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الإصدار السادس – العدد ستون
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"Improving the Structural Specifications of the Fabrics Used in the Production of Breast-Feeding Pads"

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Abstract:

Medical fabrics, as one of the modern technologies in the field of fabric production, are a mixture of medical sciences and spinning and weaving technology. This is also known as textile products that are used in the field of health and human care. Medical fabrics in the field of textile technology and design are in need of more attention for development in textile technology and design. This necessitates raising the efficiency of these fabrics to have a level of quality that achieves its effectiveness in the field of global competition.

The current paper investigates the production of breastfeeding pads used to prevent the appearance of milk leaking from the breast on clothes. The pad is considered one of the supplies that mothers need during breastfeeding, through the production of fabric samples (woven - knitwear) and the identification of the most appropriate raw materials. Two raw materials are used for the production of samples: 100% cotton and polyester cotton (50% - 50%). Also, the most appropriate structural compositions for production are used: plain 1/1, twill 1/2, jersey and rib 1/1. The most important results were as follows:

1. Twill sample 1/2 (cotton/polyester 50%-50%) recorded the lowest thickness, while the sample of 1/1 cotton 100% recorded the highest thickness.
2. -Twill sample 1/2 (cotton/polyester 50%-50%) recorded the lowest weight, while the plain sample 1/1 cotton 100% recorded the highest weight.
3. The samples produced using 100% cotton material recorded higher air permeability than 50%-50% cotton/polyester samples, as the rib sample 1/1 cotton 100% had the highest air permeability, while the plain sample 1/1 100% cotton recorded the lowest air permeability.
4. -Single cotton jersey 100% recorded the highest water absorption rate among the samples, while a plain sample 1/1 cotton/polyester 50%-50% recorded the lowest water absorption rate among the produced samples.

Research problem:

Absence of fixed standards explaining the effect of using different materials and different implementation methods on the usage properties of breastfeeding pads

Research objective

Finding stable standards explaining the effect of using different materials and different implementation methods on the usage properties of breastfeeding pads

Research hypotheses

Difference in materials and methods of implementation affect the usage properties of breastfeeding pads

Research importance

Improving the use properties of emergency pads and reducing the economic cost of them through the use of natural and synthetic materials

Research limits

Production of samples using 100% cotton and mixed cotton (50% cotton-50% polyester) using two methods of implementation: weaving (1/2 Twill - 1/1 plain) and knitting (single jersey-rib 1/1)

Research methodology

The research depends on the experimental analytical method.

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Medical textiles

The use of textile fibers has greatly developed in medical purposes, especially in the production of bandages of different types [1]. The medical fabrics sector has been one of the most successful fields recently, as these fabrics were limited to the fabrics used in hospitals, such as doctors' clothes and bed covers, but they have increased in both market size and product diversity [2].

Pads are one of the most important applications of medical fabrics; there are many types of them but each has its own use. One of these types is the breastfeeding pad used to prevent the appearance of milk leaking from the breast on clothes. This type plays an important role in the supplies mothers need during breastfeeding, as the leakage of breast milk and its appearance on the mother's clothes exposes her to an embarrassing problem, especially when she is outside [3]. to get any infections or ulcers.

-The other type maybe reused, but it must be washed after its first use. It is made of an anti-microbial material, and allows the absorption of a large amount of milk. These pads are useful to prevent milk leakage, but they can cause infections if left for a long time, so they must be changed immediately as soon as they are full of milk, not to be a medium for bacteria growth and infection.

There are two types of breastfeeding pads [4]:

-A disposable type made of soft cotton lined with a layer that allows air to pass through and at the same time insulates the leaked milk so that it prevents it from appearing on the clothes. After using it, one can abandon it easily and the pad must be changed continuously so as not

Characteristics of breastfeeding pads [5]:

1. High degree of absorption
2. To provide the surface of the skin with the necessary moisture
3. Ease of use
4. Resisting pollution and protecting the breast from the formation of ulcers resulting from breastfeeding

Sometimes gauze made of cotton is used as a breastfeeding pad because it is characterized by its softness and high absorbency, but it does not retain moisture and thus causes the gauze to stick to the surface of the skin. This causes pain when removing the pad, in the case of the formation of nipple sores, which are common among mothers at the beginning of the breastfeeding process.

