



TECTONA WOUND HEALING HERBAL BANDAGE

*S.DIVYA , ** Ms. S.RAGAVI. M.Sc.,

*S.DIVYA, Department of Costume Design and Fashion, Dr.N.G.P Arts and Science College, Coimbatore.

** Ms. S.RAGAVI. M.Sc., Department of Costume Design and Fashion, Dr.N.G.P Arts and Science College, Coimbatore.

ABSTRACT:

In order to achieve accelerated healing, wound healing is a challenging and ongoing process that is influenced by a number of variables. Our goal is to look into the development of wound dressings from conventional to modern methods of care. Our goal is to look into the improvement in These bandages are applied to a wound to aid in mending and keep the area clean. To avoid post-dressing infection, it is used in conjunction with antibacterial drugs. For the management of pain and the healing of wounds, additional medications must be taken regularly. During the antimicrobial research, the bandage's antimicrobial capability was assessed. wound dressings: conventional and modern approaches to care. A wound dressing should have antimicrobial properties in addition to qualities like biocompatibility, ease of removal, moisture retention, high absorption capacity for wound exudates, and excellent permeability for oxygen and water vapour. The developmental outlook of the new gene ratios of wound dressings is then presented for future study. The use of hygienic products is growing in both developed and developing nations. Cotton bandages loaded with silver and copper nanoparticles were tested against Escherichia coli, bacillus cereus, and staphylococcus aureus using a modified disc diffusion assay. The modified Cotton material can be used in biomedical textiles as antimicrobial and burn wound healing properties. The ideal wound dressings should be flexible.

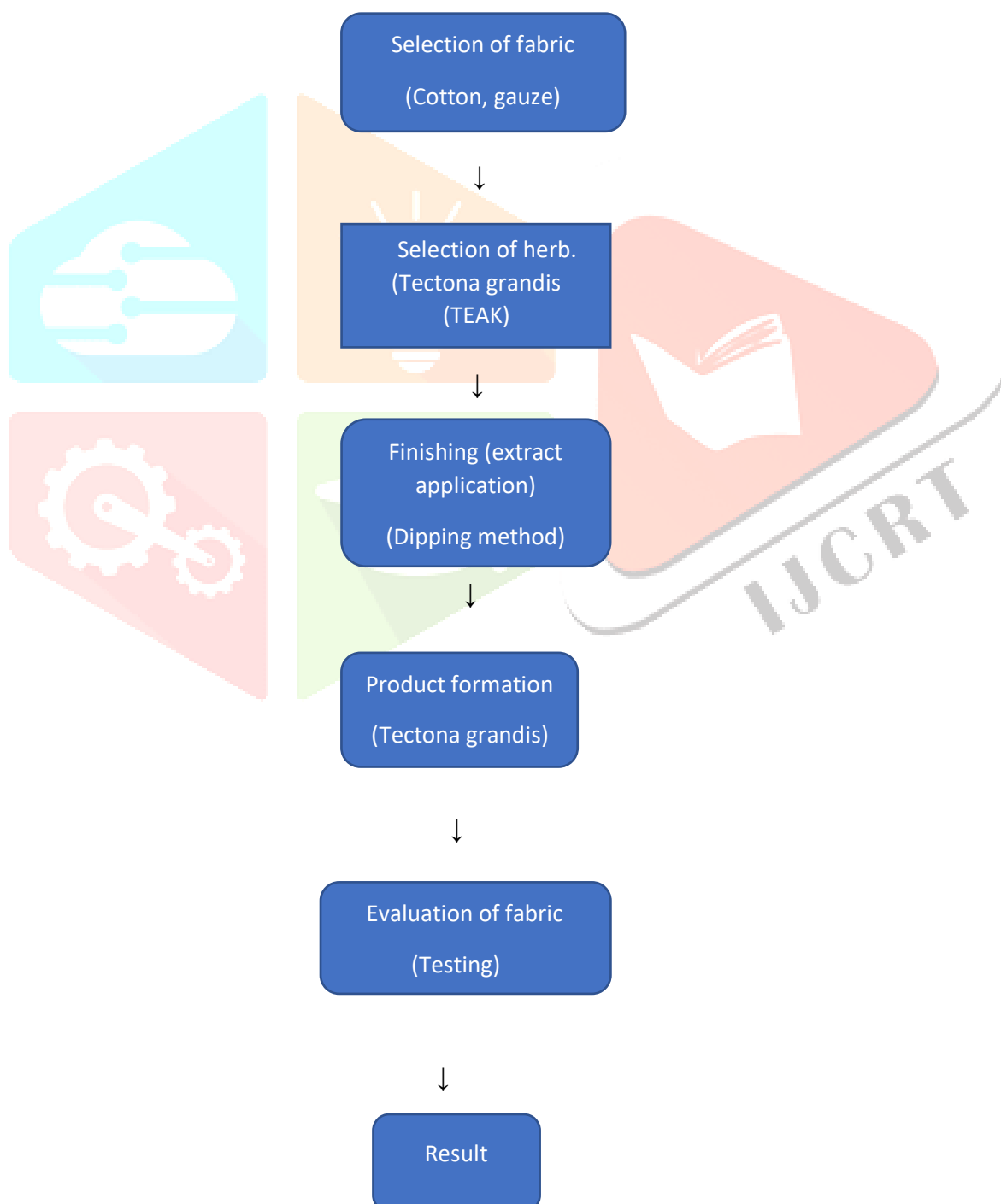
KEYWORDS: Anti-bacterial, Anti-inflammatory protection, Natural fiber, Eco-friendly.

