائية مثل متانة الخيوط حتى لا يحدث قطع أثناء العملية الجراحية وتتميز بقابليتها على التكييف والمرونة والليونة والانثناء فى يد الجراح.

ومن الدراسات الميدانية فى مجال إنتاج المستلزمات الطبية يجب توفير الخيوط الجراحية المحلية الصنع والباحث فى مجال إنتاج صناعات المستلزمات الطبية وبالأخص فى مجال الخيوط الجراحية يلمس بوضوح عدم وجود صناعة محلية للخيوط الجراحية المصنوعة من البولي إيثلين في مصر مما يؤدي إلى استيراد الخيوط الجراحية من السوق الخارجي مما يستنزف كثير من العملات الصعبة وبالإضافة لندرة وجود دراسات متخصصة لتحسين خواص أداء تلك المنتجات بما يتفق مع طبيعة الاستخدامات المتنوعة والمتعددة. ويهدف البحث إلى إنتاج خيوط جراحية غير ممتصة من خلال دراسة اختلاف درجات الحرارة أثناء عملية الغزل الإنصهاري واختلاف أقطار خيوط البولي إيثلين أثناء عملية التصنيع ولإيجاد خيط ذو مواصفات جديدة متميزة تتلاءم مع الأداء الوظيفي لغرض الاستخدام مما يؤدي إلى زيادة الاقتصاد والحفاظ على العملات الصعبة والمحلية وأيضا فتح مصانع لإنتاج هذه النوعية من الخيوط والمنافسة العالمية ويعتمد البحث على المنهج التجريبي التحليلي وخطة البحث تحقق الفروض التالية:

١- دراسة درجات الحرارة فى عملية الانصهار للخامة البولي بروبلين لها تأثير على خواص الخيوط الجراحية .

٢- دراسة قطرا لخيط لخامة البولي بروبلين لها تأثير على خواص الخيوط الجراحية .

وهذا البحث غطي الجوانب النظرية والعملية التجريبية والتطبيقية لهذا الموضوع على أساس تحليلي لكل من الجوانب التطبيقية.

وتم دراسة تأثير العوامل محل الدراسة على الخواص المختلفة التي تم دراستها مثل تأثير المتغيرات المستخدمة تحت التجربة على قوة الشد عند القطع و تأثير المتغيرات المستخدمة تحت التجربة على الاستطالة عند القطع و تأثير المتغيرات المستخدمة تحت التجربة على قوة الشد بعقدة عند القطع و تأثير المتغيرات المستخدمة تحت التجربة على الاستطالة بعقدة عند القطع ، وتم فرض العلاقات على صورة معادلة من الدرجة الثانيةوإيجاد معامل الارتباط. وقد تم التوصل إلى النتائج التالية من خلال الاختبارات المعملية على الخيوط الجراحية:

١- توجد علاقة طردية بين قوة الشد عند القطع بدون عقدة وبين اختلاف درجات الحرارة أثناء عملية الغزل الانصهاري للخامة البولي بروبلين.

٢- توجد علاقة طردية بين قوة الشد عند القطع بعقدة وبين اختلاف درجات الحرارة أثناء عملية الغزل الانصهاري للخامة البولي بروبلين.

٣- توجد علاقة طردية بين قوة الشد عند القطع بدون عقدة وبين أقطار الخيوط للخامة البولي بروبلين.

٤- توجد علاقة طردية بين قوة الشد عند القطع بعقدة وبين أقطار الخيوط للخامة البولي بروبلين.

٥- توجد علاقة عكسية بين الاستطالة عند القطع بدون عقدة وبين اختلاف درجات الحرارة أثناء عملية الغزل الانصهاري للخامة البولي بروبلين.

٦- توجد علاقة عكسية بين الاستطالة عند القطع بعقدة وبين اختلاف درجات الحرارة أثناء عملية الغزل الانصهاري للخامة البولي بروبلين.

٧- توجد علاقة طردية بين الاستطالة عند القطع بدون عقدة وبين أقطار الخيوط للخامة البولي بروبلين.

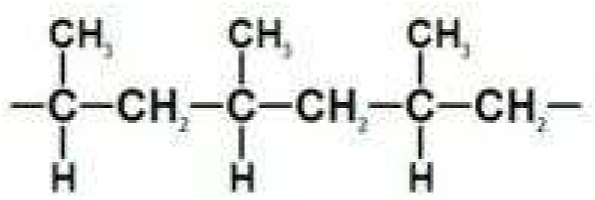
٨- لا توجد علاقة بين الاستطالة عند القطع بعقدة وبين أقطار الخيوط للخامة البولي بروبلين.

1- INTRODUCTION

Textile has swept over new fields the last three decades. It has been used indifferent fields, such as agriculture, industry and medicine, with the aim of improving the performance efficiency and reducing costs. This industry has recently achieved a tremendous success in medical fields thus, it has been used in designing and manufacturing polyproplene suture.

Propylene (CH2=CH-CH3), the by- product of the oil refineries, is one of the constituents obtained from thermal or catalytic cracking of petroleum . Under suitable polymerising conditions. Propylene produces fiber-forming. Propylene.

Spinning : polypropylene is spun by melt spinning .because it is a cheap process. Further ,since the polymer has high degree of polymerization, it is difficult to dissolve in organic solvents. the filaments, extruded at 100 0c above the melting point, are cooled in air chamber or tank of water and collected on bobbins. Rapid cooling or quenching produces small crystals . in contrast to lager crystals formed by slow cooling. The filaments are the hot- drawn and twisted into yarns[1].



Figure(1): Polyproplene Suture

Properties of poly propylene[2] :

Tenacity	High.
Elongation	Variable
Abrasion Resistance	Very Good
Absorbency	Low
Thermal Retention	Good
Resiliency	Excellent
Elastic Recovery	Excellent

Physicians have used sutures for at least 4,000 years. Archaeological records from ancient Egypt show that Egyptians used linen and animal sinew to close wounds[15],[16]. In ancient India, physicians used the heads of beetles or ants to effectively staple wounds shut. The live creatures were affixed to the edges of the wound, which they clamped shut with their pincers. Then the physician cut the insects' bodies off, leaving the jaws in place. Other natural materials doctors used in ancient times were flax, hair, grass, cotton, silk, pig bristles, and animal gut. Though the use of sutures was widespread, sutured wounds or incisions often became infected. Nineteenth century surgeons preferred to cauterize wounds, an often ghastly process, rather than risk the patient's death from infected sutures. The great English physician Joseph Lister discovered disinfecting techniques in the 1860s, making surgery much safer. Lister soaked catgut suture material in phenol making it sterile, at least on the outside. Lister spent over 10 years experimenting with catgut, to find a material that was supple, strong, sterilizable, and absorbable in the body at an adequate rate. A German surgeon made advances in the processing of catgut early in the twentieth century, leading to a truly sterile material.

Catgut was the staple absorbable suture material through the 1930s, while physicians used silk and cotton where a non-absorbable material was needed. Suture technology advanced with the creation of nylon in 1938 and of polyester around the same time. As more man-made textiles were developed and patented for suture use, needle technology also advanced. Surgeons began using an atraumatic needle, which was pressed or crimped onto the suture. This saved the trouble of threading the needle in the operating room, and allowed the entire needle diameter to remain roughly the same size as the suture itself. In the 1960s, chemists developed new synthetic materials that could be absorbed by the body. These were polyglycolic acid and polylactic acid. Previously, absorbable sutures had to be made from the natural material catgut. Synthetic absorbable suture material is now far more prevalent than catgut in United States hospitals.

The FDA began requiring approval of new suture material in the 1970s. A Medical Device Amendment was added to the FDA in 1976, and suture manufacturers have been required to seek pre-market approval for new sutures since that time. Manufacturers must comply with specific Good Manufacturing Practices, and guarantee that their products are safe and effective. Patents for new suture materials are granted for 14 years.

Natural sutures are made of catgut or reconstituted collagen, or from cotton, silk, or linen. Synthetic absorbable sutures may be made of polyglycolic acid, a glycolide-lactide copolymer; or polydioxanone, a copolymer of glycolide and trimethylene carbonate. These different polymers are marketed under specific trade names. Synthetic nonabsorbable sutures may be made of polypropylene, polyester, polyethylene terephthalate, polybutylene terephthalate, polyamide, different proprietary nylons, or Goretex. Some sutures are also made of stainless steel.