Composition of breastfeeding pads [6]

The outer layer: This layer should be in direct contact with the skin and should be made of a material that does not stick to the wound in case of nipple ulcers. It should also be characterized by softness and high absorbency.

The inner layer: This layer is made of a material that has a high ability to absorb and it is characterized by air permeability and bacteria resistance.

Application properties of breastfeeding pads [7]

1. -Light weight and ease of use.
2. -Air permeability, which facilitates air penetration.
3. -The high degree of moisture absorption.
4. Resisting contamination and keeping microorganisms away from the wound in case of nipple ulcers.

Second – Experimental work:

All woven fabrics and tricot-knitted fabrics were produced at the Cairo Technical School for Textile Industries. The woven fabric samples were produced on a Yotas machine, using the Dobby weaving method, with a power of 16 stitches. As for the samples of knitted fabrics, they were produced on a German Robet machine, which was manufactured with a 10 needle / inch. These fabrics were produced with the following variables:

-Structural composition: (plain 1/1 - cooler 1/2 - jersey - rib 1/1)

-Material type: (100% cotton - 50% cotton/polyester: 50%)

Laboratory tests on the fabrics produced:

Fabrics tests were conducted at the National Institute for Measurement and Calibration - Textile Department according to the Egyptian, American and British Standard Specifications.

A - Air permeability test:

The permeability test was carried out according to the American Standard ASTM-737-175-1980 [7]. The permeability of samples is calculated for the air in cubic feet that passes through a square foot of the sample in 1 minute in standard atmosphere with sample area is 10 cm x 10 cm.

b- Square meter weight test:

This test was carried out in accordance with the Egyptian Standard Specification AS 295/1962 [8] and the American Standard ASTM-D3776-79 [9]

C- Fabric thickness test:

This test was carried out in accordance with the Egyptian Standard Specification C.S. 295/1962.

D- Moisture absorption test:

This test was conducted according to the American Standard AATCC/ASTM Test Method TS-018 [10]

Results & Discussion

Table (3): Results of the tests of the produced fabrics

Material	Structural composition	Thickness mm	Weight g/m	Air permeability (cm3.s)/cm2	Moisture absorption%
Cotton 100%	Plain 1/1	**1.51**	**225**	**102.1**	**70.3**
Cotton 100%	Twill 1/2	**1.42**	**200**	**124.3**	**82.7**
Cotton 100%	Single Jersey	**1.21**	**190**	**170**	**95.3**
Cotton 100%	Rib 1/1	**1.8**	**219**	**183**	**89.5**
Cotton/Polyester (50%:50%)	Plain 1/1	**0.92**	**98**	**84.7**	**68.9**
Cotton/Polyester (50%:50%)	Twill 1/2	**0.64**	**89**	**97.4**	**79.6**
Cotton/Polyester (50%:50%)	Single Jersey	**0.97**	**110**	**138**	**92.1**
Cotton/Polyester (50%:50%)	Rib 1/1	**1**	**144**	**145**	**86.2**

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III Result & Discussion

Conducting the tests on the samples of the produced fabrics, the results were tabulated as follows:

1- The effect of the different type of material and the structural compositions of the fabrics used in the production of the breastfeeding pad on the thickness of the pad:

The thickness of the fabrics is one of the most important factors that must be taken into account when producing a breastfeeding pad. This pad must be characterized by a lack of thickness in order not to affect the appearance of the clothes and cause embarrassment for the mother during the breastfeeding period.

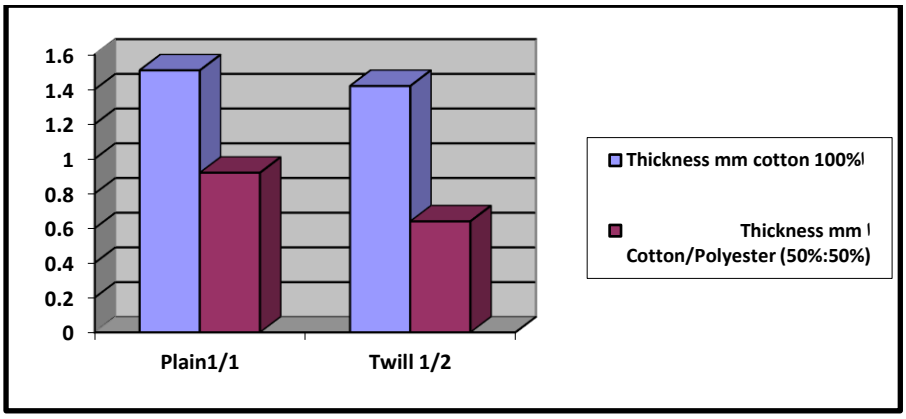

Figure 1

The impact of different textures of woven fabrics and type of material on the thickness of breastfeeding pads:

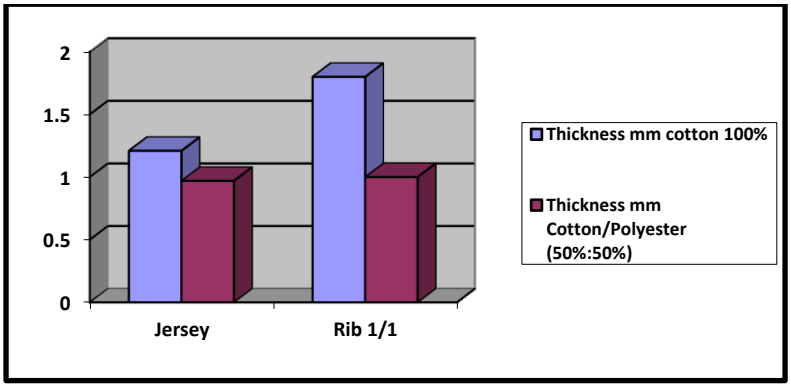

Figure 2

The impact of different structural compositions of knitted fabrics and the type of material on the thickness of breastfeeding pads:

Table (3) and Figures (1-2) show that:

-The sample using the rib method 1/1 recorded the highest value in thickness in the case of using 100% cotton and cotton/polyester (50%-50%) due to the length of the buttonholes and the nature of their composition. This gives the fabric an inflated appearance, and in general, the thickness of the samples carried out using cotton material 100% is higher than the thickness of the samples carried out using cotton/polyester material (50%-50%) due to the shape of the kidney-like cross-section of the cotton material, where the bristles are far apart, which causes the cotton material to protrude from the polyester material.

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2. The impact of the different type of material and the structural composition of the fabrics used in the production of the breastfeeding pad on the weight of the pad:

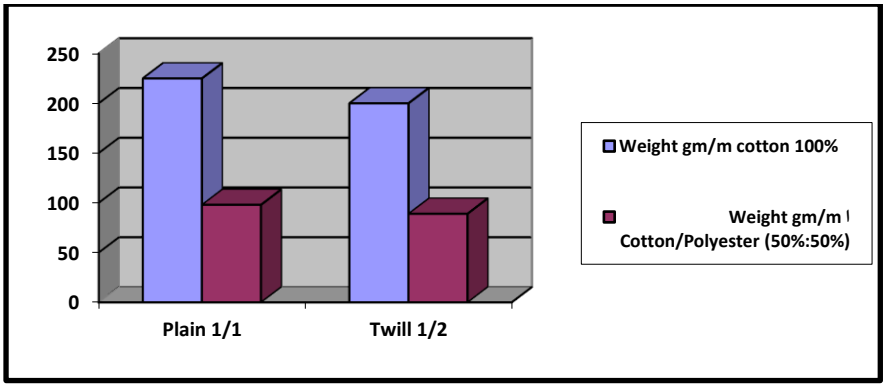

Figure 3

The impact of different texture and material compositions of woven fabrics on the weight of breastfeeding pads:

Breastfeeding pad on the weight of the pad:

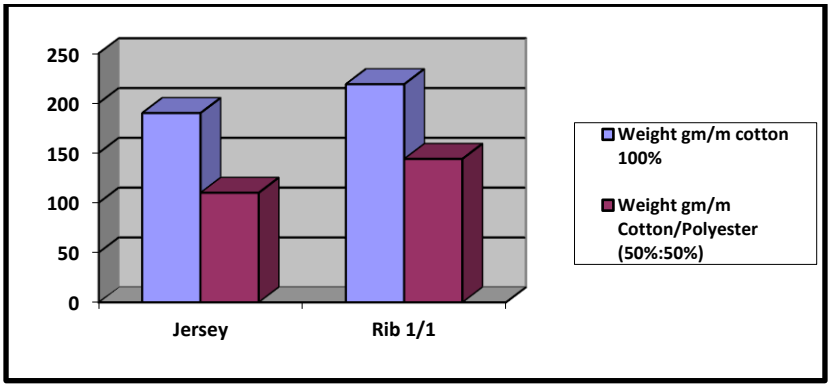

Figure 4

The impact of the different structures of knitted fabrics and the type of material on the weight of the nursing pad:

Table (3) and Figures 3-4 show that:

-The sample of plain 1/1 recorded the highest weight among the woven samples, due to the high percentage of interweaving, as the greater the interweaving, the greater the percentage of imbibing causing higher weight of the square meter. The rib sample 1/1 achieved the highest value in weight among the knitted samples due to the length of the buttonholes and the nature of its composition in the case of using 100% cotton and cotton/polyester (50%-50%). In general, the weight of samples carried out using 100% cotton material is higher than the weight of samples carried out using cotton/polyester material (50%-50%) due to the molecular weight and specific density of cotton which is greater than the molecular weight and specific density of polyester.

3. -The impact of the different type of material and the structural compositions of the fabrics used in the production of the breastfeeding pads on the air permeability of the pad:

Air permeability is one of the most important characteristics that must be available in breastfeeding pads, as air penetration helps feel comfortable, and reduces inflammation resulting from lack of ventilation.

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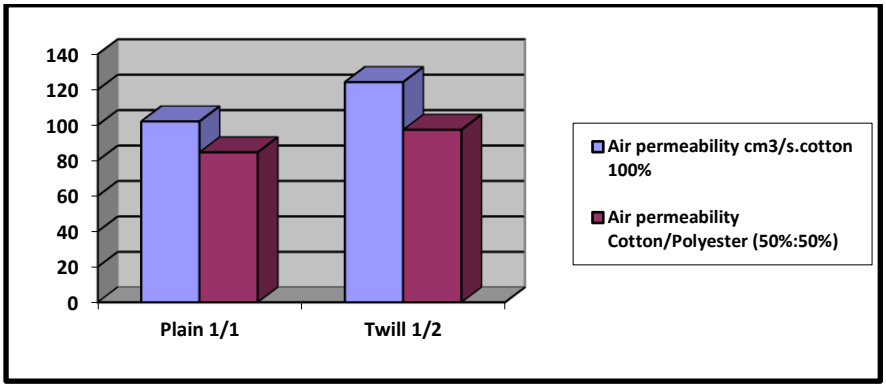

Figure 5

The impact of different texture and material compositions of woven fabrics on the air permeability of breastfeeding pads:

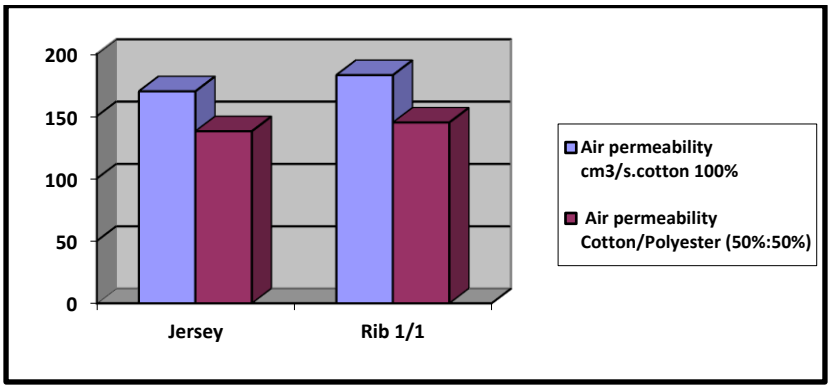

Figure (6)

The impact of different structural compositions of knitted fabrics and the type of material on the air permeability of breastfeeding pads:

Table (3) and Figures (5-6) show that:

-The sample using the twill method 1/2 recorded the highest air permeability among the woven samples due to the lack of threads intertwining in this composition and thus the increase in the inter-space distances. This is reflected on the amount of air infiltrated, while the rib sample 1/1 achieved the highest value in air permeability among the knitted samples due to length of the eyelets and the nature of their composition in the case of using 100% cotton and cotton/polyester (50%-50%). In general, samples using 100% cotton material recorded higher air permeability than samples carried out using cotton/polyester material (50% - 50%). This is due to the kidney-like shape of the cross-section of the cotton material, which helps to space the bristles, and besides the presence of bristles in the cotton threads, which helps to distance the threads from each other and increase the interspace distances and thus increase air permeability.