INTRODUCTION:

Patients who come to medical experts for treatment for injuries must receive care from them. Medical professionals must remain vigilant in their efforts and ready for the variety of needs of their patients because customers entrust doctors and nurses with their health and healing. Medical workers should develop the habit of keeping wound care supplies like wound care bandages, wound dressings supplies, and wound dressing kits sufficiently stocked and available so they can effectively treat a variety of injuries and wounds. A bandage is a piece of fabric that can be used to support the body on its own or to support a medical instrument like a dressing or splint. Skin starts to heal after an injury to the epidermal layer, and this process, called wound healing, can take years. Bandages come in a variety of forms, from simple cloth bands to specialised shapes made for particular limbs. occlusive bandages, moisture-enhancing dressings, or antibiotic ointment. Some scrapes mend without developing a scab and instead stay shiny and raw. If this happens, clean the area with water and frequently apply a new bandage. In conjunction with a dressing, the incision is covered with the dressing. . When a limb or arm is bleeding heavily, tight bandages can be used

to reduce the amount of blood that reaches the extremity. the availability of bandages made of cotton fibre or gauze for the treatment of wounds. There are sores that develop as a result of metabolic conditions or extended bed rest. Bandages are an effective home remedy for treating small household injuries. Incorporating the nano generator into the bandage allowed us to improve it between our initial research and this one. The expense of manufacturing the bandages is comparable to that of regular bandages. The wound dressings promote healing and shield the area from potential injury. Traditional uses of *Tectona grandis* include the healing of numerous wounds. The complex and drawn-out process of tissue repair and remodelling in reaction to injury constitutes the healing of a wound. Excision, incision, dead space, and burn wound models have been used to assess the wound healing abilities of different herbal extracts. The complicated cascade of cellular and biochemical reactions that take place during wound healing help injured tissues regain their strength while restoring their structural and functional integrity. Additionally, this may cause extra moisture to be left in touch with healthy skin. Wound treatment and dressings aid in the healing process while preventing infection and contamination.

METHODOLOGY:



FABRIC SELECTION:

COTTON:

The world's most widely used cellulosic and natural textile fibres for clothing, house decor, and industrial products are cotton and hemp, respectively. Cotton accounted for about 40% of the fibre eaten globally in 2004. A bill, or protective case, of cotton, a soft, fluffy staple fiber, develops around the seeds of cotton plants belonging to the genus *Gossypium* in the Malvaceae family of Mallow trees. According to botany, there are four main domesticated cotton varieties that are significant for commerce: *hirsutum*, *barbadense*, *aboreum*, and *herbaceum*. There are presently 33 recognised species, but all but these four are uncultivated wild shrubs. Each of the commercially significant species has a wide range of varieties that have been created through breeding programmes to produce cotton with ever-improving qualities (such as quicker maturing, higher yields, and improved insect and disease resistance), as well as fibres that are longer, stronger, and more uniform. The desiccated cell walls of once-living cells are what make up the cotton fibres used in the textile industry. According to botany, cotton fibres are trichomes, or seed coat hairs, which form from the epidermal cells of the cotton seed as it grows.