Sutures are often coated, especially braided or twisted sutures. They may also be dyed to make them easy to see during surgery. Only FDA approved dyes and coatings may be used. Some allowable dyes are: logwood extract, chromium-cobalt-aluminum oxide, ferric ammonium citrate pyrogallol, D&C Blue No. 9, D&C Blue No. 6, D&C Green No. 5, and D&C Green No. 6. The coatings used depend on whether the suture is absorbable or nonabsorbable. Absorbable coatings include Poloxamer 188 and calcium stearate with a glycolide-lactide copolymer. Nonabsorbable sutures may be coated with wax, silicone, fluorocarbon, or polytetramethylene adipate.

It has been suggested that polyproplene sutures are easier to tie than monofilament nylon and that the knots hold more securely [(13),(14),(5)] .

Used in over 1000 million surgical procedures , monofilament polyproplene suture has been proven important qualities and characteristics including:

1-pliability.

2-easy knot tying, with excellent knot security.

3-exceptional surface smoothness, resulting in easy passage through tissue.

4-biological inertness, eliciting only minimal tissue reaction.

5- monofilament construction, providing no harbour for bacteria.

6-considerably less than thrombogenicity than many other suture materials.

7-non-biodegradable;providing prolonged tensile strength retention in tissue after implantation, even the presence of infection.

8-non absorbable

9- monofilament polyproplene the standard for vascular surgery.[(11)]

Production of polypropylene suture is circle figure:

Figure(2):Cross Section Of Polypropylene Suture

2-MAGNITUDE OF PROPLEM RESEARCH:

As result of increasing number of patients, hospitals, and number of operations rooms which needs medical equipments and improvement of health care. we must find local industry for medical equipments to face international competition. our studies reveal that we must have our medical equipments especially suture, our studies also reveal that local industry for medical equipment not present especially polyproplene suture which leads to increase import suture from out side and also decrease researches specialized for these reasons[17].

3- IMPORTANCE OF RESEARCH:

The use of Polyproplene monofilament has increased greatly during recent years . Polyproplene suture compare to monofilament nylon ,tie more secure knots and have a very low order of tissue reactivity. Because of the smoothness of polyproplene sutures, they slip through tissue easily and, because there is no tissue ingrowths, they may be removed easily when necessary[3].

A surgical suture is used to close the edges of a wound or incision and to repair damaged tissue. There are many kinds of sutures, with different properties suitable for various uses. Sutures can be divided into two main groups: absorbable and non-absorbable. An absorbable suture decomposes in the body. It degrades as a wound or incision heals. A non-absorbable suture resists the body's attempt to dissolve it. Non-absorbable sutures may be removed by a surgeon after a surface incision has healed.

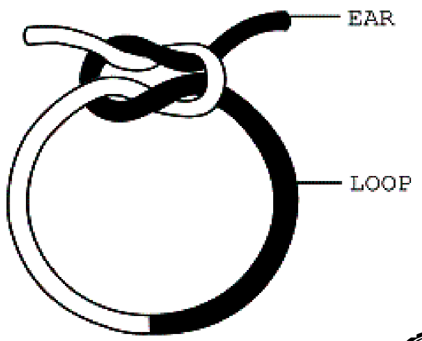
Sutures are made from both man-made and natural materials. Natural suture materials include silk, linen, and catgut, prepared submucous coat of the sheep's (and , more recently ,cow's) intestine , plain catgut is selected for fine suture and ligatures where rapid digestion is no disadvantage . Chromicized catgut has been treated to delay digestion in the tissues.(4)

Synthetic sutures are made from a variety of textiles such as nylon or polyester, formulated specifically for surgical use(10).

Absorbable synthetic sutures are made from polyglycolic acid or other glycolide polymers. Most of the synthetic suture materials have proprietary names, such as Dexon and Vicryl.

The water-resistant material Goretex has been used for surgical sutures, and other sutures are made from thin metal wire Sutures are also classified according to their form. Some are monofilaments, that is, consisting of only one thread-like structure. Others consist of several filaments braided or twisted together. Surgeons choose which type of suture to use depending on the operation. A monofilament has what is called low tissue drag, meaning it passes smoothly through tissue. Braided or twisted sutures may have higher tissue drag, but are easier to knot and have greater knot strength. Braided sutures are usually coated to improve tissue drag. Other sutures may have a braided or twisted core within a smooth sleeve of extruded material. These are known as pseudo-monofilaments.

There is a multiplicity of techniques and materials for closing wounds. Any technique should avoid tension and there is no definite need to avoid dead space ,although haemostasis is important. The hypoxia at the wound edge is the stimulus, through released chemoattractants, to macrophage function which in turn directs fibroblastic activity and angiogenesis the healing wound (6).



Figure(3):Components Of a Tied Suture(Square Knot)

As with other synthetic suture , knot security requires the standard surgical technique of square ties with additional throws as indicated by surgical circumstances and experience of the operator.(11)

KNOT BREAKAGE

When enough force is applied to the tied suture to result in breakage, the site of disruption of the suture is almost always the knot. The force necessary to break a knotted suture is lower than that required to break an untied suture made of the same material. The forces exerted on a tied suture are converted into shear forces by the knot configuration that break the knot. The percentage loss of tensile strength, as a result of tying a secure knot, is least with monofilament and multifilament steel. This relationship between the tensile strength of unknotted and knotted suture, which is designated knot efficiency, is described in the following equation:

KNOT EFFICIENCY(%)= Tensile strength of a knotted suture ÷ Tensile strength of a knotted suture

Regardless of the type of suture material, the efficiency of the knot is enhanced with an increasing number of throws, although only up to a certain limit. The type of knot configuration that results in a secure knot that fails by breaking varies considerably with different suture material. The magnitude of force necessary to produce knot breakage is influenced by the configuration of the knotted suture loop, type of suture material, and the diameter of the suture. The tissue in which the suture is implanted also has considerable influence on the knot strength of suture. In the case of absorbable sutures, a progressive decline in knot breaking strength is noted after tissue implantation. In addition, the magnitude of knot breakage force is significantly influenced by the rate of application of forces to the "ears" of the knot. When a constant force is applied slowly to the knot "ears," the knot breakage force is significantly greater than that for knots in which the same constant force is applied rapidly to the "ears." The latter knot loading rate is often referred to as "the jerk at the end of the knot," especially when the knotted suture breaks[12].

4-: THE METHODOLOGY OF RESEARCH:

Depends On The Experimental Analytical Approach.

5- OBJECTIVES OF RESEARCH:

1-To study the effect Of Temperature In Melt Spinning Of Polypropylene that affect Properties of Suture .

2- To study the effect of Diameter Suture Polypropylene that affect Properties Suture .

MATERIALS OF SUTURE USED IN RESEARCH

6-1:SPECIFICATION OF POLYPROPYLENE :

1-DENSITY 0.9 GRAM/CM3

According To American Standard Specification D-1505

2-MFI 3 GRAM/10MIN

According To American Standard Specification D-1238

6-2:SPECIFICATION OF MASTER BATCH :

Specification Of Master Batch Is 0.5% And Colour Of Suture Polypropylene Is Blue .According To Unit Stats Pharmacopoeia, European Pharmacopoeia And British Pharmacopoeia [7],[8],[9].

7-FACTORS EXAMINED THROUGH THE RESEARCH

7-1:UNCHANGEABLE SPECIFICATIONS:

7-1-1:Polypropylene Material.

7-1-2:Machine Row Of Melt Spinning

7-1-3:Speed Of Winding.

7-1-4:Material Master Batch.

7-1-5:Stretching 1:5.

7-2:CHANGEABLE SPECIFICATIONS:

7-2-1:TEMPERATURE.

A-Temperature Of Zone(240-250-250-260-265 ^{0}C).

B- Temperature Of Zone(260-270-270-280-285 ^{0}C).

C- Temperature Of Zone(280-290-290-300-305 ^{0}C)

7-2-2: DIAMETER:

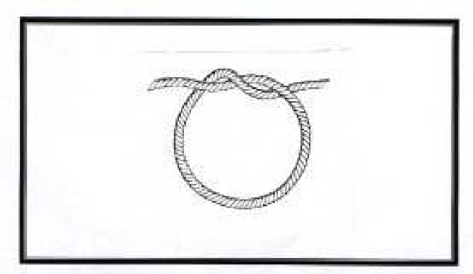
A-1.5 Metric Size.

B-2 Metric Size.

C-2.5 Metric Size.

8-RESULTS & DISCUSSION

The tests of tensile strength and elongation by knot and with knot on samples of poly propylene sutures which made in laboratory with the temperature of 20±1 and Relative Humidity of 65±2 for obtaining suture with special properties suitable for economic level and end use. The results of these measurements in the following tables:



Figure(4): Shows Suture with Knot used for Tensile Strength And Elongation .

