The Effect of some different Structural Elements on The Properties of Children Summer Fabrics

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Abstract:
Considering the skyrocketing prices of fabrics in Egypt, and in consequence the final product price, especially children clothes (this paper subject) , achieving the requirements especially in the fabric , and maintaining a suitable price for the wide range of people , became difficult. Based in the previous introduction, a study has been compelled to attain samples that would fulfill the demands required in children clothes, and submit those samples to the tests , to determine their suitability. For these reasons , this research produces a group of mixed fabrics samples , and put them to lab tests , and document the obtained results, and how effectual these results are in achieving what's required concerning both high quality and affordable price .9 samples have been produced using a constant warp number 80/2 cotton , with a comb 20 × 2 . And a variable of 3 wefts with different numbers , a cotton , Viscose , and Polyester wefts have been used with numbers (30/1, 40/1 , 50/1) for each .

Keywords:
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1.Introduction

Clothes are basic essential to a child, and they have a great impact on the way he feels and the way he performs on every day basis . They give him confidence and uplift his spirits . Therefore the specialists are concerned with the fabrics with which children clothes are made . These fabrics have to provide comfort , flexibility, and sustainability to endure the constant strains adjacent to kids constant activities. Also bearing in mind the fresh and chic designs that would impress the child and those close to him .

. In conclusion making the right choice of fabrics used in manufacturing children's garment based on a correct scientific and technical data ,achieve a very important fundamental to build a whole and a level character for the child in the future. Clothes don't represent the outer look only , but rather have a direct effect on the child psychological behavior, health, and social status.

2. Materials used for the study :

2.1 Cotton:

Cotton is regarded as a standout amongst the most significant weaving fibers on the planet, it is planted in such huge numbers of spots around the world, and it is utilized in textile industry on a wide range, regardless of whether in its raw structure, or mixed with different types of raw materials. It is likewise utilized in upholstery fabrics because of its exceptional attributes and its sufficiency to a wide scope of industrial purposes, some of it require solidity and stretching capacity that are accessible in cotton, in addition to its high perseverance quality, and its high comfort capacity [1,2] .

Cotton can stick effectively to bleach, dye, and setting up, the way that legitimize the wide application scope of the fabrics made of it .

2.2 Viscose:

Viscose is an assembling cellulose fibers that renders a great deal of preparing during producing, experiencing stages, for example, soaking, cleaving, fermentation, and after that it is treated with liquid carbon disulfide. In the wake of blending and dissolving, it is put away under determined conditions for some days, then sifted and experiences the ordinary phases of spinning.

The word fibro is utilized for the short bristles of viscose, it has a low price production that makes it a focused woven material to its partners, for example, wool, linen and cotton [2].

2.3 Polyester:

Polyester fibers are set apart with firmness and high flexibility. At the point when blended with different fiber sits attributes are exceedingly pondered the last produced fabric. For instance, when blended with wool, it builds the tensile of the strength fabric and increment the resistance for

the crease. It likewise add to holding the first elements of the fabric. When blended with cotton, the produced material is preferred in quality over the one made of a 100% cotton, better in appearance, solidity, wrinkling resistance, and warmth. Polyester likewise utilized in other fields rather than manufacturing, for example, carpets, blankets, upholstery, and other medical purposes [1],[2] .

3.Ideal conditions that should be monitored in children clothes fabrics :

3.1. Fabrics should be made of pure cotton or cotton mixed with synthetic fibers with minimal proportion.

3.2. Comfort should be maintained in concern with the square meter weight of the fabric . It should not be of heavyweight.

3.3. Fabrics should have the ability to absorb moisture.

3.4. Fabrics should have fixed colors that are safe for a child skin , and that would not react to perspiration , would not fade with washing or friction.

3.5. The fabric should be soft to the touch and smooth to provide maximum comfort to the sensitive skin of a child .

. Other requirements for the child fabrics:

- To be of simple designs .
- Colors should be suitable for the child age and attractive .
- Suitability for weather , provide warmth in winter and coolness in summer .
- The clothes should fashionable. [3,4]

3.1 Air permeability in summer clothes fabrics:

Air permeability is a significant factor in indicating the fabric related to its purpose. Air permeability is characterized as the volume of air in cubic centimeter that goes in one second through one cm2 of fabric at a pressure difference of 1cm head of water.

Porosity is characterized as the level of a void piece of the material's full volume .The estimation of porosity relies upon fibers volume and the spread factor. Expanding the spread factor of the warp, r the weft or them two, results in lower air permeability. Air permeability is a significant trademark that impacts promptly body comfort capacity. However, on the off chance that the fabric is made of materials or fibers that can't assimilate the dampness, or if using a thin weave plan, moistness won't be leak through the permeable of the fabric to the outside climate which will result in gigantic awkward sensation for the body while wearing these clothes, which by turn influence the mental and wellbeing issue of the individual wearing the clothes[5], [6],[7].

