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Development Of Soft Composite With Impact Resistance Using Kevlar/Nylon Fabric With Shear Thickening Fluid

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Abstract

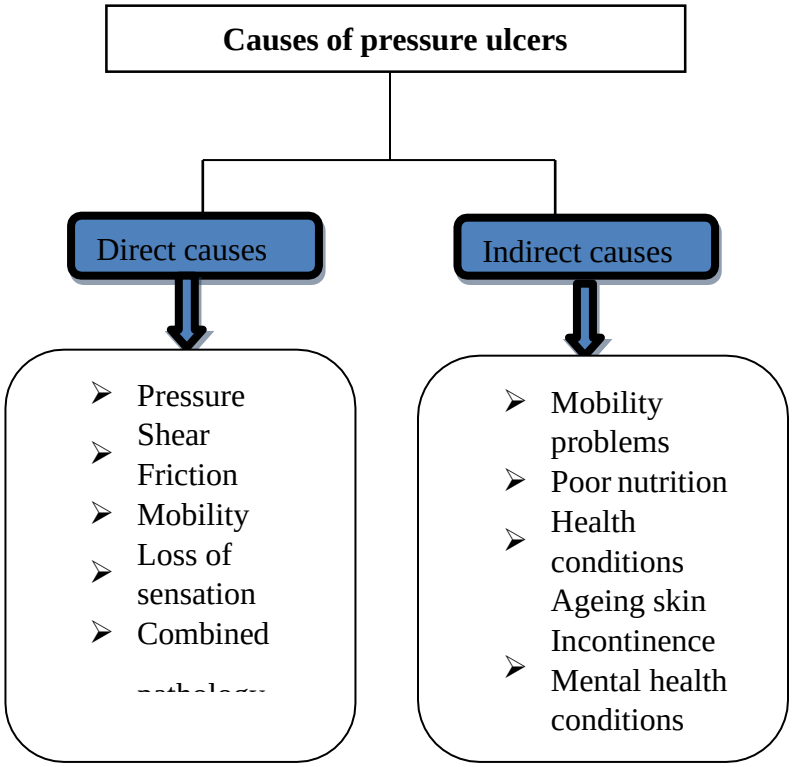
As Ayurvedic and Sustainable fashion being an emerging trend in today's medical textile world, this paper surely going to be a great help for the hospitalized bed returned patients in pleasing their issues. A decubitus ulcer (bed sore) is formed by the pressure against skin, which controls blood flow of the skin. Limited movement can cause serious damages to the skin and lead to the development of psoriasis. A bedsore develops when the blood supply to the skin is cut off for more than 2 to 3 hours. This paper shows that better improvements than the conventional treatments used for bed sore repellent like applying medicine on the bed sore area, bed sore sprays. When the skin dies, the patch starts at first as a red, painful area, which eventually turns as a serious wound. If it is left untreated, the skin can break down and the area can become infected. So this medical textile can prevent the formation of bed sore and also act as treatment in the infected area.

In this paper a needle punched non- woven will be taken and finished with the herbals used naturally to treat the bed sores. The non- woven fabric sample will be coated by using the herbals like Kedrostis foetidissima (Appokava Leaf), Chrysopogon zizanioides (Vettiver), Neem and Turmeric. The functional testing of the treated non - woven samples will be subjected for the functional properties. Based upon the test inferences the coated non-woven will be made as a suitable end use products as use and through bed covers. It will be cost effective, non-allergic and the bacteria's can be protected from affecting others or patient attender who will be using the bed again

Keywords: Herbal, Ayurveda, Bed sore, Kedrostis foetidissima, Chrysopogonzizanioides, Neem

INTRODUCTION

1. Causes of pressure ulcers



Bed source is caused by pressure against the skin, which controls blood flow to the skin. Limited movement can damage the skin and lead to the development of bed sores.

There are three main causes of bed sores:

Pressure:

Constant pressure on any part of your body will reduce blood flow to the tissues. Blood flow is essential for the supply of oxygen and other nutrients to the tissues. Without these essential nutrients, the skin and nearby tissues can be damaged and eventually die. The prolonged pressure is happened on the body part with more bone less muscles area (pelvic area, back area and elbow area) affecting bed sore by the pressure of bone on the other surface.

For those with limited mobility, this type of pressure can be caused by muscle or fat that is not well absorbed and in areas above the bone such as the spine, tail bone, shoulder blades, hips, heels and elbows.

Friction:

Friction occurs when the skin rubs against clothing, skin dragged over the surface or bedding. This can injure brittle skin, especially if the skin is moist.

Shear:

Shear occurs when two surfaces move in opposite directions. For example, when raising a bed with your head up, you can slide down on the bed [7]. As the tail bone moves

downward, the skin on top of the bone may be in place - basically pulling in the opposite direction of the external surface.

Material and Methods

Fabric particulars

1. Spun bond bamboo non woven fabric 400 GSM
2. Needle punched cotton non woven fabric 100 GSM

Herbs particulars

Herbs used for the research study along with their medical textile application.