Table(1):Results of Polypropylene Sutures At Temperature (240:265 ^{0}c).

N	Code Of Sample	Tensile Strength Without knot (Kg)	Elongation Without knot (mm)	Tensile Strength With Knot (Kg)	Elongation With Knot (mm)
1	H-28	1.1858	52.472	1.0364	34.032
2	H-29	1.0686	48.6964	0.953	33.32
3	H-30	0.963	46.568	0.8916	34.1888

Table(2):Results of Polypropylene Sutures At Temperature (260:285 ^{0}c).

N	Code Of Sample	Tensile Strength Without knot (Kg)	Elongation Without knot (mm)	Tensile Strength With Knot (Kg)	Elongation With Knot (mm)
1	E-37	1.2302	58.18	1.17	35.9
2	E-38	0.9634	76.68	0.8168	41.94
3	E-39	0.9052	54.346	0.8084	36.926

Table(3):Results of Polypropylene Sutures At Temperature (280:305 ^{0}c).

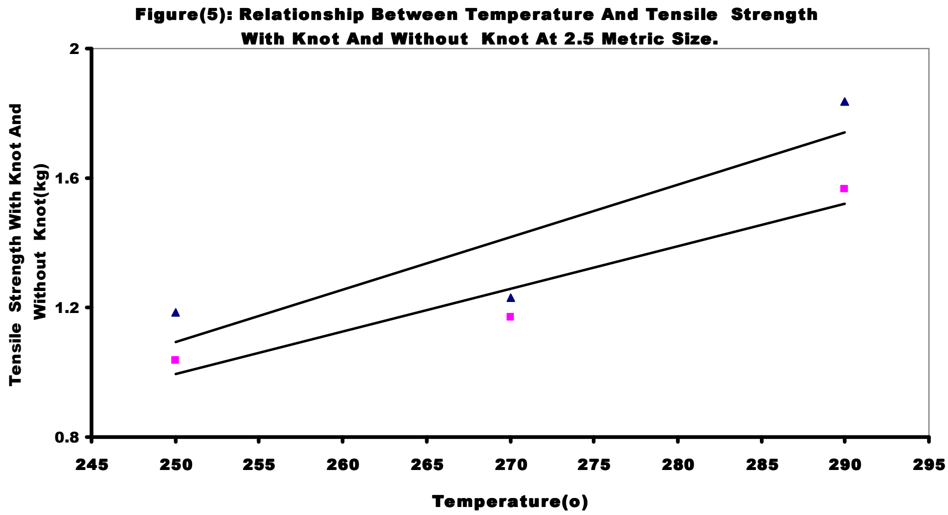
N	Code Of Sample	Tensile Strength Without knot (Kg)	Elongation Without knot (mm)	Tensile Strength With Knot (Kg)	Elongation With Knot (mm)
1	A-46	1.836	46.956	1.565	32.0436
2	A-47	1.8584	43.8152	1.541	31.078
3	A-48	1.7586	44.9538	1.5192	29.2016

8-1: Tensile Strength With Knot And Without Knot

8-1-1: Relationship Between Temperature And Tensile Strength With Knot And Without Knot At 2.5 Metric Size.

Table(4): Relationship Between Temperature And Tensile Strength With Knot And Without Knot At 2.5 Metric Size.

N	Code Of Sample	Tensile Strength Without knot (Kg) ▲	Tensile Strength With Knot (Kg) ■
1	H-28	1.1858	1.0364
2	E-37	1.2302	1.17
3	A-46	1.836	1.565



Figure(5) shows Relationship Between Temperature And Tensile Strength Without Knot At 2.5 Metric Size. Represented the straight line equation of samples(H28-E37-A46) ▲ Tensile strength without knot y=2.97+0.02x r=0.9

as the temperature increases. It's found that tensile strength without knot increases also.

It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between temperature and tensile strength without knot.

And also Figure(5) shows Relationship Between Temperature And Tensile Strength With Knot At 2.5 Metric Size.

Represented the straight line equation of samples (H28-E37-A46) ■

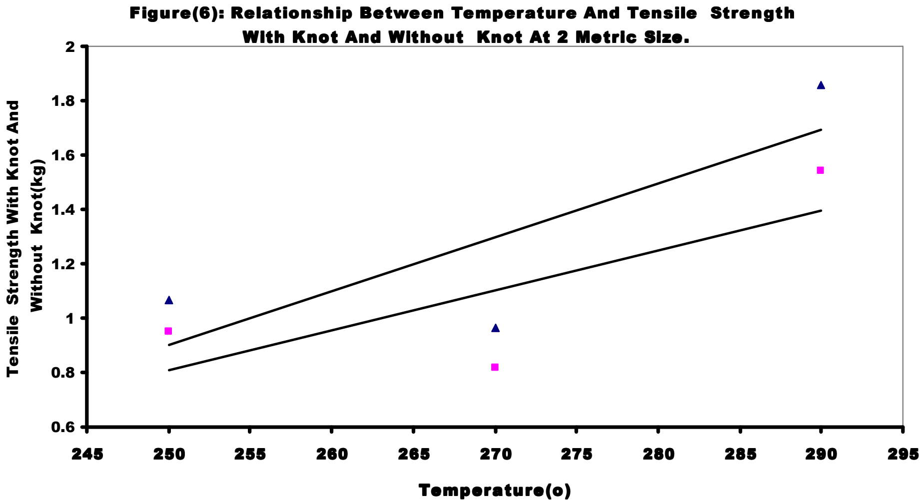
Tensile strength with knot $y=2.31+0.01x$ $r=0.9$

as the temperature increases. It's found that tensile strength with knot increases also. It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between temperature and tensile strength with knot. As a result from increase temperature leads to increase flexibility fibers leads to increase in the tensile strength of poly propylene suture with knot.

8-1-2: Relationship Between Temperature And Tensile Strength With Knot And Without Knot At 2 Metric Size.

Table(5): Relationship Between Temperature And Tensile Strength With Knot And Without Knot At 2 Metric Size.

N	Code Of Sample	Tensile Strength Without knot (Kg) ▲	Tensile Strength With Knot (Kg) ■
1	H-29	1.0686	0.953
2	E-38	0.9634	0.8168
3	A-47	1.8584	1.541



Figure(6): shows Relationship Between Temperature And Tensile Strength Without Knot At 2 Metric Size.

Represented the straight line equation of samples (H29-E38-A47) ▲

Tensile strength without knot y=- 4.03+0.02x r=0.8

as the temperature increases. It's found that tensile strength without knot increases also. It's also found that the correlation factor is r=0.8 which indicates that there is a strong proportional relation between temperature and tensile strength without knot.

And also Figure(6) shows Relationship Between Temperature And Tensile Strength With Knot At 2 Metric Size.

Represented the straight line equation of samples (H29-E38-A47) ■

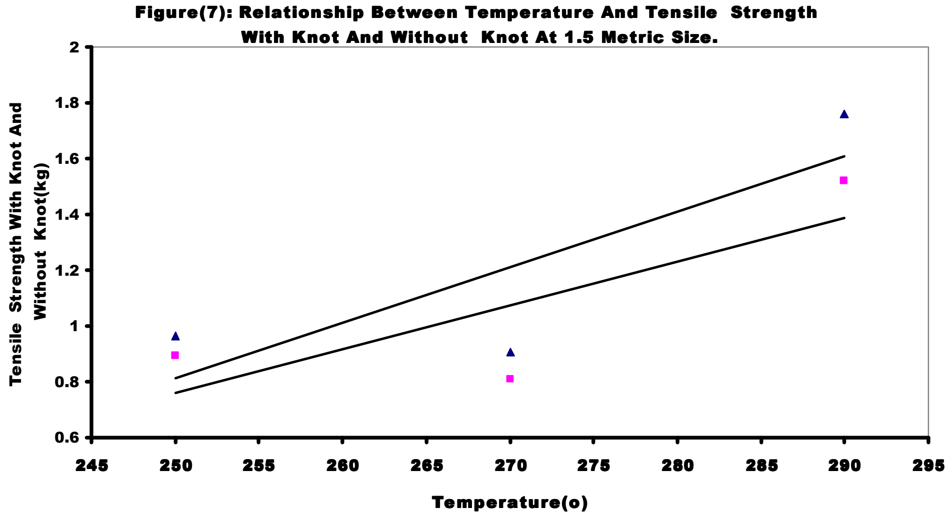
Tensile strength with knot y=-2.87+0.01x r=0.8

as the temperature increases. It's found that tensile strength with knot increases also. It's also found that the correlation factor is r= 0.8 which indicates that there is a strong proportional relation between temperature and tensile strength with knot. As a result from increase temperature leads to increase flexibility fibers leads to increase in the tensile strength with knot.