Cotton fibre's physical characteristics:

Tenacity:

Cotton fibre's strength is ascribed to the well-aligned long polymers in the fibre. Because of the numerous ongoing hydrogen bond formations between the adjacent polymers and the spiralling fibrils in the main and secondary cell walls, its polymer system is approximately 70% crystalline. One of the few fibres that gets stronger when moist is this one. This happens as a result of the polymers' better alignment and the growth in the number of hydrogen bonds to its crystalline polymer structure, cotton is relatively elastic, which makes cotton clothing wrinkle and crease easily. Because of its absorbent properties and affinity for the numerous polar off groups, cotton fibre has a hydroscopic character. These draw polar water molecules to their polymers. Cotton textiles typically aren't hydroscopic, so they can't generate static energy. Any potential static charge is dispersed by the polarity of the water molecules drawn to the hydroxyl groups on the polymers.

Thermal characteristics:

Since cotton is not thermoplastic, extreme heat application causes the cotton strand to char and burn without first melting.

Cotton coated with lustre lacks a noticeable lustre. Therefore, they must be mercerized in order to make it glossy.

Strength:

- 1) It has a fair amount of strength.
- 2) The capacity of a fibre to withstand being pulled or torn apart when subjected to tension can be used to describe a fibre's strength.

Elasticity is the capacity of a fibre to elongate under tension before snapping back to its original form.

Resilience:

- 1) It refers to how much a fabric can be compressed and deformed before returning to its initial shape.
- 2) The finishing procedure significantly enhances the ability of cotton products to resist wrinkles.

Drapability:

- 1) Drapability is the ability of a fabric to hang freely and collapse into graceful shapes and folds.
- 2) The type of fiber, yarn, fabric construction, and finish used to create the finished product all affect this quality.

Absorbency:

- 1) It establishes how much wetness is absorbed by the fibre from the air.
- 2) The thread in cotton is very absorbent.
- 3) The yarn's twist affects absorption as well.
- 4) When compared to high twisted yarn, low twisted yarn collects more moisture.
- 5) The fabric's structure also affects how absorbent it is; a looser weave will be more absorbent than one that is stiffer.

COTTON CHARACTERISTICS:

- Good permeability
- Retention of colour.

Prints nicely.

- Can be dry cleaned.
- Strong build.
- Drapes nicely.
- Simple to use and stitch

THE MAIN PROPERTIES AND BENEFITS OF COTTON INCLUDE:

- Cotton is cosy.
- Cotton has a built-in sustainability.

Cotton benefits local economies and producers.

- Cotton is preferable for sleep.
- Hypoallergenic cotton.
- Cotton has no smell.
- Cotton requires little upkeep.



Cotton

GAUZE:

A gauze bandage is a thin, woven medical bandage that is used to shield wounds while also absorbing a lot of blood and other bodily fluids from the injury site. A gauze bandage can be used to hold dressings in position, keep a wound clean, or even to directly apply on the surface of the injury. Its primary use is for wound protection. 100% clean, medical-grade cotton is used to make gauze bandages. If the wound is still bleeding when the gauze bandage is applied to it, tie it firmly so that compression can stop the bleeding where the injury is. Wrap it tightly but with a modest amount of force around wounds that do not require strict compression to stop bleeding. strength to prevent undue strain on the injury. The cotton layers that make up gauze wraps, also known as gauze rolls, allow them to be used as either a main or secondary dressing. Gauze wraps can be used as a main dressing for minor wounds or can be applied on top of an antibiotic ointment. Gauze, a loosely woven, nearly transparent material, is used to cover incisions. For 24 hours, keep the bandage in place to dry. When used for surgical dressings, gauze is a thin, open-weave cloth made of cotton. When used for dress trimming, it is made of silk and other fibres.

GAUZE BANDAGES' FUNCTIONS:

A gauze bandage serves a general purpose. It is a substance that is utilised to safeguard and repair damaged parts. Surgery requires it as a matter of medical imperative. Cotton or gauze can be used to make a basic gauze patch. It is frequently applied to the limbs, tail, head, torso, and abdomen of humans. The focal areas are better handled by a different variety of gauze bandage. Based on the affected area and shape, this gauze bandage seeks to produce gauze bandages in a variety of shapes. One layer of cotton cloth is also used instead of the previous substance. To enhance thickness and protect the affected region, cotton cloth of varying thicknesses can be sandwiched together. when using a cotton towel with two layers. These gauze bandages from the hospital are wrapped in cloth strips so that the medical staff can make knots and treat the patient's injured region. There is also a specific gauze bandage that is used primarily to fix the human body's limbs and joints.

