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Design And Development of Nursing Pad Using Hemp Fabric

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Abstract - Nursing pads are generally used by nursing mothers to prevent staining of clothing and decrease skin irritation caused by leaking of milk. The aim of this study is the production of a new and alternative absorbent layer for reusable nursing pads. This research aims to produce fabrics suitable for being used as a breast-milk absorbent pad. Hemp is the natural bast fibre, biodegradable, and eco-friendly with better moisture absorbency, strength and durability .The produced nurse pad consists of three layers. On the other hand physical-chemical properties including thickness, absorption, Water permeability, air permeability, and handle properties of the fibers and absorbent layer were evaluated according to the final product determined.

Key Words: Nursing pad, 3 layer , Absorbency, Hemp fiber.

1.INTRODUCTION

Nursing pads for absorbing breast milk leakage are available on the market and fall into two general categories: disposable and reusable pads. There are two major types of nursing pads . The second type (which is concerned in this research) is the brassier pad used by nursing mother for absorbing breast milk leakage after nursing her baby to prevent seepage into and through her garments, principally during the night (1). Breast-feeding mothers often have more milk than a baby needs the excessive milk can leak. Leaked milk may cause clothing contamination. To prevent this, mothers use nursing pads inside the bra. The use of hygienic products is increasing both in developing and developed countries. (2) Hemp fiber is natural, biodegradable , and eco-friendly. Washable nursing pads are reusable and recycle. It has 3 layer of absorbent(4).

Today most wadding used in quilting are needle-punched. Needle-punching is similar to felting although instead of using needles with barbs, the fibres are punched through a very fine (9).In **Water proof**, breathable water droplets should not penetrate into fabric but perspiration should. Water-repellent finishes are surface finishes imparting some degree of resistance to water but are more comfortable to wear because the fabric pores remain open.It help to prevent embarrassment, and protect your clothing from stains.(10).

2. LITERATURE REVIEW

Nursing pads for absorbing breast milk leakage are available on the market and fall into two general categories: disposable and reusable pads. There are two major types of nursing pads .The first is a therapeutic breast pad for heating or cooling the female breast during nursing to alleviate the symptoms of clogged milk duct . The second type (which is concerned in this research) is the brassier pad used by nursing mother for absorbing breast milk leakage after nursing her baby to prevent seepage into and through her garments, principally during the night (1). Breast-feeding mothers often have more milk than a baby needs—the excessive milk can leak. Leaked milk may cause clothing contamination. To prevent this, mothers use nursing pads inside the bra. The use of hygienic products is increasing both in developing and developed countries. Therefore, this area of the market is increasingly expanding and competitive.(2

Not all of the natural fibres can be converted into fabric because some of them can be considered new, and their extraction method cannot produce fine and clean fibres. In order to convert the fibres into woven fabric, fibres need to go through a long process from 1 spinning to weaving and this necessitates good, smooth and clean fibres. However, hemp were established in woven fabric and they possess good properties as reinforcement in composite materials. (4) The production of hemp is generally cheaper than cotton. The process of blending the hemp with other conventional natural fibres helps to achieve the textile cloth softer and more durable. The

study conducted on cotton/hemp blended fabric to analyze the moisture management level of the cloth and to verify the role of fibre type in enhancing the moisture management of fabric. (5,8)

Some women experience shooting pain within the breast during the milk ejection reflex. Typically, this sensation occurs in the early weeks of breastfeeding while the milk supply is being established. Pressure on the brachial plexus caused by poorly fitted bras or heavy backpacks may lead to shooting breast pains. Candida infections can also cause deep shooting pain in the breast. Good hand washing is important. Wash the hands with warm soapy water and Use paper towels for hand drying and then discard them because yeast can live on a moist towel. Hang washed towels in the sun to dry, if possible. Ironing will help kill yeast. Because freezing does not destroy yeast, the milk could possibly be a source of reinfection, but it is unlikely. If a yeast infection is not resolving, the mother can reduce sugar and dairy products in her diet Some women report that it helps to add acidophilus, garlic, zinc, more water, or B vitamins (from a source other than nutritional yeast) to their diets. (7)

Today most wadding used in quilting are needle-punched. Needle-punching is similar to felting although instead of using needles with barbs, the fibres are punched through a very fine.That holds the fibres together. which gives a softer handle but does allow the wadding to be pulled apart more easily. This is the traditional choice for quilt and is usually 1/8" thick. Cotton has the great advantage that it is the same raw material as the fabric. There are some cotton wadding on the market that have been manufactured with a special finish to make hand stitching much easier. (9)

