DEVELOPMENT OF MEDICAL BEDSPREAD WITH INCREASED COMFORT PROPERTIES

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Abstract- *Textiles have always been a major part of the healthcare and hygiene sector. Nonwoven materials have a wide range of applications in the medical field to cater diversified requirements of medical textiles[1].These are disposable, sterile, cheaper and of single use. The bed sheets used in home and hospital bedding are made of cotton or polyester cotton blende d fabrics, which seems to date from the past centuries. But these home and hospital textiles need to ensure the comfort and hygienic level of the human and needs to be engineered with specific comfort properties. But no effort has been made to make new textile materials that could help in reducing the discomfort experienced by the human. Bed spreads play an integral role and invariably contribute to the patient being susceptible and prone to any means of infection which could end up fatal.*

Key words: *Bed linen, Woven structure, Water vapor permeability, Air permeability, Drape, Low stress mechanical properties, total handle value (THV), Electro static charge.*

1.INTRODUCTION

An important and growing part of the textile Industry is the medical and related healthcare and hygiene sectors. The range of products available is vast but typically they are used in the operating room theatre or on the hospital ward for the hygiene, care and safety of staff and patients. The number of applications range from the simple cleaning wipe to the advanced barrier fabrics used for operating rooms. Medical textiles are products and constructions for medical applications. As health care is growing, off take of medical textile products is also on increase. The bed sheets used in home and hospital bedding are made of cotton or polyester cotton blended fabrics, which seems to date from the past centuries. Textile products are used in many sectors in various forms. The complexity of applications has increased with research and developments in the area of bed linen materials. . Fabrics produced from 100% linen and their blends with cotton and viscose have been studied for handle and comfort properties. .Compared to the other two fibers, lyocell features the highest moisture absorption rate: with air humidity at 65 %, lyocell still has unused capacity to absorb moisture from the skin. compares the surface structure of lyocell and cotton fibers. Lyocell fiber has an extremely smooth surface and feels soft and pleasant on the skin [1]. The combination of a smooth fiber surface and excellent moisture absorption creates a positive environment for healthy skin, making lyocell ideal even for anyone with sensitive skin. According to recent dermatological studies, wearing clothing made of lyocell significantly improves comfort and promotes a feeling of well being . The comfort properties of single layered and double layered fabrics made of tencel/ polyester blend ed yarns in the face of the fabric and polyester as the skin contact layer. From the experimental results the authors concluded that tencel can be used effectively for the development of high performance. Comparative analysis of thermal insulation properties of fabrics made of cotton and tencel with different weave structures. The fabrics made of tencel yarn showed lower values of thermal conductivity and thermal absorption and also higher values of thermal diffusion and resistance than fabrics made of cotton yarns. Role of fiber properties on comfort characteristics of fabric and studied how the blending of fibers at yarn manufacturing stage can lead to fabrics having the desired characteristics from comfort point of view. Air permeability increases with increase in polyester content and the water vapour transmission rate also increased with the air flow rate of the above fabric. both the fabric construction and the constituent fiber properties affect thermal comfort. Effect of polyester content, pick density and weave on the thermal comfort and tactile properties of polyester/ viscose blended yarn fabrics for suiting, by measuring the low stress mechanical properties on

Kawabata evaluation system and reported that increasing polyester content increased fabric hand but decreased fabric smoothness, softness, fullness and total hand value and increased thermal insulation and water vapourresistance. The handle and comfort properties of fabrics made of 100% linen and their blends with cotton and viscose, and reported that total hand value (THV) of linen fabric is higher than that of cotton fabric and blending of viscose and cotton improves the hand value of linen fabric . The dynamic moisture absorption behavior of polyester/cotton fabrics of different warp and weft densities, and the results showed that the fabric moisture absorption velocity is in reverse relation with its warp and weft densities . For getting thermo physiological comfort the clothing should have suitable thermal conducting properties as well as sufficient permeability to water vapour and / or sufficient level of ventilation [10]. The overall comfort of an apparel fabric depends on the proper combination of values for pore size, air permeability, water vapour permeability, thermal insulation, surface contact with skin and several other fabric properties . For comfort properties oftextiles with varying end use applications, in the normal textile sector, technical textiles and other fields, moisture management play a key role .