3.2 Importance of mugginess and water vapor absorbance:

The capacity to exchange body humidity to the outside atmosphere is a noteworthy one in outfits fabric that is on the grounds that human body transude a customary measure of sweat that requirements to vanish off of the skin surface to keep up body temperature, in this manner keeping up the comfort capacity in hot and cold weather. Indeed, even at the soundness express the body keeps on exclude sweat in little sums (30 gm/h), ordinarily it vanishes and the body stays dry. Because of this procedure the body temperature become stable. By thusly the body misfortunes part of its warmth, the remainder of body heat is lost through radiation and exchange. Warmth lost through perspiration vanishing speak to 20% of absolute body heat dissemination. If there should be an occurrence of temperature rise the body increment discharge of perspiration to keep up stable body temperature, and at the aim of clothes to give comfort capacity, they must almost certainly shed stickiness through fabric. For whatever length of time that the fabrics have high capacity for shedding body sweat, they would be appropriate for continuing body comfort capacity whether in hot or cold climate. Regardless of the way that in cold weather, the body is ensured with more layers of cloth to diminish the rate of warmth dissipation, it must discharge humidity uniquely if the body is in movement and exuding a ton of warmth, the fibers must absorb humidity without the wet feel, after that exchange it to the outside weather. wool has the kind of fibers that is fit for engrossing moistness without the wet feel, that is mostly in light of the fact that fabrics made of wool are not really adjoining to the skin [7],[8], [9].

4. Experimental Work

The research required maintaining constant factors under study to facilitate data analysis in the light of other factors being variable. For that reason square meter weight factor has been selected to be controlled through controlling both the count and the number of picks to maintain a constant weft weight for the meter with variable counts, as shown in the following table below :

Table (1) : Samples Parameters

samples	Material of weft	Count of the weft/ eng	Density of weft/cm
1	cotton	30/1	24
2		40/1	32
3		50/1	40
4	viscose	30/1	24
5		40/1	32
6		50/1	40
7	polyester	30/1	24
8		40/1	32
9		50/1	40

The difference between wefts counts is set to 10 English counts , that difference is enough to obtain physiological differences when comparing the mechanical and natural characteristics of the threads . This research intend to use a cotton warp to keep the cotton percentage higher than the ratio of any other material that is used in the wefts .

The choice of a plain weave construction 1/1 for samples , because it is considered the standard in the production of woven child fabrics .

4.1 Tensile strength and elongation test:

Estimate of the tensile strength of a fabric is regarded as a trial of significant significance, in light of the fact that tensile is a feature that means that fabric strength and continuance for effort and traction, and it is additionally an intimation of the fabric capacity to extending at exposure to mechanical powers.

4.2 Abrasion Resistance test:

Abrasion is defined as the wearing a way of any part of the fabric by rubbing against another surface . Fabrics are subjected to abrasion during their lifetimes and this may result in wear, deterioration , damage and loss of performance . However, the abrasion resistance is important factor to wear performance or durability.

4.3 Air permeability test:

One of the major tried properties in light (or summer) clothes, because of its immediate impact on the comfort capacity factor as well as protecting the body from humidity.

4.4 Stiffness test:

Tensile is a basic factor to comfort and durability of the cloth. It is the capacity of the fabric to hold its normal properties, and return back to its unique shape after the end of the influential. In this way, estimating the stiffness of the fabrics show its tensile.

5 Results And Discussion:

The following table and diagrams present results of the experimental tests carried out on samples under study. Results are also statistically analyzed for data recorded and relationships between variables are acquired.

Table (2) : Results of tests

	Warp tensile strength K gm	Weft tensile strength K gm	Warp elongation %	Weft elongation %	Abrasion Resistance Loss of weight %	Air permeability l/m2 sc	Stiffness in warp direction mg	Stiffness in weft direction mg
1	34.3	24.5	11.75	8.5	5.2	705	35	33
2	36.75	28.3	12.5	9.5	4.6	442	38.2	35.1
3	38.72	37	14	11	4.1	365	40	36.8
4	33.5	48	13.5	10	2.9	834	34.2	35.5
5	36.38	50.8	14.25	12	2.1	665	36.7	38.3
6	38.52	53.6	15	13.5	1.7	434	38.2	41.4
7	34.3	50.6	14	11	2.7	821	36.5	41.7
8	37.38	58	14.75	14	2.2	602	39	43.5
9	40	64.5	16	18	2	416	41.4	46