In Water proof**,** breathable water droplets should not penetrate into fabric but perspiration should. Water-repellent finishes are surface finishes imparting some degree of resistance to water but are more comfortable to wear because the fabric pores remain open. Such finishes include wax and resin mixtures, aluminum salts, silicones, and fluorochemicals. To create a surface with low surface energy, so that the interaction between surface and fluid is less than internal between fluids and fluids, therefore a fluid drops off. Water proofing is a finishing that would withstand the hydrostatic pressure exerted by a column of water 1 min a depth before the first drop is able to penetrate inside. (10)

3.MATERIALS AND METHEDOLOGY:

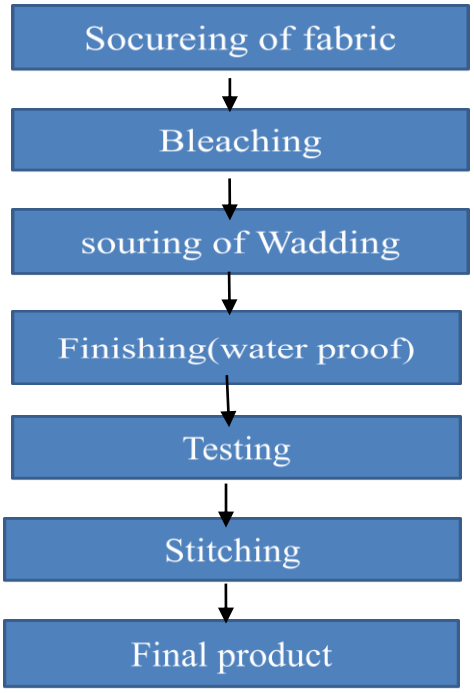
3.1.MATERIALS

The Material we are selecting according to the results we are intended to yet. Fabric and other related materials are collected which suits the project. The selected materials are

- Hemp fabric
- Cotton wadding

3.2.METHODOLOGY

Flow chart of nursing pad



3.2.1 Souring of hemp fabric

Hemp is the natural bast fibre with better moisture absorbency, strength and durability. Hemp also has special properties likenonallergic,nonirritant,antistaticandantibacterial.He mpcultivation has several advantages compared to cotton that is hemp requires less water, fertilizers and pesticides.I purchase the hemp fabric in Hemp Affair private limited in Uttar Pradesh and the fabric GSM is 270g.

Fig -1: Hemp fabric

3.2.2 Bleaching

Bleaching is the process of decolorization of raw textile material by removing inherent and or acquired coloring components from the fiber. It provides base whiteness to the textile material with the help of optical brighteners for dyed printed depending on the desired end use. I did the bleaching process in Sri Amman Colors in Tirupur.

3.2.3 Wadding

I use the 100% Cotton wadding for because it is soft and comfortable. Cotton wadding is thin, usually about 1/8″ thick. Wadding is essential to give shape and support to the area where it is applied. It absorbs moisture, provides insulation, and acts as a thermal insulator. I purchase wadding from the matrix enterprise in Tirupur.

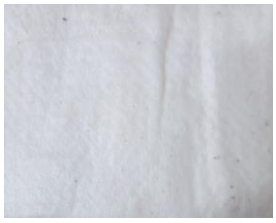


Fig -2: Cotton wadding

3.2.4 Finishing (water proof)

The term 'waterproof' is normally taken to represent the conditions in which a textile can prevent the absorption of water and also the penetration of water into its structure. Water-repellent finishes are surface finishes imparting some degree of resistance to water but are more comfortable to wear because the fabric pores remain open..I did the water proof finish in Sri Amman Colors in Tirupur

3.2.5 Testing

3.2.5.1 Air permeability

An air tronic tester with model number 3240A and ASTM D737 (figure 3) is used to test air permeability. It has a volumetric counter with a minimum capacity of 50 litres per hour and a maximum capacity of 5800 litres per hour. It is also available with different testing areas of 20,20, 10, 5, 2 cm2. We tested hemp fabric that had been treated using a test area of 10 cm2 with a pressure drop of 100 Pa and and readings were recorded

Fig -3: Air tronic tester

3.2.5.2 Water permeability

The testing of fabrics in the Water Vapour Permeability Tester Model M261(figure 4) with the specifications of ASTME 96 is used with 46ml of water at 20 °C±2 °C in each open dish predetermined from the dimensions of the dish to give an air layer which is 10±1mm deep between the surface of the water and the underside of the supported specimens. The specimens were placed over the turn table and the water vapour permeability readings of different fabrics were calculated.

Fig-4: Water vapour permeability tester (cup method M261)

3.2.5.3 Wickability

Wickability was testing using the manual method. In this test a strip of fabric is suspended vertically with its lower edge in a reservoir of distilled water. The rate of rise of the leading edge of the water is then monitored at different timings. The measured height of rise in a given time is taken as a direct indication of the wickability of the test fabric. The measured height of water rise and wickability test fabric absorbency values were calculated.