2.MATERIALS AND METHODS

The bed linen fabric has been developed the by using different combination of yarns in both warp and weft direction. For producing the woven fabric yarn made up of cotton Lyocell modal viscose has been used, The fabric has been produced using the different combination of yarn in warp and weft. Plain weave used for producing the bed linen fabric.

S.NO	TYPE OF YARN	COUNT
1	Cotton	40s
2	Lyocell	40s
3	Viscose	40s
4	Modal	40s
5	Polyester	30s

Table -1 Fabric construction details

Weave : plain weave

S.NO	WARP	WEFT
A	Cotton	Cotton
B	Cotton	Modal
C	Cotton	Lyocell
D	Cotton	Viscose
E	Cotton	Polyester

The total handle value of bed linen fabric made from the cotton yarn as warp and weft shows highest value when compared to other fabrics. The bed linen fabric made from cotton shows a better result in terms of comfort properties and physical properties. The fabric made from the combination of cotton warp and lyocell weft also shows a better results in terms of physicalproperties and comfort properties. The fabrics made from the combination of cotton-modal and cotton viscose shows moderate results compared to the fabric made from cotton warp and wet cotton warp and lyocell weft. Hence it has been concluded that the fabric produced from

the co tton warp and weft, cotton warp and lyocell weft has a significant improvement in all manner and is best suited for making bed linen.

Cotton is the most popular fabric used to make sheets and other bedding and for good reason. It's durable, breathable, soft, easy to care for, and generally quite affordable. You'll find several different types of cotton, however. Some terms refer to the origin of the cotton fibers themselves, while other terms refer to the style of weaving or methods of treating cotton fabric. Here are some of the most common:

Lyocell is a semi-synthetic fabric that is commonly used as a substitute for cotton or silk. This fabric is a form of rayon, and it is composed primarily of cellulose derived from wood. Lyocell also known as Tencel is a brand name for fabric made out of eucalyptus tree wood pulp. It's soft, very durable, and naturally antimicrobial.1 Tencel is generally considered an environmentally friendly fabric, as its production requires less water, energy, and chemicals than does cotton.
While Tencel is fairly cool, it's not quite as breathable as cotton, and it can have a slightly clammy feel.

3.WEAVE:

3.1.PLAIN WEAVE

Plain weave is the most common and tightest of basic weave structures in which the filling threads pass over and under successive warp threads and repeat the same pattern with alternate threads in the following row, producing a chequered surface. They do not ravel easily but tend to wrinkle and have less absorbency than other weaves. The plain weave is variously known as Calico or Tabby weave. It is the simplest of all weaves having a repeat size of 2.

1. It has the maximum number of binding points
2. The threads interlace on an alternate order of 1 up and 1 down.
3. The thread density is limited
4. Cloth thickness and mass per unit area are limited.
5. It produces a relatively stronger fabric that is obtained by any other simple combination of threads, excepting that of "gauze" or "cross weaving".

The firmness of any woven structure depends on the frequency of interlacing between the warp and weft threads. The greater the number of intersections the better will be the firmness of the cloth.

End Use

Plain weave finds extensive uses. It is used in cambric, muslin, blanket, canvas, dhothi, saree, shirting, suiting, etc.

3.2.DOUBLE CLOTH

Double cloths are compound class of weave in which fabric is made from two or more than two sets of warp and weft. This type of fabric is having two separate layers which are interlaced or interlocked by parent thread (threads use to form two layers) or another set of threads which are known as stitching threads. All type of double cloths are made from four series of threads; face warp, face weft, back warp, back weft. Apart from this some double cloth have extra set of stitching thread or guiding thread.