NEEM – Azadirachta Indica: Used for skin infections, promote wound healing and combat sign of skin ageing. It is highly useful in effective against skin diseases, septiulcers and affected burns. Also recommended for leaves, boils, ulcers.

APPAKOVAI - Kedrostis Foetidissima: The leaves have a very strong unpleasant odor and can be identified with the red fruits and aroma of the plant. These leaves have antibacterial and antifungal properties. Used for eczema, diarrhea, measles and boils.

VETTIVER - Chrysopogon zizaniods: used for accelerates skin cell regeneration and promotes the growth of new tissues in the affected area. It helps to eliminate the appearance of scars ranging from acne, box and burns scars, stretch marks and fat cracks- leading to clear, improve the tone of the skin, easily heel the wound and flawless skin.

TURMERIC - Curcuma longa:
Used for improve the blood circulation, support the immune system, heal faster and eliminate toxins. It will reduce the pain, get immediately relief and the wounds heal in a few days.

Active agents from plant

S. No	Vernacular name	Botanical name	Family	Medical uses
1.	Neem	Azadiration Indica	Meliacceae	Acaricidal, Antiviral wound healer immunomodulatory
2.	Appakovai	Kedrostis Foetidissima	F- Cucurbitaceae	Cure cold, Measles, Diarrhea, Eczema and Cure boils
3.	Vettiver	Chrysopogon zizaniods	F- Poaceae	Relieving Stress, Shock, Lice, and Repelling Insects
4.	Turmeric	Curcuma longa	Zingiberaceae	Skin cancer, Small pox, Chicken pox, Wound healing, Urinary tract infections and Liver ailments

Methodology:

Non-woven fabric **Herbal extract** **Herbal non-woven treated fabric**

Needle punched non-woven fabric:

The fiber sections are rearranged and move from the surface of the web to the inside of the cotton fabric, becoming perpendicular to the plane. The needle punched Non-woven materials have many properties that are popular in the medical field because they can easily control various parameters such as porosity, fabric weight, and thickness; Non-woven ones are easy to disinfect; the applications of textiles are generally characterized by their high porosity, large fiber surfaces and absorption capacity for other materials. So that the needle

punched fabric are having the more air permeable properties.

Herbal extraction
Step1:
The collections of herbs are dried without the sun light after to make the powder formation by traditional grinding techniques.
Step2:

The extractions was carried out by dissolving 5 grams of the powder in 100 ml of 80% ethanol, kept eight hours in shaking condition with help of magnetic stirrer and maintain the temperature range 50-600C.
Step3:

Then the extraction was filtered by the whatmann filter paper, filtrate was evaporated at the room temperature.

Step4: The fabric was immersed in the extraction solution at 1 hour 500 C in oven. After 1 hour the fabric was air dried in shade.

Samples	Material 1	Material 2
Neem	5%	2%
Appakovai	5%	2%
Vettiver	5%	2%
Turmeric	5%	2%
MLR ratio(Fabric was dipped in 1 hr)	1:20	1:20
Drying (5 min)	600C	600C
Curing(5 min)	1600C-1700C	1600C-1700C

Construction of Quilt bed spread
The treated material was constructing by the quilt filling process. The bed spread width 2 feet and length is 3 feet. After quilt filling process the bed spread was diagonal stitches on both directions that kind of construction produce the diamond shape and ridge pit.

Result and discussion

Air permeability

Fabric air permeability is defined as the rate of airflow passing vertically through and identified area under a given air pressure difference between two surfaces, and it measures the pressure drop through the fabric. The sample is placed between two rubbers. Ensure that air passes through the sample with gaskets and a protected ring connection over the

air inlet. Then, air is drawn through the sample using suction. At this point, it measures the rate of airflow using a flow meter. Due to the irregularity in the fiber entanglement, the air permeability value of the fabric is different over the entire area of a sample.

Wick ability test:

The fabric sample size is 12" ×1" and hung over the stand. A beaker is filled with dyed distilled water. The lower end of the strip of cloth is set so that it touches the water, submerging the cloth half an inch high in the water. A load of 10 g is applied to the bottom of the fabric to keep it in a straight configuration. The rise in water level in the cloth is measured after 5 minutes, 10 minutes and 15 minutes. The fouling of treated and untreated bamboo and cotton non woven fabric samples was evaluated by time to wetting. The vertical wicking test results are shown in the table 4

S. No.	Type of Sample (Non Woven)	Wicking Height in Centimeters (5 min)	Wicking Height in Centimeters (10min)	Wicking Height in Centimeters (15 min)
1.	Untreated cotton	3	5.5	7
2.	Untreated Bamboo	2	4	5.5
3.	Treated cotton	5	7	9
4.	Treated Bamboo	3.5	6	7.5

Conclusion

The main purpose of the present study is explore the bed sore repellent properties of neem, appakovai, vettiver and turmeric extract in needle punched cotton fabric and to move the next stage of new technology for consumer needs and it is suggested that herbal treated non woven fabrication can be used to prevent bed sores and other application that requires an antimicrobial coating. And it gives people a cost effective benefits. In addition, it is ECO friendly disposal product and Natural resources are safe for humans.

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