8-1-3: Relationship Between Temperature And Tensile Strength With Knot And Without Knot At 1.5 Metric Size.

Table(6): Relationship Between Temperature And Tensile Strength With Knot And Without Knot At 1.5 Metric Size.

N	Code Of Sample	Tensile Strength Without knot (Kg) ▲	Tensile Strength With Knot (Kg) ■
1	H-30	0.963	0.8916
2	E-39	0.9052	0.8084
3	A-48	1.7586	1.5192



Figure(7) shows Relationship Between Temperature And Tensile Strength Without Knot At 1.5 Metric Size.

Represented the straight line equation of samples (H30-E39-A48) ▲

Tensile strength without knot y=-4.16+0.02x r=0.8

as the temperature increases. It's found that tensile strength without knot increases also. It's also found that the correlation factor is r=0.8 which indicates that there is a strong proportional relation between temperature and tensile strength without knot.

And also Figure(7) shows Relationship Between Temperature And Tensile Strength With Knot At 1.5 Metric Size.

Represented the straight line equation of samples (H30-E39-A48) ■

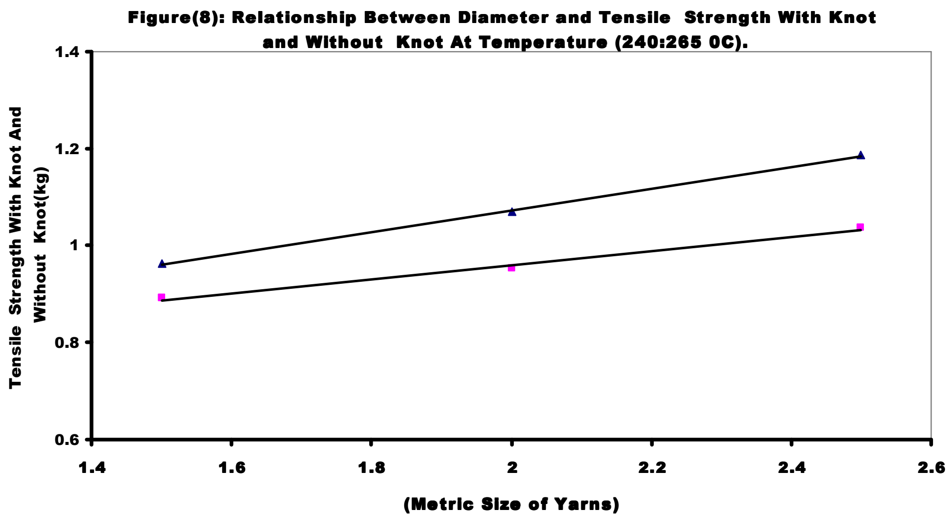
Tensile strength with knot y=-3.16+0.02x r=0.8

as the temperature increases. It's found that tensile strength with knot increases also. It's also found that the correlation factor is r=0.8 which indicates that there is a strong proportional relation between temperature and tensile strength with knot. As a result from increase temperature leads to increase flexibility fibers leads to increase in the tensile strength of poly propylene suture with knot.

8-1-4: Relationship Between Diameter And Tensile Strength With Knot And Without Knot At Temperature (240:265 0C).

Table(7): Relationship Between Diameter And Tensile Strength With Knot And Without Knot At Temperature (240:265 ^{0}C).

N	Code Of Sample	Tensile Strength Without knot (Kg) ▲	Tensile Strength With Knot (Kg) ■
1	H-28	1.1858	1.0364
2	H-29	1.0686	0.953
3	H-30	0.963	0.8916



Figure(8) shows Relationship Between Diameter And Tensile Strength Without Knot At Temperature (240:265 ^{0}C).

Represented the straight line equation of samples (H28- H29- H30) ▲

Tensile strength without knot y=0.63+0.22x r=0.9

as the Diameter increases. It's found that tensile strength without knot increases also.

It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between Diameter and tensile strength without knot.

And also Figure(8) shows Relationship Between Diameter And Tensile Strength With Knot At Temperature (240:265 ^{0}C).

Represented the straight line equation of samples (H28- H29- H30) ■

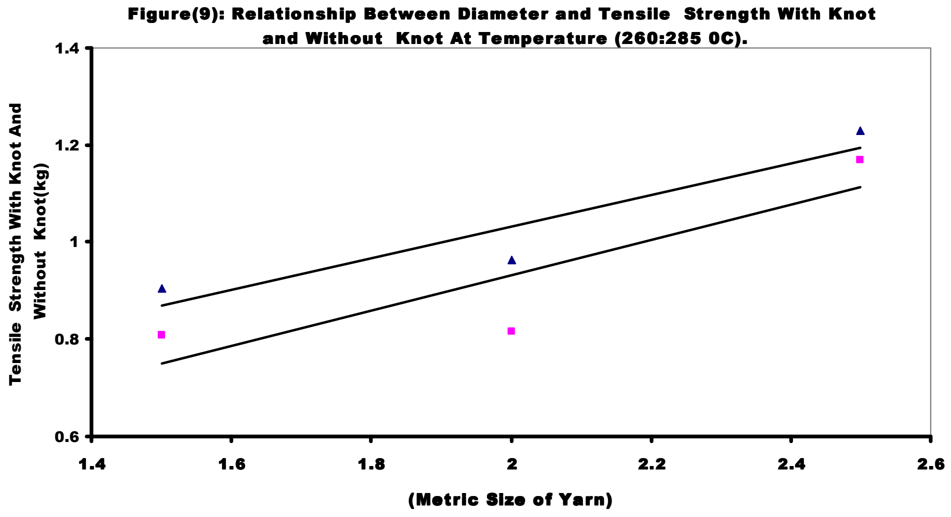
Tensile strength with knot y=2.31+0.01x r=0.9

as the Diameter increases. It's found that tensile strength with knot increases also. It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between temperature and tensile strength with knot. As a result from in the sample of suture 2.5 metric size gives greatest tensile strength without knot and diameter of 1.5 metric size gives the least tensile strength without knot and these result from increase of polypropylene suture cross section.

8-1-5: Relationship Between Diameter And Tensile Strength With Knot And Without Knot At Temperature (260:285 0C).

Table(8): Relationship Between Diameter And Tensile Strength With Knot And Without Knot At Temperature (260:2850C).

N	Code Of Sample	Tensile Strength Without knot (Kg) ▲	Tensile Strength With Knot (Kg) ■
1	E-37	1.2302	1.17
2	E-38	0.9634	0.8168
3	E-39	0.9052	0.8084



Figure(9) shows Relationship Between Diameter And Tensile Strength Without Knot At Temperature (260:285 ^{0}C).

Represented the straight line equation of samples (E37- E38- E39) ▲

Tensile strength without knot y=0.38+0.33x r=0.9

as the Diameter increases. It's found that tensile strength without knot increases also.

It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between Diameter and tensile strength without knot.

And also Figure(9) shows Relationship Between Diameter And Tensile Strength With Knot At Temperature (260:285 ^{0}C).

Represented the straight line equation of samples (E37- E38- E39) ■

Tensile strength with knot y=0.31+0.54x r=0.9

as the Diameter increases. It's found that tensile strength with knot increases also.

It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between temperature and tensile strength with knot.

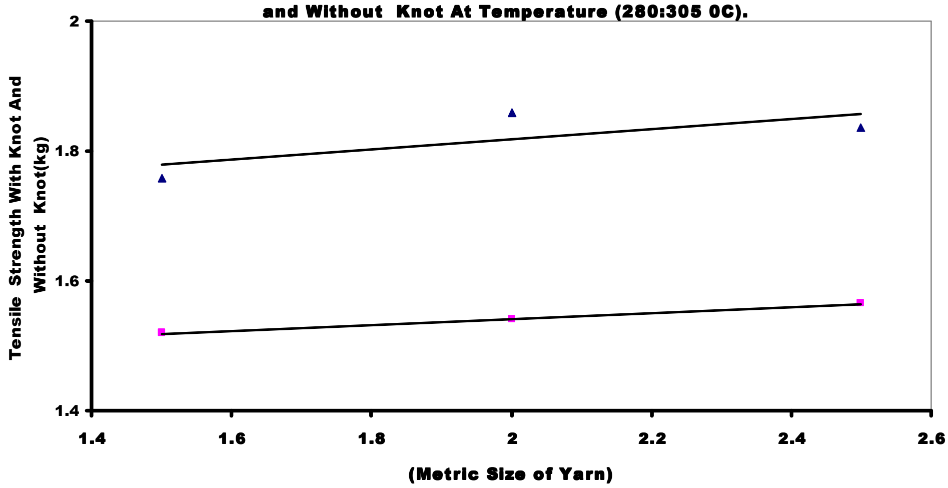
As a result from in the sample of suture 2.5 metric size gives greatest tensile strength without knot and diameter of 1.5 metric size gives the least tensile strength without knot and these result from increase cross section.