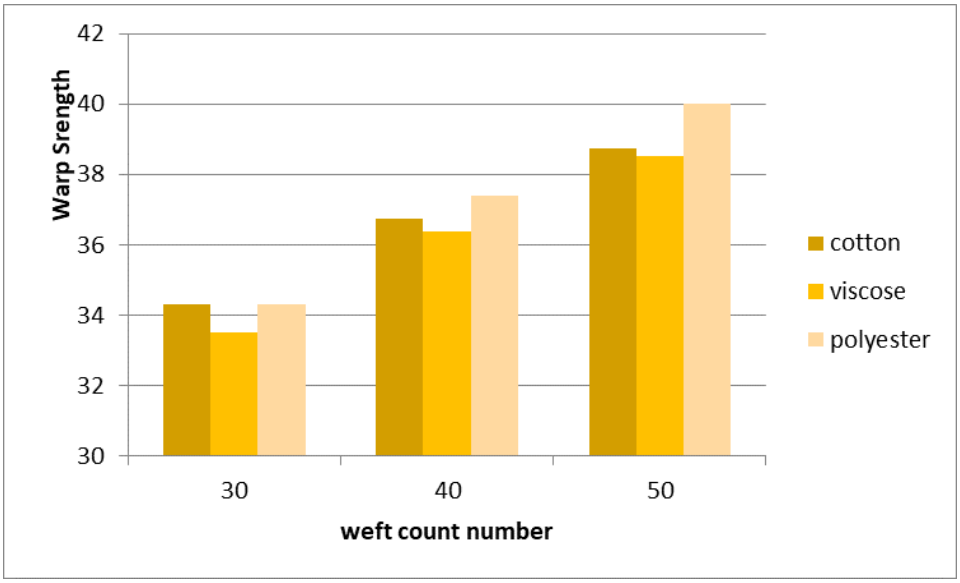

Fig. (1) Relation between cotton and weft counts and warp tensile strength for three materials under study

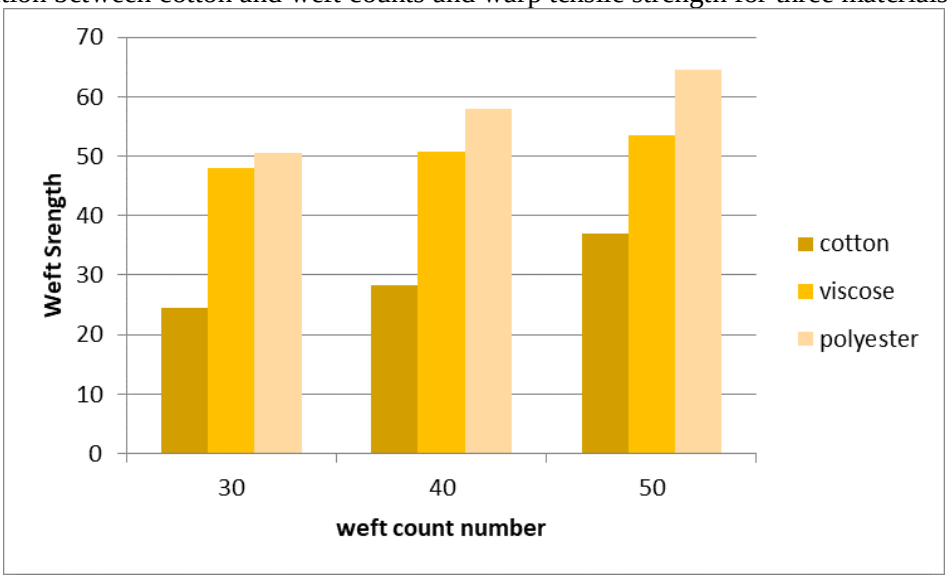

Fig. (2) Relation between cotton and weft counts and weft tensile strength for three materials under study

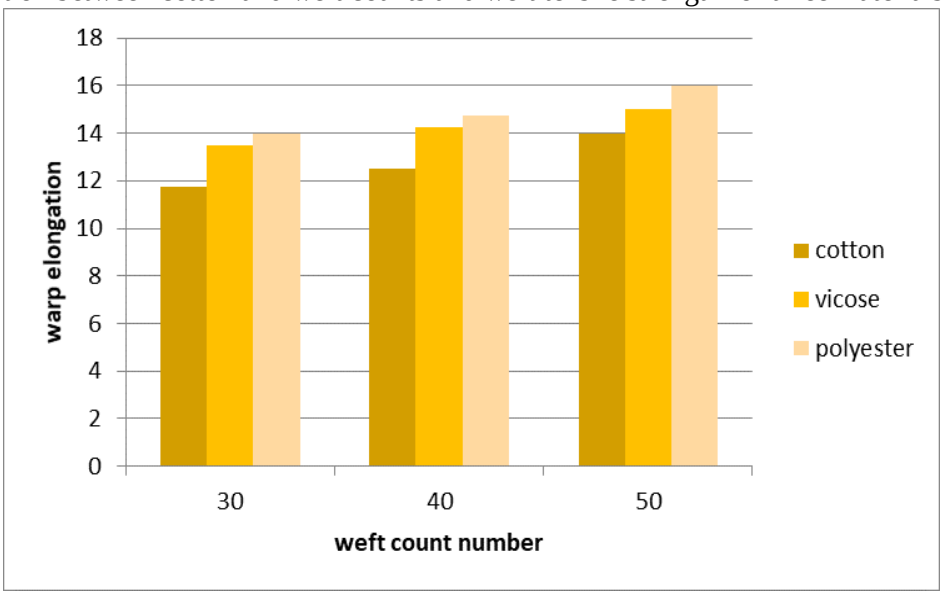

Fig. (3) Relation between cotton and weft counts and warp elongation strength for three materials under study.