Objective to manufacture double cloth:

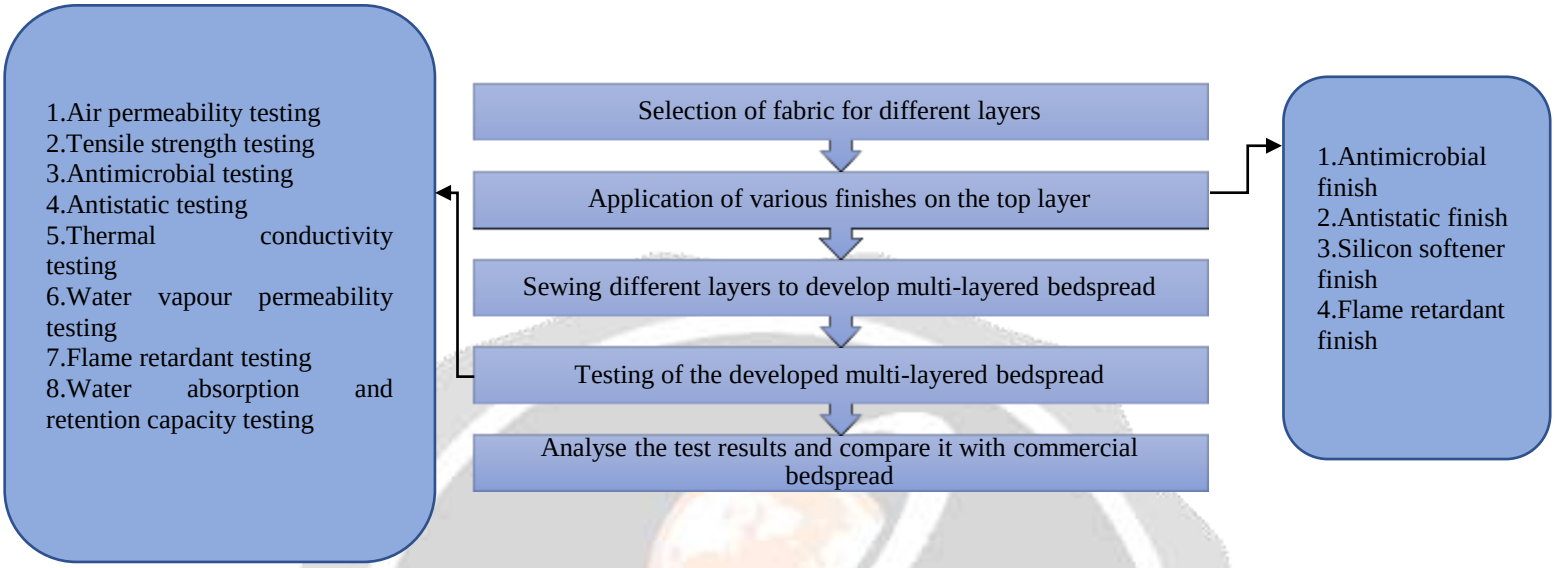
1. To improve thermal insulation value of fabric.
2. To increase good appearance.
3. For better hand feel.

Characteristics of double cloth:

1. Double cloths have at least two series of warp and weft yarns.
2. Upper layer is formed by interlacing face warp and weft yarn while lower layer is formed by interlacing back warp and weft yarn.

3. These two layers are interlaced.

4.METHODOLOGY



5.VARIOUS FINISHES

5.1 ANTI MICROBIAL FINISH

Textiles which are finished with antimicrobials have the properties of controlling the growth of microbes such as bacteria, fungi and, algae and viruses on the fabric. Fabrics with antimicrobial finish are highly useful for using in medical and hygiene products, where controlling the spread of microbes is necessary. Antimicrobial finishing on fabrics can be durable or leachable.