8-1-6: Relationship Between Diameter And Tensile Strength With Knot And Without Knot At Temperature (280:305 0C).

Table(9): Relationship Between Diameter And Tensile Strength With Knot And Without Knot At Temperature (280:305 ^{0}C).

N	Code Of Sample	Tensile Strength Without knot (Kg) ▲	Tensile Strength With Knot (Kg) ■
1	A-46	1.836	1.565
2	A-47	1.8584	1.541
3	A-48	1.7586	1.5192

Figure(10): Relationship Between Diameter and Tensile Strength With Knot and Without Knot At Temperature (280:305 0C).



Figure(10) shows Relationship Between Diameter And Tensile Strength Without Knot At Temperature (280:305 ^{0}C).

Represented the straight line equation of samples (A46- A47- A48) ▲

Tensile strength without knot y=1.66-0.08x r=0.7

as the Diameter increases. It's found that tensile strength without knot increases also.

It's also found that the correlation factor is r=0.7 which indicates that there is a strong proportional relation between Diameter and tensile strength without knot. Represented the straight line equation of samples (A46-A47- A48) ■

Tensile strength with knot $y=1.45-0.05x$ $r=0.9$

as the Diameter increases. It's found that tensile strength with knot increases also.

It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between temperature and tensile strength with knot.

As a result from in the sample of suture 2.5 metric size gives greatest tensile strength without knot and diameter of 1.5 metric size gives the least tensile strength without knot and these result from increase cross section.

8-1-7: Comparison Between Diameter And Tensile Strength With Knot And Without Knot .

Table(10): Comparison Between Diameter And Tensile Strength With Knot and Without Knot .

N	Code Of Sample	Tensile Strength Without knot (Kg) ■	Tensile Strength With Knot (Kg) ■
1	H-28	1.1858	1.0364
2	H-29	1.0686	0.953
3	H-30	0.963	0.8916
4	E-37	1.2302	1.17
5	E-38	0.9634	0.8168
6	E-39	0.9052	0.8084
7	A-46	1.836	1.565
8	A-47	1.8584	1.541
9	A-48	1.7586	1.5192

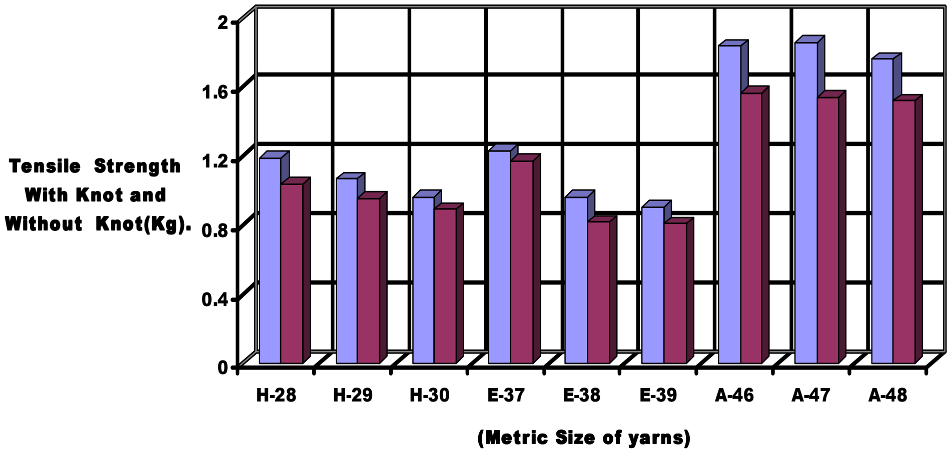
Figure(11) shows Comparison Between Diameter And Tensile Strength Without Knot . The results show that greatest level of tensile strength without knot achieved at A-47 which measured 1.86 kg at temperature (260-270-270-280-285^{0}C) and Diameter 2 metric size.

The second sample of tensile strength without knot achieved atA-46 which measured 1.83 kg at temperature (240-250-250-260-265^{0}C) and diameter 2.5 metric size.

The third sample of tensile strength without knot achieved at A-48 which measured 1.76 kg at temperature (280-290-290-300-305^{0}C) and diameter 1.5 metric size.

And also Figure(11) shows Relationship Between Diameter And Tensile Strength With Knot.

Figure(11): Comparison Between Diameter And Tensile Strength With Knot And Without Knot .



The results show that greatest level of tensile strength with knot achieved at A-46 which measured 1.57 kg at temperature (240-250-250-260-265^{0}C) and Diameter 2.5 metric size.

The second sample of tensile strength with knot achieved at A-47 which measured 1.54 kg at temperature (260-270-270-280-285^{0}C) and diameter 2 metric size.

The third sample of tensile strength with knot achieved at A-48 which measured 1.52 kg at temperature (280-290-290-300-305^{0}C) and diameter 1.5 metric size.

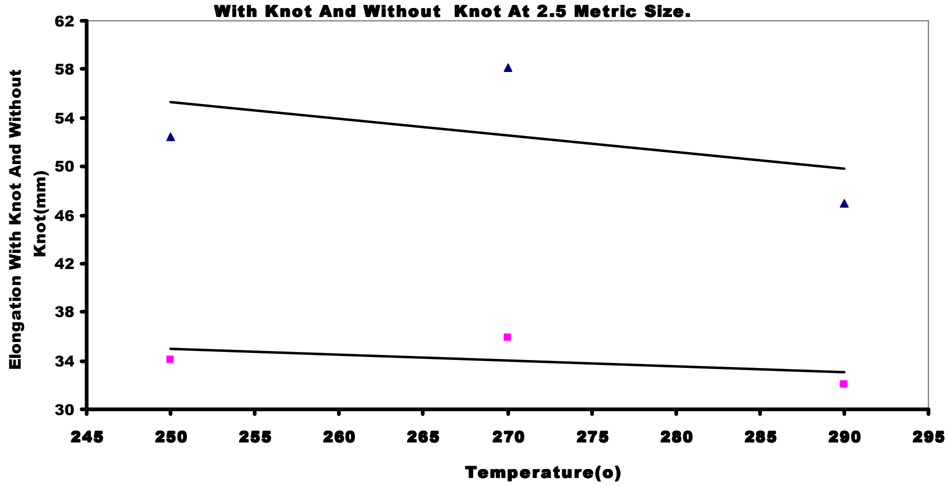
8-2: Elongation With Knot And Without Knot.

8-2-1: Relationship Between Temperature And Elongation With Knot And Without Knot At 2.5 Metric Size.

Table (11): Relationship Between Temperature And Elongation With Knot And Without Knot At 2.5 Metric Size.

N	Code Of Sample	Elongation Without knot (mm) ▲	Elongation With Knot (mm) ■
1	H-28	52.472	34.032
2	E-37	58.18	35.9
3	A-46	46.956	32.0436

Figure(12): Relationship Between Temperature and Elongation With Knot And Without Knot At 2.5 Metric Size.



Figure(12) shows Relationship Between Temperature And Elongation Without Knot At 2.5 Metric Size.

Represented the straight line equation of samples (H28-E37-A46) ▲

Elongation without knot y=89.77-0.14x r=- 0.5

as the temperature decreases. It's found that Elongation without knot increases.

It's also found that the correlation factor is r=- 0.5 which indicates that there is a an inverse relation between temperature and Elongation without knot.

And also Figure(12) shows Relationship Between Temperature And Elongation With Knot At 2.5 Metric Size.

Represented the straight line equation of samples (H28-E37-A46) ■

Elongation with knot y=47.42-0.05x r=-0.5

as the temperature increases. It's found that Elongation with knot increases also. It's also found that the correlation factor is r=-0.5 which indicates that there is an inverse relation between temperature and Elongation with knot.

As a result from increase temperature leads to decrease elongation of poly propylene suture with knot.