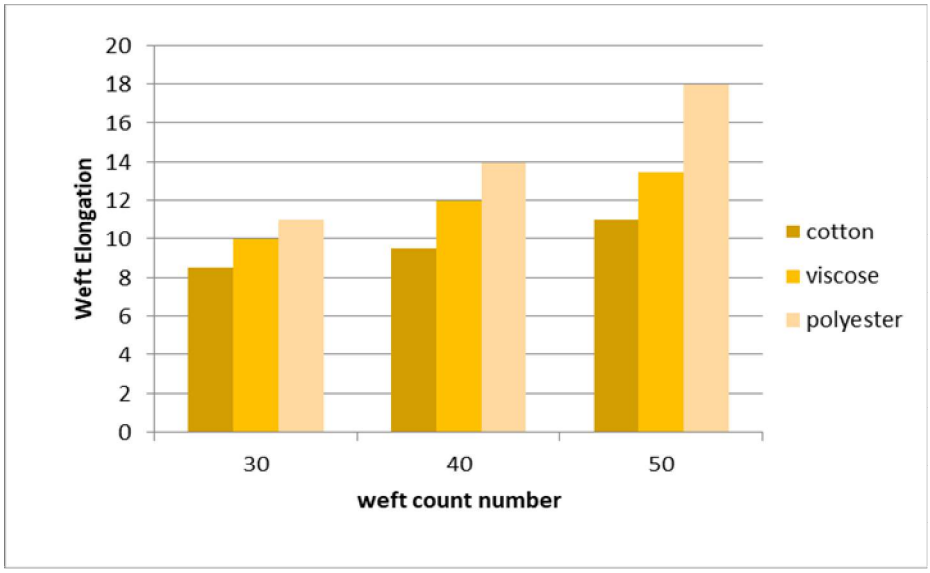

Fig. (4) Relation between cotton and weft counts and weft elongation strength for three materials under study.

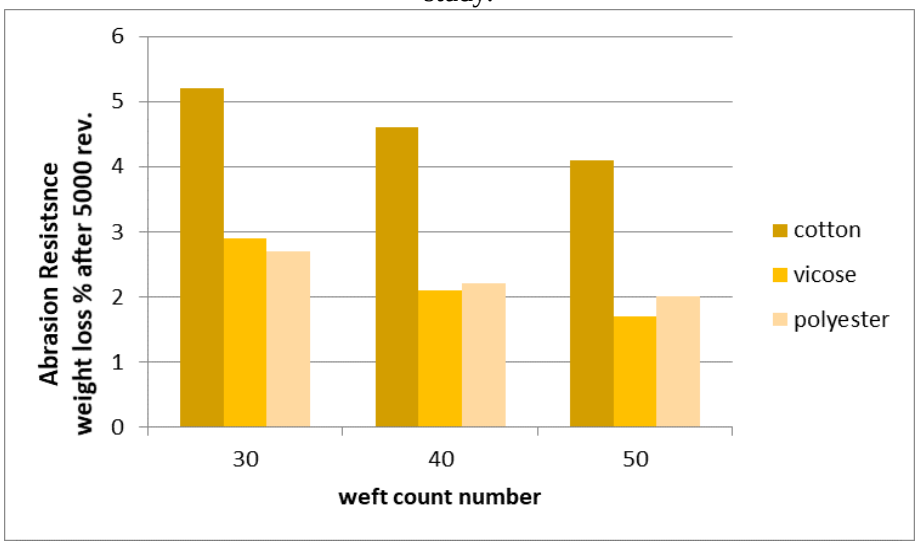

Fig. (5) Relation between cotton and weft counts and abrasion resistance for three materials under study.