5.2 ANTISTATIC TEXTILE:

Antistatic finishes are generally applied when the antistatic nature of the substrate is to be maintained for a longer time, antistatic can be applied to the textile material either by coating, finishing or as an addition in the polymer dope itself. Antistatic agents are added to the bulk of the polymer forming a pathway for the charges to flow from the polymer surface to ground. External antistatic agents are applied externally from solutions to the textile surface through a variety of methods including padding baths, spraying, plasma grafting, vapor deposition, coating, finishing etc. External antistatic agents have hydrophobic and hydrophilic functionalities in their molecular structure. The hydrophilic part orients itself towards the air and promotes the absorption of moisture, resulting in better ion mobility and dissipation.

5.3 SILICON SOFTNER FINISH

Silicone finishes for textiles offer durable soft finish to cotton and its blended fabrics apart from offering aesthetic features. The performance of a silicone finish varies depending upon the functionality and molecular weight of the silicone polymer. The chemistry of silicones for textile treatment is big and the commonly used silicones in textiles have amino, amido, organo and epoxy functionalities. Depending upon the functionality in the polymer chain, they offer a wide range of performance properties like durable softness, sewability, lubricity, elasticity, hydrophobicity, hydrophilicity, wrinkle and stretch recovery.

As silicone finishes are increasingly preferred due to their versatility in finishing of fabrics, it is very important for the user to follow a set of 10 general precautions that need to be strictly adopted during handling and application.

1. Pre-dilute the silicone that is ready for application in a ratio of 1:4 by adding clean water slowly into it while blending gently.
2. Never use hot water to dilute silicones.
3. Ensure a water PH of 4.50 5.00 in the tank before the addition of silicone emulsion.
4. PH adjustment must be done using glacial acetic acid.
5. Check the compatibility of the silicone emulsion with other auxiliaries before going for any combinations in bulk, as some cationic softeners tend to raise the PH to a level where the stability of the silicone emulsion gets affected severely.
6. After every finishing, do clean the machinery thoroughly before going for the next lot. As the silicones have the tendency to dry out and form a sticky mass on the metal and ebonite surfaces that may affect the subsequent finishing, thorough cleaning between different lots is mandatory.
7. Always keep the container closed and store the product in an area where there is no direct sunlight, as air and light may lead to rapid oxidation that could adversely affect the emulsion stability.
8. Use separate jugs for silicones and do not mix up with other auxiliaries.
9. Try to take only the required quantity precisely. Avoid pouring back excess material into the container.
10. Hard water and chlorinated water must be strictly avoided in silicone finishing.

5.4 FLAME RETARDANT FINISH

Flame retardants are the type of textile finishing which is done on fabrics which are non-flammable. Phosphor amide is one of the most common things which is used to make flame retardants and is highly suitable for the purpose. Textile Info media provides you with sellers of various types of finished fabrics to meet your textile requirements. We are the leading portal for **textile buyers** and sellers. We are the leading portal for **denim fabric manufacturers and exporters**.

6.FACTORS INFLUENCING THERMAL COMFORT

6.1. AIR TEMPERATURE

This is the temperature of the air surrounding the body. It is usually given in degrees Celsius (°C).

6.2. RADIANT TEMPERATURE

1. Thermal radiation is the heat that radiates from a warm object. Radiant heat may be present if there are heat sources in an environment.
2. Radiant temperature has a greater influence than air temperature on how we lose or gain heat to the environment.

Examples of radiant heat sources include: the sun; fire; electric fires; ovens; kiln walls; cookers; dryers; hot surfaces and machinery, molten metals etc.

6.3. AIR VELOCITY

This describes the speed of air moving across the employee and may help cool them if the air is cooler than the environment.

6.4. RELATIVE HUMIDITY

Relative humidity is the ratio between the actual amount of water vapour in the air and the maximum amount of water vapour that the air can hold at that air temperature.

7.CONCLUSION

A bedspread with more comfort properties for hospital beds(especially for bed ridden patients) has been developed. More moisture absorbency in the bedspread has been imparted. The bedspread with antimicrobial and antistatic has been made. More comfort to the patients has been provided .The produced bedspread is analysed and compared with the commercially available bedspread.

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