When temperature of poly propylene suture increase leads to decrease elongation without knot as a result of change in passage of polypropylene material in screw melt spinning. of

When temperature decrease with increase passage of poly propylene material in screw at 2.5 METRIC SIZE diameter leads to that poly propylene suture not reached to the demanding temperature so leads to decrease elongation without knot .

When passage of poly propylene material in screw decrease at 1.5 METRIC SIZE

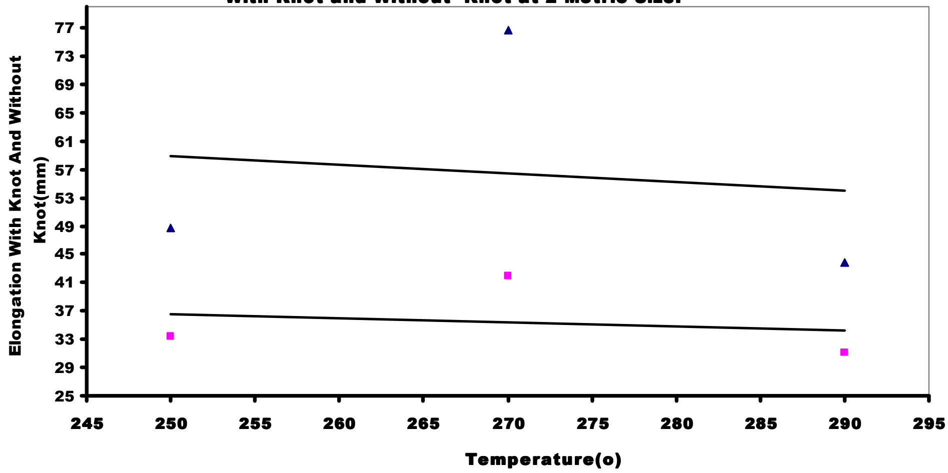
Leads to reached to the demanding temperature so leads to decrease elongation without knot .

8-2-2: Relationship Between Temperature And Elongation With Knot And Without Knot At 2 Metric Size.

Table(12): Relationship Between Temperature And Elongation With Knot And Without Knot At 2 Metric Size.

N	Code Of Sample	Elongation Without knot (mm) ▲	Elongation With Knot (mm) ■
1	H-29	48.6964	33.32
2	E-38	76.68	41.94
3	A-47	43.8152	31.078

Figure(13): Relationship Between Temperature and Elongation With Knot and Without Knot at 2 Metric Size.



Figure(13) shows Relationship Between Temperature And Elongation Without Knot At 2 Metric Size.

Represented the straight line equation of samples(H29-E38-A47) ▲

Elongation without knot y=89.35 - 0.12x r=- 0.1

as the temperature decreases. It's found that Elongation without knot increases. The results show that greatest level of Elongation without knot achieved at E-38 which measured 76.68 mm at the temperature(260:285 ^{0}C). The Least level of Elongation without knot achieved at A-47 measured 43.82 at the temperature(280:305 ^{0}C).

It's also found that the correlation factor is r=- 0.1 which indicates that there is a an inverse relation between temperature and Elongation without knot.

And also Figure(13) shows Relationship Between Temperature And Elongation With Knot At 2 Metric Size.

Represented the straight line equation of samples (H29-E38-A47) ■

Elongation with knot y=50.58 - 0.06x r=-0.2

as the temperature increases. It's found that Elongation with knot increases also.

It's also found that the correlation factor is r=-0.2 which indicates that there is an inverse relation between temperature and Elongation with knot.

As a result from increase temperature leads to decrease elongation of poly propylene suture with knot.

When temperature of poly propylene suture increase leads to decrease elongation without knot as a result of change in passage of polypropylene material in screw melt spinning. of

When temperature decrease with increase passage of poly propylene material in screw at 2.5 METRIC SIZE diameter leads to that poly propylene suture not reached to the demanding temperature so leads to decrease elongation without knot .

When passage of poly propylene material in screw decrease at 1.5 METRIC SIZE

Leads to reached to the demanding temperature so leads to decrease elongation without knot .

8-2-3: Relationship Between Temperature And Elongation With Knot And Without Knot At 1.5 Metric Size.

Table(13): Relationship Between Temperature And Elongation With Knot And Without Knot At 1.5 Metric Size.

N	Code Of Sample	Elongation Without knot (mm) ▲	Elongation With Knot (mm) ■
1	H-30	46.568	34.1888
2	E-39	54.346	36.926
3	A-48	44.9538	29.2016

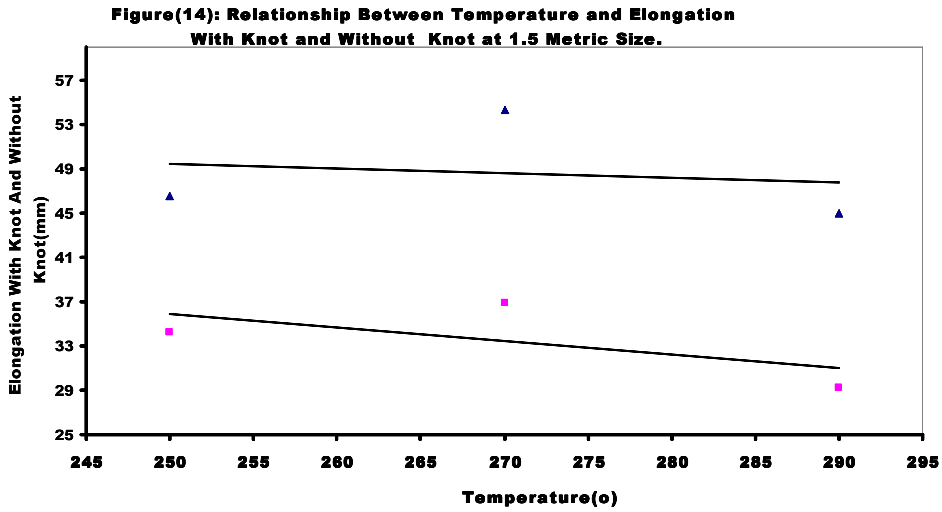


Figure (14) shows Relationship Between Temperature And Elongation Without Knot At 1.5 Metric Size.

Represented the straight line equation of samples (H30-E39-A48) ▲

Elongation without knot y=59.52 - 0.04x r=- 0.2

as the temperature decreases. It's found that Elongation without knot increases.

It's also found that the correlation factor is r=- 0.2 which indicates that there is a an inverse relation between temperature and Elongation without knot.

And also Figure(14) shows Relationship Between Temperature And Elongation With Knot At 1.5 Metric Size.

Represented the straight line equation of samples (H30-E39-A48) ■

Elongation with knot y=67.10 - 0.13x r=-0.6

as the temperature increases. It's found that Elongation with knot increases also.

It's also found that the correlation factor is r=-0.6 which indicates that there is an inverse relation between temperature and Elongation with knot.

As a result from increase temperature leads to decrease elongation of poly propylene suture with knot.

When temperature of poly propylene suture increase leads to decrease elongation without knot as a result of change in passage of polypropylene material in screw melt spinning. of

When temperature decrease with increase passage of poly propylene material in screw at 2.5 METRIC SIZE diameter leads to that poly propylene suture not reached to the demanding temperature so leads to decrease elongation without knot .

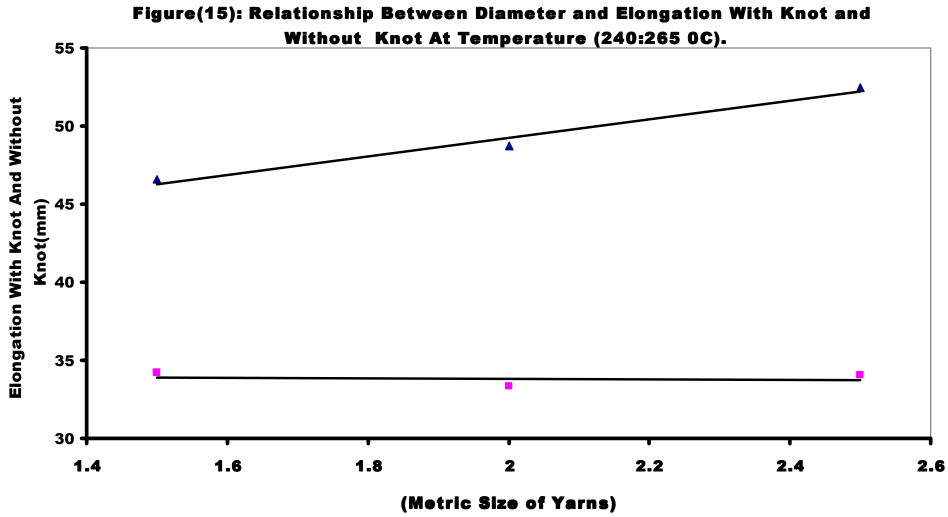
When passage of poly propylene material in screw decrease at 1.5 METRIC SIZE

Leads to reached to the demanding temperature so leads to decrease elongation without knot.