Fig -5: wickability

3.2.5.4 Spray rating tester

A specified volume of distilled water is sprayed onto a test specimen, which has been mounted on a ring and placed at an angle of 45o, so that the centre of the specimen is 150mm below the spray nozzle. The spray rating is determined by comparing the appearance of the specimen with descriptive standards on the AATCC photographic scale

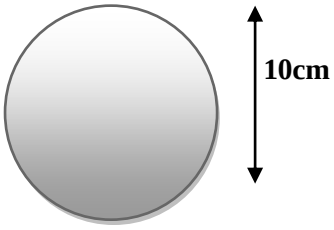
Fig -6: Spray rating Tester

3.3.6 Stitching of nursing pad

3.3.6.1 Design

Fig -7: Design of nursing pad

3.3.6.2 Pattern for nursing pad



This figure show the pattern for nursing pad, this contain three layers.

3.3.6.3 Construction Procedure

- To cut the fabric with the pattern size.
- To compile all layers.
- To design the triangle shape.
- Finish the side seams and cover the raw edges.

3.3.7 End product

In hemp nursing pad it contain 3 layer .They are

1. First layer is hemp fabric it give soft feel and absorb the milk.
2. Second layer is cotton wadding it can absorb for long time and it can easily dry.
3. Third layer is hemp waterproof and fragrance finish fabric it help to prevent the leakage and avoid the bad smell

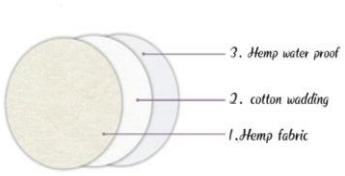


Fig- 8: The 3 layers of nursing pad

Fig -9: Hemp nursing pad

4. RESULTS AND DISCUSSION :

4.1 Air permeability

The air permeability of the fabric samples was tested and the results are given in(table no 1). It has a volumetric counter with a minimum capacity of 50 litres per hour and a maximum capacity of 5800 litres per hour. It is also available with different testing areas of 20, 20, 10, 5, 2 cm2. We tested hemp fabric that had been using a test area of 10 cm2 with a pressure drop of

100 Pa and a measuring volume of 10 litres per minute, and readings were recorded.

Table -1: Air Permeability of hemp Fabric samples

S.no	Hemp fabric
1	48.1
2	51.8
3	49.4
4	50.5
5	48.2
Average	49.6

4.2 Water Vapour Permeability

The water vapour permeability of the fabric samples were tested and results were given in(table no 2). The weight of specimen of with and without fabric samples is calculated theoretically and reference sample is also taken into account. This water permeability of fabric depends upon the weave structure, cover factor, pore diameter, etc. Thus the given sample was tested using water permeability tester under standard conditions and the result is taken

Table - 2: Water permeability of hemp fabric sample

s.no	Initial weight (g)	Final weight (g)	Mass difference (g)	Area (m2)	WVP(g\m2\ 24 hr)
1	140.47	138.14	2.33	0.0054113	1722.3
2	140.42	138.1	2.42	0.0054113	1788.8
3	140.9	138.6	2.36	0.0054113	1744.4
4	140.39	138.42	2.39	0.0054113	1766.1
5	140.67	138.25	2.37	0.0054113	1759.8

4.3 Wickability

The wickability of the fabric samples was tested, and the results are given in (table no3).Wicking property of the woven fabric is observed , the distance of water that travels up in the fabric material is measured in various intervals and it is resulted that wicking property, in weft direction is higher than warp direction of the fabric.

Table -3 : Wicking property of wrap and weft Hemp fabric Samples

Times in minutes	Weft direction	Wrap direction
1minutes	2.6	2.3
3minutes	3.8	3.5
5 minutes	5	4.6

4.4Spray rating tester.

The spray rate of each fabric (Table 4) is tested using spray rating tester. This spray rate is obtained by comparing the fabric absorption and AATCC photographic scale. Water resistance of fabric depends upon porosity of the fabric surface and contact angle during wetting of the fabric. Thus the given sample was tested under standard conditions and the result rated as per the ISO standards and reported.

Table- 4: Spray rating tester of Hemp fabric

S.no	Type of Sample	Observed Rating	INTERFERENE
1	Hemp fabric	50 ISO 1	Complete wetting of the entire specimen face beyond the spray point.
2	Hemp water proof fabric	90 ISO 4	Complete wetting of the entire specimen face beyond the spray point

5. CONCLUSIONS

From this study, Hemp nursing pad have good absorbency, high liquid retention ratio, good handle properties, high air permeability, and low cost, Hemp fiber is the most appropriate material for use in production of absorbent layers for nursing pads and It does not cause any rashes and infection because it is a chemical free substance .This hemp nursing pad it contain 3 layer and It is washable , reusable and odor free product. Nursing pads absorb the leaks and can help soothe sore nipples. It help to prevent embarrassment, and protect your clothing from stains.

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