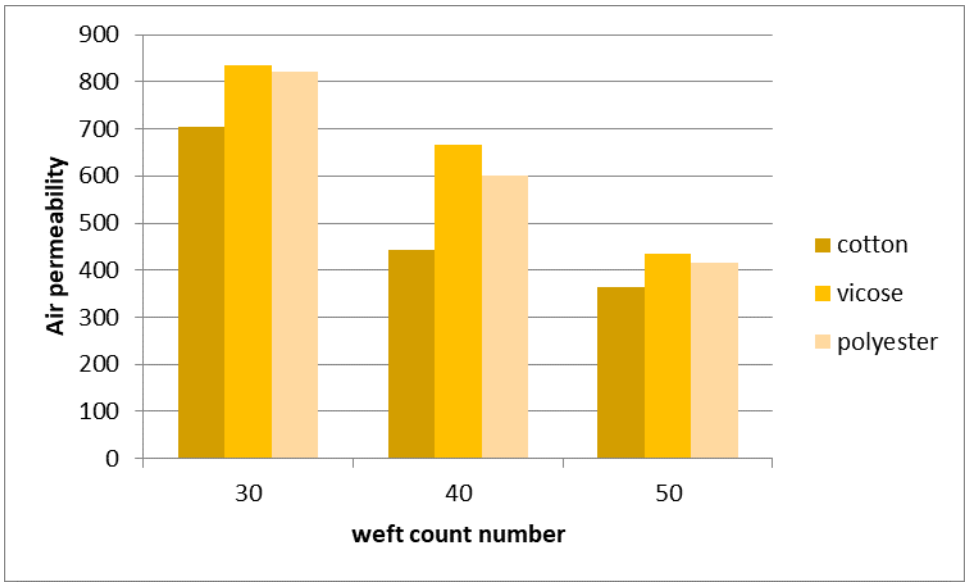

Fig. (6) Relation between cotton and weft counts and air permeability for three materials under study.

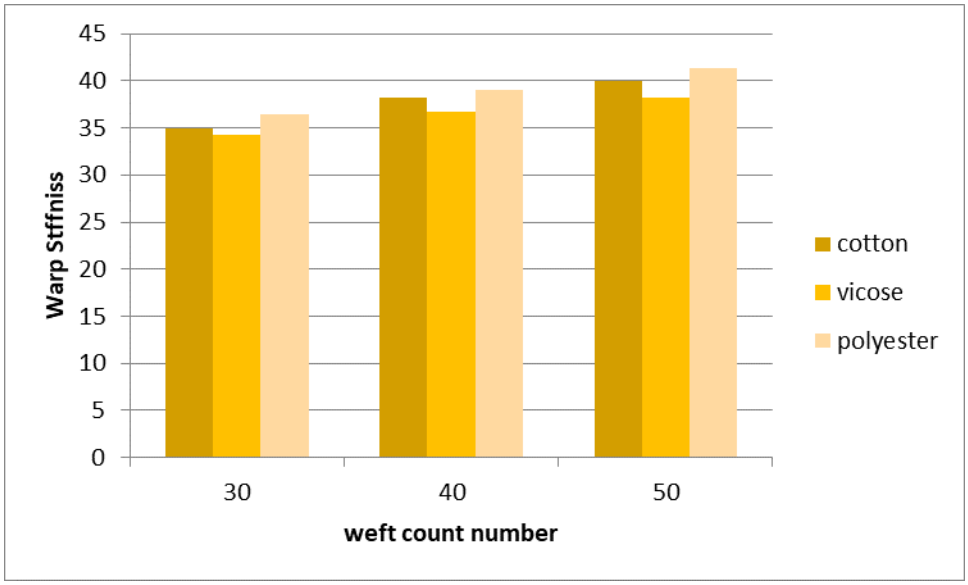

Fig. (7) Relation between cotton and weft counts and warp stiffness strength for three materials under study.

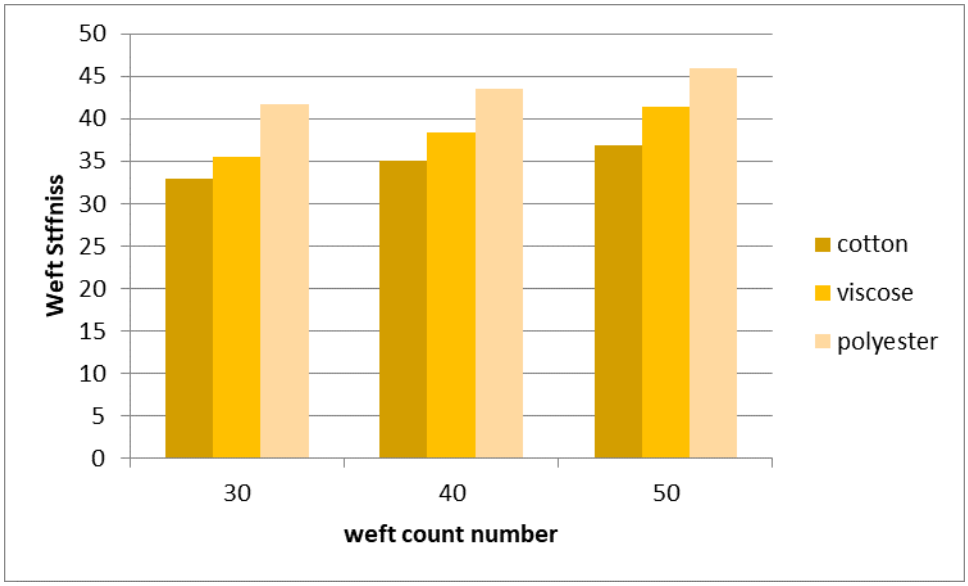

Fig. (8) Relation between cotton and weft counts and weft stiffness strength for three materials under study.