4 -The impact of the different type of material and the structural composition of the fabrics used in the production of breastfeeding pads on the water-absorbing property of the pad:

The water absorption feature is one of the most important characteristics that must be available in breastfeeding pads to ensure that the pad can absorb the milk that leaks during the breastfeeding, as this causes a lot of embarrassment for the mother, especially when outside.

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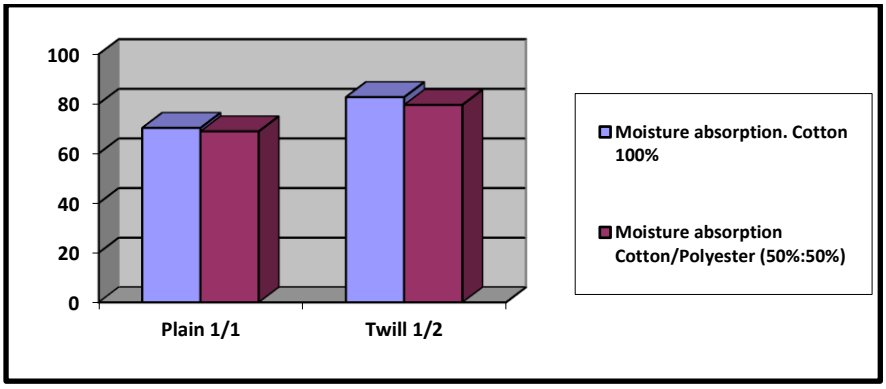

Figure 7

The impact of different textures and materials for woven fabrics on the moisture absorption of breastfeeding pads

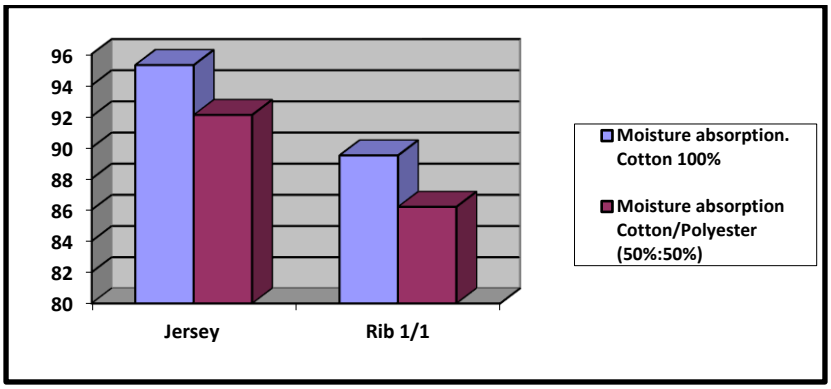

Figure 8

The impact of different structural compositions of knitted fabrics and the type of material on the water absorption of a breastfeeding pads

Table (3) and Figures (7-8) show that:

-The sample using the twill method 1/2 recorded the highest water absorption among the woven samples, due to the lack of interconnection of the threads and the increase in the interspace distances, which is reflected in the degree of absorption. The single jersey sample achieved the highest value in water absorption among the knitting samples due to the voids resulting from the buttonhole in the case of using 100% cotton and cotton/polyester (50%-50%). In general, the samples carried out using the 100% cotton material recorded higher water absorption than the samples carried out using the cotton/polyester material (50%) (50%) due to the fact that the basic material in cotton is cellulose; which contains in its chemical composition the hydroxyl group. This is a group that absorbs water.

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Evaluation of breastfeeding pads to determine the best specimen for end use:

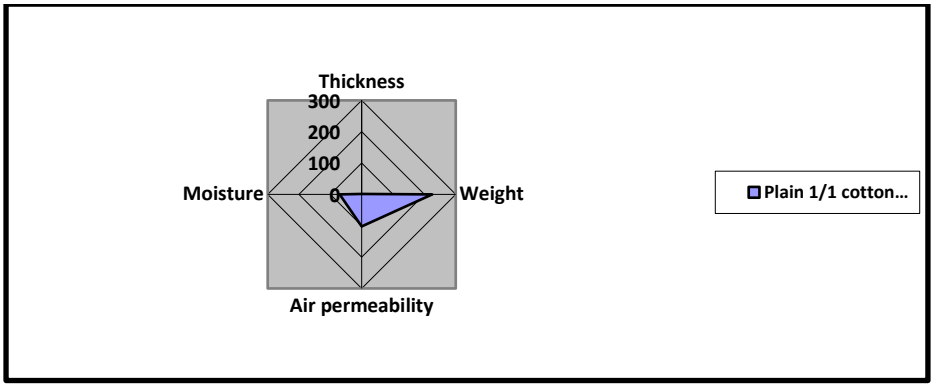

Figure 9

Evaluation of a plain sample 1/1 using 100% cotton

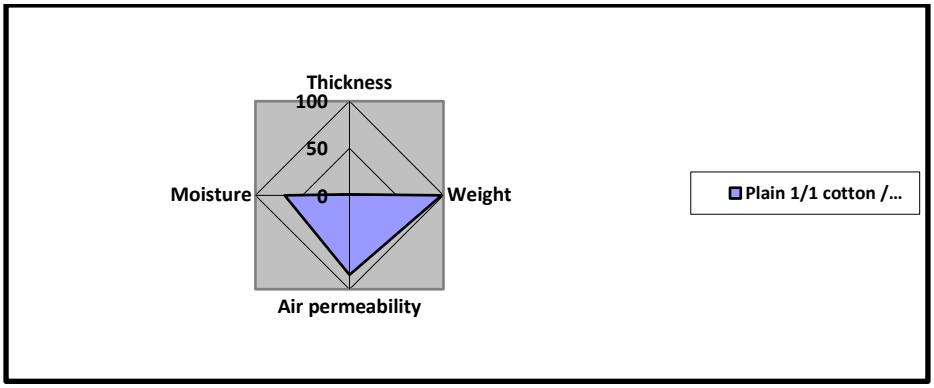

Figure 10

Evaluation of a plain sample 1/1 using a cotton/polyester material (50%-50%)

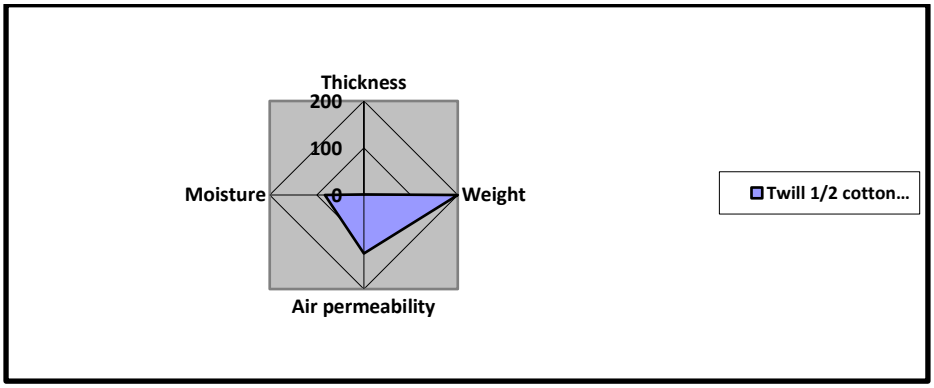

Figure 11

Evaluation of a 1/2 twill sample using 100% cotton

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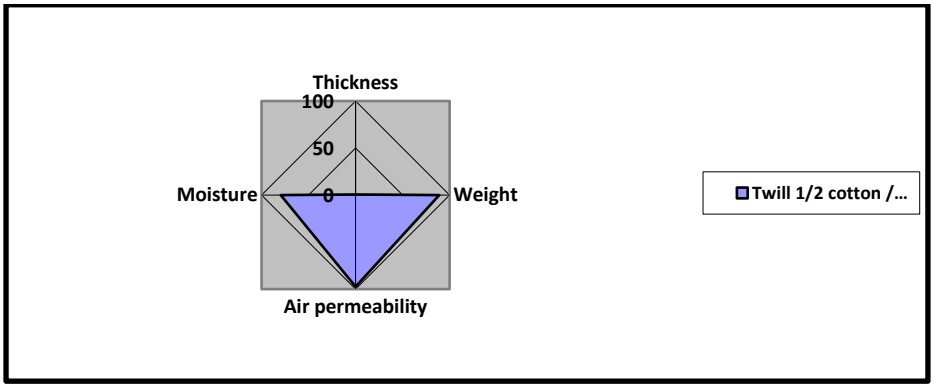