MEDICAL USE:

When used as a medical dressing, woven gauze is usually made of cotton. It is especially useful for dressing wounds where other fabrics might stick to the burn or laceration many modern medical gauzes are covered with a perforated plastic film such as telfa or polyblend which prevents direct contact and further minimises wound adhesion. Also, it can be impregnated with a thick, creamy mixture of zinc oxide and calamine to promote healing, as in Unna's boot. The woven fabric nature of the bandage is what makes it absorbent which is useful as it helps prevent excess moisture around the wound site. They can be used on wounds where the infection is already present and in the process of treatment. They can be combined with topical medicines for such purposes. Gauze has been around for centuries and is very affordable. You are using medical gauze to treat an open wound then you should make sure you are using a sterile gauze.

WOVEN GAUZE:

Woven gauze has a loose open weave. The loose nature of the weave allows the fluid from the wound to be absorbed into the fibres. The open weave helps the wound fluid to pass through the gauze and be absorbed by other more absorbent dressing such as gauze pads or sponges. Woven gauze cannot be cut, the cotton material, because it is woven, will starts to unravel. The debris or lint can get lost in the wound which will delay healing. Woven gauze is a general gauze that is used as a secondary dressing. It should not be used directly against a wound because it can dry the wound out which will make dressing removal painful and it wound damage any newly healed tissues.

PROPERTIES OF GAUZE FABRIC:

- It is a sheer and lightweight fabric.
- It has a soft feel.
- It drapes and gathers very well.

- Generally, 100% Cotton and less resilient.
- Gauze fabric characteristics.



gauze

SELECTION OF HERB: TECTONA GRANDIS -COMMON NAME (TEAK)

Preparation of extract:

The powder of leaves was macerated for 24hr in 70% water. The hydro alcoholic extracts were obtained by percolation using 70% water as a solvent was obtained. The yield of extract was around 50%.

Preparation of drug formation:

Tectona grandis leaf extract was mixed with simple bandage as mentioned below:

Preparation of bandage – simple bandage (100gIP):

- Water – 85g
- Tectona grandis powder – 10g

- Fat – 5g

5% Bandage:

- Simple bandage – 95g
- TG leaf extract – 5g

10% Bandage:

- Simple bandage – 90g
- TG leaf extract – 10g

15% Bandage:

- Simple bandage – 85g
- TG leaf extract – 15g

20% Bandage:

- Simple bandage – 80g
- TG leaf extract – 20g

METHOD OF FINISHING:

- The different extraction method such as dipping extraction were investigated by 10g Tectona powder extracted with 100ml water.
- In dipping extraction, the powder of Tectona was mixed with solvent for different times.

- This leave was washed thoroughly to get rid insects if any were present.
- The leave was added to 2 liters of boiling water and boil the extract until the water level reduce to half a liter.
- The leave was filtered after 3 hours of rest.
- Then this solution was diluted with water and was dipped all over the woven fabric and was shade dried

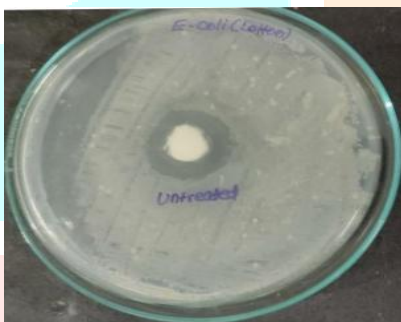
RESULT

Anti-Bacterial test:

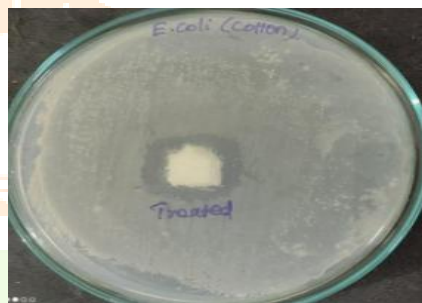
Preparation of the bacterial inoculum:

Stock cultures were maintained at 4°C on slopes of nutrient Agar and potato dextrose agar. Active culture for experiments were prepared by transferring a loop full of cells from stock cultures to test tubes of 50ml nutrient broth bacterial cultures were incubated with agitation for 24hours and at 37°C on shaking in cubator and fungal cultures were incubated at 27°C for 3-5 days. Each suspension of test organism was subsequently stoked out on nutrient Agar media and potato dextrose agar. Bacterial cultures then incubated at 37°C for 24hours and fungal incubated 27° for 3-5days. These stock cultures were kept at 4°C for use in experiments, a loop of each test organism was transferred into 50ml nutrient broth and incubated separately at 37°C for 18-20hours for bacterial cultures.

1)E. coli Test:



E. coli cotton (untreated)

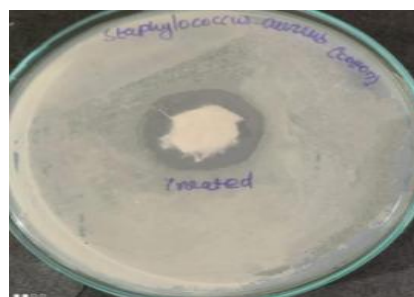


E.coli Cotton (treated)

2)Staphylococcus aureus Test:



staphylococcus aureus (untreated)



staphylococcus aureus (untreated)

WELL DIFFUSION METHOD:

The antibacterial activity and antifungal activity of crude extract extracts was determined by well diffusion method. MHA plates were prepared by pouring 20ml of molten media into sterile Petri plates. After solidification of media, 20-25ml suspension of bacterial inoculums was swabbed uniformly. The sterile paper disc was dipped in agar plates. Then 10 -50 ml of plant extract was poured into the wells. After that, the plates were incubated at 37°C for 24hours. Assay was carried into triplicates and control plates were also maintained. Zone of inhibition was spread on mullerhintonagar plate and potato dextrose agar well were put into the agar medium using sterile forceps. Plant extract were poured on to Wells. Then plates were incubated at 37°C for about 24hours and control was also maintained zone of inhibition was measured from the clear zone in mm. Antibacterial activity was performed by agar diffusion method. Van der watt et al.,2001. The stock culture of bacteria (*E. coli* and *candida albicans*) was received by inoculating in nutrient broth media and grown at 37% for 18hours. The agar plates of the above media were prepared. Each plate was inoculated with 18hours old cultures the bacteria were swab in the sterile plates placed the extract treated cloth and untreated cloth were placed. All the plates were incubated at 37°C for 24hours and the diameter of inhibition zone was noted in cm. Agar well diffusion method has been used to determine the antimicrobial activities and minimum inhibitory concentration or plant extracts against gram-positive, gram-negative bacteria. The extract exhibited antibacterial activities against tested microorganisms. Agar well diffusion method has been used to determine the antimicrobial activities and minimum inhibitory concentration or plant extracts against gram-positive, gram-negative bacteria. The extracts exhibited antibacterial activities against tested microorganisms. The combination of cotton fabric is more inhibit the treated fabric when compare with the untreated materials.

TESTING RESULT:

Antibacterial activity was performed by agar well diffusion method. The stock culture of bacteria (*staphylococcus aureus*, *E. coli*) were received by inoculating in nutrient broth media and grown at 37% for 18hours old cultures the bacteria were swab in the sterile plates. The 1cm width tested cloth was put into the plates. All the plates were incubated at 37°C for 24hours and the diameter of inhibition zone was noted in cm.

S.No	Name of the Microorganism	Zone of Clearance (cm)	Zone of Clearance (cm)
		Untreated	Treated
1	<i>E. Coli</i>	1.0 cm	1.5 cm
2	<i>Staphylococcus aureus</i>	0.8 cm	1.3 cm

CONCLUSION:

Thus, the herbal bandage has been developed and tested according to AATCC standards. As per my aim is to decrease the pain and injuries of arthritis patients. This comes under the medical textiles. Herbal bandage reduces the arthritis injuries pain. This herbal bandage possesses antibacterial and anti-inflammatory properties. Developed herbal bandage using surgical Cotton and gauze fiber finished with *Tectona grandis* extracts. No chemicals are used in this herbal bandage. It's completely natural. Hence it is healthier and cheaper for injuries patients.

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