After the statistical analysis for the tests results, the factors of influence based on the research variables have been deduced, and they are as follow :

5.1 Tensile quality of the warp

Table (2), and fig. (1) shows the warp tensile test results of the examples created by the examination factors. These factors are; weft material, weft counts, and weft density. The test outcomes showed that the warp tensile strength of the examples is little influenced by the adjustment in the counts and the density of weft threads. It is additionally obvious from the test outcomes that the impact of changing the weft material on tensile is taking everything into account, the tensile increments with the increase in the weft density and with the utilization of better counts, and diminishes with diminishing weft density and utilizing thicker counts.

So, studying the factors impact clears up what follows:

5.1.1 Variation in weft material impact:

Considering the impact of utilizing diverse weft material in the creation of the research tests, as the main variable with different factors being fixed, shows that changing the weft material does not have much impact on the warp tensile, where the readings of tensile for the three instances of various utilized materials are of an extremely nearness, as is delineated in table (2), along these lines, weft material does not sensibly affect warp tensile when every single other variables are being

fixed.

5.1.2 Weft count and density impact:

From the displayed investigation that depends on fixing the weight of the square meter. By changing the two factors density and counts of wefts, it was discovered that every factor can't be measured individually, where the outcomes demonstrate the covering of the two factors consequences for the measured component. Table (2) clears up that the utilization of thin or fine weft count nearby a higher density of weft builds the warp tensile more than the case using thicker weft count and less density. That can be clarified by that the expansion in weft density per centimeter results in more crossing point focuses, and utilizing a slight weft that turns around warp threads effectively, so it declines the stress upon that warp, likewise, expanding convergence focuses enables longer length for the warp to be increasingly ready to persevere through the tensile strength.

5.2 Measuring tensile sternght of weft:

Table no.(2) represents the test outcomes of weft tensile of tests delivered for this research, utilizing similar factors alluded to previously. The outcomes demonstrate the incredible impact for changing the three factors on weft tensile strength. In more subtleties weft material factor has a more noteworthy impact more than the other two factor. Likewise tensile strength increments with the increase of weft density. Studying the factors impact results shows the following:

5.2.1 Weft material impact on weft tensile strength:

By studying the impact of various weft material sorts on tensile towards wefts, it is exhibited that Polyester accomplishes the most elevated tensile strength record, as appeared table (2), then viscose. Where the cotton made wefts come last. This outcomes depends on the properties of the weft material itself, For similar counts and weaving process, polyester is known to have higher tensile strength than viscose and cotton , and Viscose threads has higher tensile strength than cotton made threads.

5.2.2 Weft count and density impact:

Table (2), and figure (2), outline how weft tensile strength is enormously influenced by changes weft density and count. The outcomes show that weft tensile strength increments by the increase of weft density per centimeter, and the increase of weft count by means of use of circuitous numbering. In disdain the well-established actuality that weft tensile is contrarily relative with weft include in English numbering system, But for the situation displayed, the expansion in thin count density, and the decrease in thick include density result in the contrary impact. What's more, it has the demonstrated impact on making weft tensile strength corresponding with higher density of thin count.

5.3 Measuring of fabric elongation in warp direction:

Table(2), and figure (3) outlines test outcomes of warp elongation for research tests. The outcomes illuminate that warp elongation is influenced by covering of research factors, where is fabric elongation in warp direction accomplishes most noteworthy rates when Polyester wefts are utilized , then it marginally less with the utilization of Viscose, and reduces more with cotton made wefts .It is likewise certain that Warp elongation is relative with expanded weft density. Studying the factors impacts shows the following:

5.3.1 Weft material impact:

By examining the impact of various weft material, we find that warp elongation is in its most elevated rate for polyester made wefts, then with Viscose, and in its least rate with cotton made wefts. That is a result of the Polyester thread weave consistency and the vicinity of its fibers, which result in a little thread diameter, that along these lines diminishes the warp crimp proportion , and subject it to less stress, which permits higher capacity of elongation when exposed to tensile.

5.3.2 Weft density and count impact:

At examining weft count and density impact on warp elongation, we discovered that with the expansion in weft count, the measurement of weft thread diminishes which help it to loop effectively around the warp threads and in this way reduces the warp crimp, and thus decreases the pressure put upon it even with higher weft density. As diminishing the warp elongation proportion amid the weaving process, as increasing warp capacity for elongation after weaved when it is under pressure. Likewise increasing the weft density brings about increasing the tensile strength which thus increment the fabric elongation before cutting.