8-2-4: Relationship Between Diameter And Elongation With Knot And Without Knot At Temperature (240:265 0C).

Table(14): Relationship Between Diameter And Elongation With Knot And Without Knot At Temperature (240:265 ^{0}C).

N	Code Of Sample	Elongation Without knot (mm) ▲	Elongation With Knot (mm) ■
1	H-28	52.472	34.032
2	H-29	48.6964	33.32
3	H-30	46.568	34.1888



Figure(15) shows Relationship Between Diameter And Elongation Without Knot At Temperature (240:265 ^{0}C).

Represented the straight line equation of samples (H28- H29- H30) ▲

Elongation without knot y=37.16 +5.9x r=0.9

as the Diameter increases. It's found that Elongation without knot increases also.

It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between Diameter and Elongation without knot.

These result indicate the highest elongation without knot at Diameter 2.5 metric size and least elongation without knot Diameter 1.5 metric size and these result from when Diameter increase the elongation without knot increase because increase cross section. And also Figure(15) shows Relationship Between Diameter And Elongation With Knot At Temperature (240:265 ^{0}C).

Represented the straight line equation of samples (H28- H29- H30) ■

Elongation with knot y=34.16 - 0.16x r=-0.2

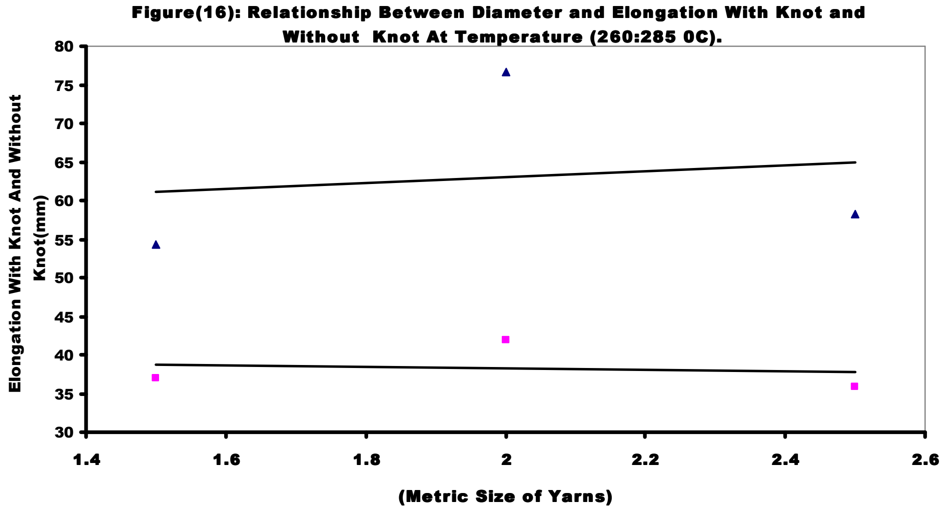
as the Diameter increases. It's found that Elongation with knot increases also.

It's also found that the correlation factor is r=-0.2 which indicates that there is an inverse relation between temperature and Elongation with knot.

8-2-5: Relationship Between Diameter And Elongation With Knot And Without Knot At Temperature (260:285 0C).

Table(15): Relationship Between Diameter And Elongation With Knot And Without Knot At Temperature (260:285 ^{0}C).

N	Code Of Sample	Elongation Without knot (mm) ▲	Elongation With Knot (mm) ■
1	E-37	58.18	35.9
2	E-38	76.68	41.94
3	E-39	54.346	36.926



Figure(16) shows Relationship Between Diameter And Elongation Without Knot At Temperature (260:285 ^{0}C).

Represented the straight line equation of samples (E37- E38- E39) ▲

Elongation without knot $y=55.40 +3.83x$ $r=0.2$

as the Diameter increases. It's found that Elongation without knot increases also.

It's also found that the correlation factor is r=0.2 which indicates that there is a proportional relation between Diameter and Elongation without knot.

These result indicate the highest elongation without knot at Diameter 2.5 metric size and least elongation without knot Diameter 1.5 metric size and these result from when Diameter increase the elongation without knot increase because increase cross section.

And also Figure(16) shows Relationship Between Diameter And Elongation With Knot At Temperature (260:285 ^{0}C).

Represented the straight line equation of samples (E37- E38- E39) ■

Elongation with knot $y=40.31 - 1.03x$ $r=-0.2$

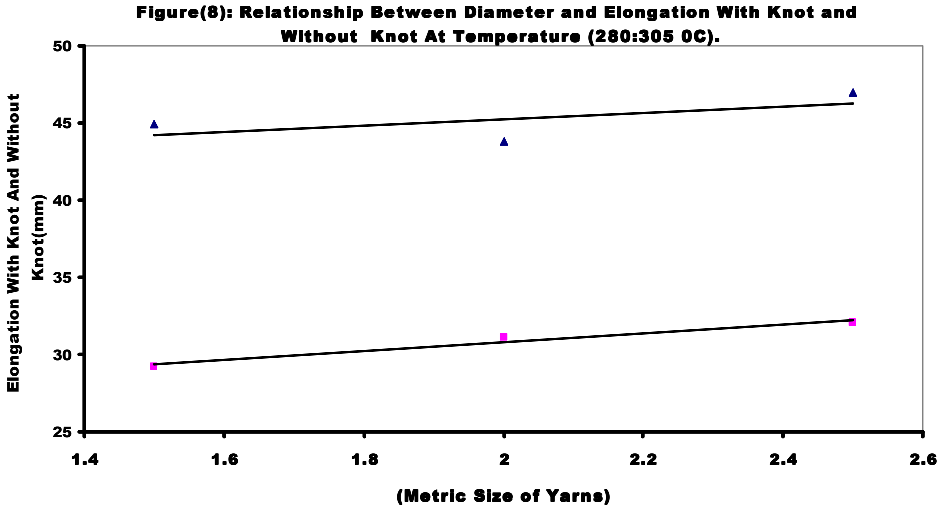
as the Diameter increases. It's found that Elongation with knot increases also. It's also found that the correlation factor is r=-0.2 which indicates that there is an inverse relation between temperature and Elongation with knot.

As a result from increase temperature leads to decrease elongation of poly propylene suture with knot. as a result of change in passage of polypropylene material in screw in melt spinning. of

8-2-6: Relationship Between Diameter And Elongation With Knot And Without Knot At Temperature (280:305 0C).

Table(16): Relationship Between Diameter And Elongation With Knot And Without Knot At Temperature (280:305 ^{0}C).

N	Code Of Sample	Elongation Without knot (mm) ▲	Elongation With Knot (mm) ■
1	A-46	46.956	32.0436
2	A-47	43.8152	31.078
3	A-48	44.9538	29.2016



Figure(17) shows Relationship Between Diameter And Elongation Without Knot At Temperature (280 :305 ^{0}C).

Represented the straight line equation of samples (A46- A47- A48) ▲

Elongation without knot y=41.24 +2.002x r=0.6

as the Diameter increases. It's found that Elongation without knot increases also.

It's also found that the correlation factor is r=0.6 which indicates that there is a proportional relation between Diameter and Elongation without knot.

These result indicate the highest elongation without knot at Diameter 2.5 metric size and least elongation without knot Diameter 1.5 metric size and these result from when Diameter increase the elongation without knot increase because increase cross section.

And also Figure(17) shows Relationship Between Diameter And Elongation With Knot At Temperature (280 :305 ^{0}C).

Represented the straight line equation of samples (A46- A47- A48) ■

Elongation with knot y=25.09 - 2.84x r=0.9

as the Diameter increases. It's found that Elongation with knot increases also. It's also found that the correlation factor is r=0.9 which indicates that there is a strong proportional relation between temperature and Elongation with knot.