Figure 12

Evaluation of a 1/2 twill sample using a cotton/polyester material (50%-50%)

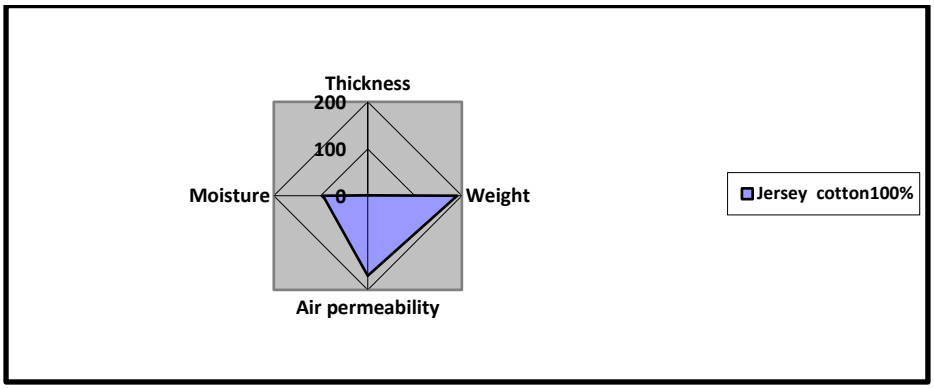

Figure 13

Evaluation of a single jersey sample using 100% cotton

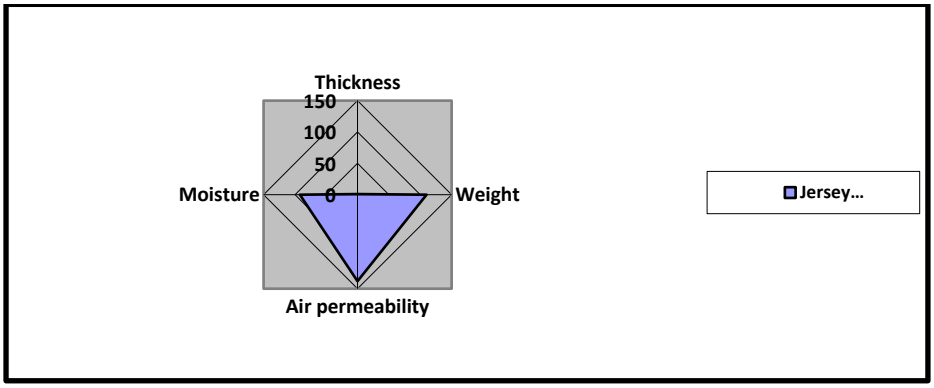

Figure 14

Evaluation of a jersey sample using cotton/polyester (50%-50%)

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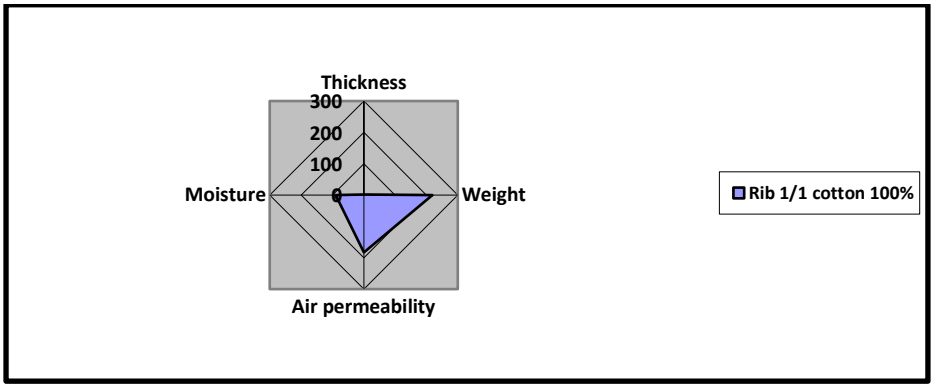