5.4 Measuring fabric elongation in weft direction

Table (2) shows weft elongation testing results for unmistakably the research tests. Fabric elongation in weft heading is extraordinarily affected by research factors. Polyester wefts results in the most elevated fabric capacity to elongate, Viscose made wefts came second, cotton made one give the least capacity to elongate. The outcomes likewise focuses at the immediate relationship between the quantity of wefts per centimeter and the weft elongation rate. Examining the outcomes deduced in the following:

5.4.1 Weft material impact:

By looking at the outcomes, and as cleared up in figure (4), utilizing cotton wefts or Viscose made one, gave proximate outcomes, where the elongation capacity of Viscose wefts is somewhat higher than those made of cotton. Be that as it may, when Polyester made wefts were utilized the capacity of stretching is a lot higher, This is because of the tenacity of polyester fibers and its capacity to oppose the tensile and elongation before cutting and this is regarded as the significant feature of the polyester materials.

5.4.2 Weft count and density impact:

Table (2), and figure (4), outline that weft threads capacity to extend increments with higher thread density per unit, however higher thread density implies thinner fibers. It is notable that thread include in English system is contrarily corresponding with its capacity to elongate. In any case, in the introduced research the factor of expanding - especially when the distinction in weft count is seven wefts which is an indispensable contrast speaks to 25% of the entire thread include in one measuring unit - has the more grounded impact on the capacity of the fabric to have a place ate in the weft direction before cutting.

5.5 Abrasion Resistance for fabrics:

Abrasion Resistance test results for the samples clarify that with the increase of centimeter picks and with the use of a thinner number , the fabric strain resistance increases. That can be explained by the fact that longer hairs are used for making the thin number , than these used for making the thick number , which in turn leads to increasing the cohesion among hairs constructing the thread. So using a larger number of picks within the centimeter increases the overlapping thus increasing the solidity of the fabric and its resistance for strains and friction with surrounding objects.

5.6 Air permeability for fabrics:

Table (2) and the fig. (6) delineate air permeability test results for the conducted tests. Air permeability of fabrics is influenced by the covering activity of both density and weft count, notwithstanding the adjustment in test material. Air permeability is at its most astounding structure when less density and thicker counts are connected on account of the three materials. Furthermore, it is in its most reduced structure when higher density and thinner counts are utilized. Lower density implies increasingly void spaces subsequently to warp meeting with wefts which permits more air permeability in fabric. Then again utilizing high density of thinner threads results in short proximity wefts with less inter spaces from warp and wefts convergences, in this way less air permeability to the fabric produced.

The outcomes likewise demonstrate that the three materials (polyester, cotton, viscose) yield proximate outcomes when counts 30/1 is connected. In the event that count 50/1 is connected, the first being the thicker number could be utilized, and the second being the more thinner. Be that as it may, when counts 40/1 is connected the outcomes vary that is a result of the distinction in yarn quality and the normality of the threads that thusly result in slight change in the counts.

By considering the outcomes , we reached that cotton influenced wefts to permit somewhat bring down air permeability than polyester made weft or viscose, and the reason behind that is the smooth surface of polyester and viscose threads in contrast with cotton, that permit increasingly void and inter spaces between threads in this way permitting more air permeability.

5.7 Fabric stiffness measure in the direction of warp:

stiffness measure test results for research tests, outlined in table (2), and figure (7) show that examples stiffness toward warp is influenced to a minor degree by the change in density, count, or material (research factors) , where tests samples stiffness expanded by just 7 to 8% when exposed to the adjustments in research factors. It was additionally seen that Viscose made wefts respected least yielded toward warp, pursued by cotton one, and after that Polyester which yielded the most elevated rate of yielded in conducted tests. The outcomes likewise illuminate that fabric stiffness in the warp direction, increments by the expansion of weft density, by the expansion of density the void spaces between threads decline accordingly permitting less mobility which along these lines actuate the stiffness of the conducted tests.

5.8 Fabric stiffness measure in the direction of weft:

Weft stiffness measure test results for the conducted tests, that are outlined in table (2), and fig. (8) point to the diverse response cotton made wefts had to the covering of the other two factors, where weft stiffness is in its most noteworthy rate when Polyester is utilized, Viscose comes next, then cotton comes toward the end in the rundown to accomplish the least stiffness proportion. Likewise the covering impact of the two factors (density, count) does not cause a discernible cotton wefts response, where the readings are discovered proximate. Then again when polyester or viscose is utilized, an incredible response is

seen, and the readings are discovered dissimilar on an extraordinary scale. That is because of the fact that polyester and viscose strands are stronger than cotton fibers that impact exchanges on to fabrics made of these fibers.