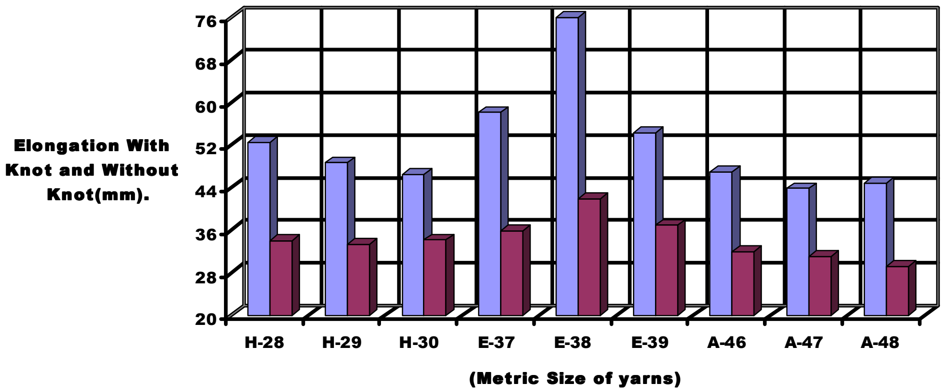
These result indicate the highest elongation with knot at Diameter 2.5 metric size and least elongation with knot Diameter 1.5 metric size and these result from when Diameter increase the elongation with knot increase because increase cross section.

8-2-7: Comparison Between Diameter And Elongation With Knot And Without Knot .

Table(17): Comparison Between Diameter And Elongation With Knot And Without Knot.

N	Code Of Sample	Elongation Without knot (mm)	Elongation With Knot (mm)
1	H-28	52.472	34.032
2	H-29	48.6964	33.32
3	H-30	46.568	34.1888
4	E-37	58.18	35.9
5	E-38	76.68	41.94
6	E-39	54.346	36.926
7	A-46	46.956	32.0436
8	A-47	43.8152	31.078
9	A-48	44.9538	29.2016

Figure(18): Comparison Between Diameter and Elongation With Knot And Without Knot .



Figure(18) shows Comparison Between Diameter And Elongation Without Knot. The results show that least level of Elongation without knot achieved at A-47 which measured 43.82 mm at temperature (260-270-270-280-285^{0}C) and Diameter 2 metric size.

The second sample of Elongation without knot achieved at A-48 which measured 44.95mm at temperature (280-290-290-300-305^{0}C) and diameter 1.5 metric size.

The third sample of Elongation without knot achieved at H-30 which measured 46.57mm at temperature (280-290-290-300-305^{0}C) and diameter 1.5 metric size.

And also Figure(18) shows Relationship Between Diameter And Elongation With Knot.

The results show that least level of Elongation with knot achieved at A-48 which measured 29.20 mm at temperature (280-290-290-300-305^{0}C) and diameter 1.5 metric size.

The second sample of Elongation with knot achieved A-47 which measured 31.08 mm at temperature (260-270-270-280-285^{0}C) and Diameter 2 metric size.

The third sample of Elongation with knot achieved at A-46 which measured 32.04 mm at temperature (240-250-250-260-265^{0}C) and diameter 1.5 metric size.

SUMMARY

Textile has swept over new filed in the last three decades. It has been used indifferent fields, Such as agriculture, Industry and medicine, with the aim of improving the performance efficiency and reducing costs. This industry has recently achieved a tremendous success in medical fields thus, it has been used in designing and manufacturing polyproplene suture.

our studies reveal that we must have our medical equipments especially suture, our studies also reveal that local industry for medical equipment not present especially polyproplene suture which leads to increase import suture from out side and also decrease researches specialized for these reasons.

This research covering the theoretical, practical and experimental aspects of the subject. These research depend on analytical approach of the practical aspects of sutures.

The methodology of the research depends on the experimental analytical approach.

The Objectives Of Research to:

1-Study the effect Of Temperature In Melt Spinning Of Polypropylene that affect Properties of Suture .

2- Study the effect of Diameter Suture Polypropylene that affect Properties Suture .

<u>The Following Results Were Identified:</u>

1- There is a direct relationship between tensile Strength without knot and temperature of melt spinning of polypropylene suture.

2- There is a direct relationship between tensile Strength with knot and temperature of melt spinning of polypropylene suture.

3-There is a direct relationship between tensile Strength without knot and diameter of polypropylene suture.

4-There is a direct relationship between tensile Strength with knot and diameter of polypropylene suture.

5-There is an inverse relationship between elongation without knot and temperature of melt spinning of polypropylene suture.

6-There is an inverse relationship between elongation with knot and temperature of melt spinning of polypropylene suture.

7-There is a direct relationship between elongation without knot and diameter of polypropylene suture.

7-There is no relationship between elongation with knot and diameter of polypropylene suture.

References:

1- PROF.V.A. SHENAL PROF . OF TEXTILE CHEMISTRY OF UNIVERSITY OF BOMBAY, TECHNOLOGY OF TEXTILE PROCESSING , TEXTILE FIBERS, THIRD EDITION VOLUME:1,PAGE:394,395- YEAR:1991.

2-SARA J.KADOLPH, ANNA L. LANGFORD, NORMA HOLLEN, JANE SADDLER, LOWA STATE UNIVERSITY, TEXTILES, SEVENTH EDITION, PAGE :117, YEAR:1995.

3-ALFONSO R.GENNARO , THE SCIENCE AND PRACTICE OF PHARMACY-NINETEENTH EDITION-VOLUME 2-CHAPTER:108 -USA-PAGE:1880- YEARS:1995.

4- R. M. KIRK - SURGICAL OPERATION - FIRST PUBLISHED -PRINTED IN GREAT BRITIAN BY PITMAN PRESS LTD., BATH U.K-PAGE: 3- YEAR: 1979.

5- BATES TOM.- OLANE'S HOSPITAL - POLYPROPLENE SUTURES-BRITISH MEDICAL JOURNAL-VOLUM:10-PART:1-PAGE:615-YEAR:10 MARCH 1973.

6-ERIC W.TAYLOR –INFECTION IN SURGICAL PRACTICE-PUBLISHE IN THE UNITED STATESBY OXFORD –U.S.A-PAGE:21,22-YEAR:1992.

7-UNITED STATES PHARMACOPOEIA - NINETEENTH EDITION -U.S.A - PAGE: 1586- YEAR: 2000.

8-UNITED STATES PHARMACOPOEIA - NINETEENTH EDITION -U.S.A - PAGE: 1586- YEAR: 2000.

9-EUROPEAN PHARMACOPOEIA – THIRD EDITION - PAGE: 1567- YEAR:1998.

10- BRIAN A. MAURICE- SURGERY FOR GENERAL PRACTI TIONERS - FIRST EDITION –CASTLE HOUSE PUBLICATIONS- UNITED KINGDOM -PAGE: 108- YEAR: 1989.

11-ETHICON COMPANY-ETHICON CATALOGUE- SUTURES MATERIAL SECTION - U.K- PAGE: 1991.

12 -KANT Y. LIN, M.D., PROFESSOR OF PLASTIC SURGERY, UNIVERSITY OF VIRGINIA HEALTH SYSTEMS, AND WILLIAM B. LONG III, M.D, MEDICAL DIRECTOR, TRAUMA SPECIALISTS, LLP, SCIENTIFIC BASIS FOR THE SELECTION OF SURGICAL NEEDLES AND SUTURES, U.S.A,YEARS: MARCH 2005.

13-KNIGHT CD & GRIFFEN FD - ABDOMINAL WOUND CLOS URE WITH ACONTINOUS MONOFILAMENT POLYPROPYLENE SUTURE

EXPERIENCE WITH 1.000 CONSECUTIVE CASES-ARCH- SURGERY-PART:118- VOLUME: 11-PAGE: 1305, 1308- YEAR: 1983.

14- GASPAR MR., MOVIUSH J., ROSENTALJ J., BELL DD. & LEMIRE GG. - PROLENE SUTURES ARE NOT ASINGHICANT FACTORINANASTONOTIC FALSE ANERYSNS-VOLUME: 146 –PAGE: 216 - YEAR: 1983.

١٥- د/بول غليونجى –الطب عند قدماء المصريين- الطبعة الأولى –مؤسسة المعارف للطباعة والنشر- بيروت – سنة: ١٩٩١ م.

١٦- د/حسن كمال – الطب المصري القديم- الطبعة الأولى – الناشر مكتبة مدبولى- القاهرة- سنة: ١٩٩١م.

١٧- قطاع شركات الأجهزة والمستلزمات واللوازم والمعدات الطبية (المستوردين- توكيلات - تجارية- توزيع)- شركة ها يل للنشر والتوزيع – صفحة :١٠١- سنة: ٢٠٠١م.