Figure 15

Evaluation of the 1/1 rib sample using 100% cotton

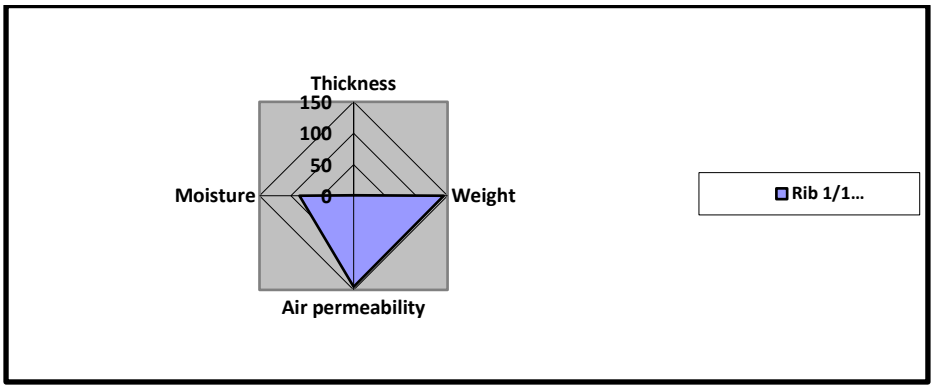

Figure 16

Evaluation of the 1/1 rib sample using a cotton/polyester material (50%-50%)

Figures (9-10-11-12-13-14-15-16) show that the ideal sample that achieves the best performance is twill 1/2 cotton/polyester, and the worst sample is plain 1/1 100% cotton.

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American Standard "ASTM-737-75-1980.7-

M.S.C. No. 295/1962 (estimate the weight, thickness, length and width of the fabrics(

American Standard Specification "ASTM-D3776-79"

ATCC/ASTM Test Method TS-018.

Standard Specification Order ASTM-D790-99 -10

""تحسين المواصفات الهيكلية للأقمشة المستخدمة في إنتاج حفاضات الرضاعة"

إعداد الباحثة:

د. منى علي وجيه

أستاذ مساعد بقسم تصميم الأزياء كلية التصاميم جامعة القصيم

المملكة العربية السعودية

الملخص:

تعتبر الأقمشة الطبية، باعتبارها إحدى التقنيات الحديثة في مجال إنتاج الأقمشة، مزيجاً من العلوم الطبية وتكنولوجيا الغزل والنسيج. يُعرف هذا أيضًا بالمنتجات النسيجية المستخدمة في مجال الصحة والعناية بالإنسان. تحتاج الأقمشة الطبية في مجال تكنولوجيا وتصميم النسيج إلى مزيد من الاهتمام لتطوير تكنولوجيا وتصميم النسيج. وهذا يستلزم رفع كفاءة هذه الأقمشة لتصل إلى مستوى الجودة الذي يحقق فاعليتها في مجال المنافسة العالمية.

يتناول البحث الحالي إنتاج فوط الرضاعة الطبيعية المستخدمة لمنع ظهور تسرب الحليب من الثدي على الملابس. تعتبر الفوطة من المستلزمات التي تحتاجها الأم أثناء الرضاعة الطبيعية، وذلك من خلال إنتاج عينات القماش (المنسوج – التريكو) وتحديد الخامات الأنسب لها. يتم استخدام مادتين خام لإنتاج العينات: 100% قطن وبوليستر قطن (50% – 50%). كما يتم استخدام التركيبات الهيكلية الأكثر ملاءمة للإنتاج: عادي 1/1، نسيج قطني طويل 2/1، جيرسي وضلع 1/1. وكانت أهم النتائج كما يلي:

1. سجلت عينة التويل 2/1 (قطن/بوليستر 50%–50%) أقل سمك، في حين سجلت عينة 1/1 قطن 100% أعلى سمك.

2. – سجلت عينة التويل 2/1 (قطن/بوليستر 50%–50%) أقل وزن، في حين سجلت العينة السادة 1/1 قطن 100% أعلى وزن.

3. سجلت العينات المنتجة باستخدام مادة قطن 100% نفاذية هواء أعلى من عينات القطن/البوليستر 50%–50%، حيث أن العينة المضلعة 1/1 قطن 100% كانت لها أعلى نفاذية للهواء، بينما العينة العادية 1/1 100%. سجل القطن أدنى نفاذية للهواء.

4. – سجلت عينة القطن المفرد 100% أعلى معدل امتصاص للماء بين العينات، في حين سجلت العينة السادة 1/1 قطن/بوليستر 50%–50% أقل معدل امتصاص للماء بين العينات المنتجة.