6 Conclusions:

From the past outcomes and debate with summer shirts fabrics properties, for example, tensile strength, stiffness and air permeability, a few conclusions were accomplished for the production of these fabrics. In this way, better effectiveness of the practical exhibition of those fabrics is attained. Conclusion of this research can be summed as follows:

1-Warp tensile is not influenced by weft material when consistent count is kept up steady, On the other hand, it somewhat shifts (not over 10%) regarding both the count and density of the weft.

2 - It is clear from the experimental results that when the quantity of picks increment per centimeter the tensile increments thus paying little mind to the kind of material utilized. This impact is much progressively observable when thinner counts are connected. So when pick number is expanded and thinner counts are connected the tensile strength a similar direction.

3-The research approves that as weft number increments per single unit, fabric tensile strength in weft course increments. This impact is because of the expansion in thread combining rate that thus increment covering among warp threads, therefore flaunting fabric breaking tenacity.

4-Test results for elongation in the direction of weft are close in an incentive in instances of cotton and viscose examples, with a slight prevalence for viscose. Then again, polyester accomplishes the most noteworthy stretching extent among the three.

5- Results show that using Polyester gives the highest resistance to friction rate, next in line comes Viscose then cotton .

7-Outcomes demonstrate that fabric air permeability decline detectably with higher weft density level, even with thinner wefts. Where the expansion in weft number prompts covering increment which results in littler interior spaces among weft and warp threads of the fabric.

8-Outcomes confirm that the most astounding material to accomplish the largest amount of air permeability is thick, that is because of the nature and particulars of viscose threads, its inconsistency and the smoothness of its surface, which enable air to infiltrate effectively through the fabric.

9-Outcomes conclude that viscose influenced wefts to accomplish the best outcomes in stiffness, elongation, and air permeability, with a medium elasticity, and a lesser expense contrasted with cotton made wefts. For this situation, cotton can be utilized just for warp so as to keep up a satisfactory dimension of the ideal features.

10-Fabric stiffness toward warp stays unaffected notwithstanding when adjusting material sorts, as long as the weft count stays consistent. What's more, it is somewhat influenced with the change in weft density and count, where the raise in weft density per centimeter brings about expanding the quantity of covering which is thought about warp threads development capacity, which thusly increment the stiffness of the fabric, yet in rather slight proportion.

11-Fabric stiffness in the direction of weft increments with the expansion in weft number that prompts higher combining level among warp and weft threads, diminishing fabric's elasticity as the density increments, even with use of more thinner wefts.

12-Fabric stiffness in weft direction varies with respect to weft material. Where the most elevated stiffness proportion is achieved with polyester, then decrease with viscose, and in it is negligible with cotton.

13-Experiments demonstrate that polyester scores the most elevated outcomes in stiffness and elongation tests, and accomplish a normal score in air permeability test among the tested samples yet it scores lower elasticity and cost that cott

REFERENCES

[1] M. A. Sultan "Textile raw materials", Faculty of engineering, Alex. University, Egypt, 2004.

[2] M. Sabri, "Textile raw materials", Faculty of Applied Arts, H. University, Egypt, 2013.

[3] امانى محمد شاكر " تحديد المعايير البنائية لتحقيق متطلبات الاداء لاقمشة ملابس الاطفال " - رسالة دكتوراة - كلية الفنون التطبيقية - جامعة حلوان- 1999

[4] عادل جمال الدين الهنداوى- رانيا محمد احمد حمودة - هبه محمد سيد على " تأثير بعض عوامل التركيب البنائية لاقمشة البيكة على الخواص الوظيفية واداء الحياكة لملابس الاطفال"- مجلة علوم وفنون - المجلد السادس والعشرون- العدد الثالث -يوليو 2014

[5] تامر فاروق, أسامة عز الدين و أسامة محروس - "تأثير إختلاف بعض عناصر التركيب البنائي النسجي على خواص أقمشة القمصان الصيفية مع ثبات معامل تغطية اللحمات" مجلة علوم و فنون, المجلد 19, العدد الأول,

.2007 يناير

[6] K. S. Aung "A study of the nature of fabric comfort design- oriented fabric comfort modle"503(5), 2004, 128 :135.

[7] Faten M. Abd-eltwab , Thesis, ' Specification for Achievement of Comfort Property in Ready Made Garments' Depart of Textile, Faculty of Applied Arts, Helwan University, Egypt, 2008.

[8] A. Z. Ismail " Determine the most appropriate textile structure combinations to achieve the physiological properties of comfort to wear sports training in the Egyptian climatic conditions "Master's degree , Faculty of Applied Arts, Helwan University, Egypt ,2008.

[9] F. F. Saied "The prediction of garment comfort from measured fabric properties"