

APPLICATION OF ANTIMICROBIAL HERBAL EXTRACT ON BAMBOO NON-WOVEN FABRIC FOR TREATING BASAL CELL CARCINOMA SCARS

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Abstract:

As the current and commonly used treatment methods for skin cancer are very harmful and potentially destructive, new approaches should focus on the development of clothing that can promote both tumor elimination and to regenerate the skin. The current study focuses on herbs (Ziziphus jujuba and Terminalia Chebula) utilized in Bamboo non – woven fabric with an antimicrobial finish and wound healing property. The selected her Ziziphus Jujuba naturally possess skin rejuvenation property. Jujuba fruit has been used for the preparation of ointments for skin problems like acne, scars etc. This study is covers about the finishing process of the selected fabric with selected herbal extraction for the development of BCC scar treatment bandages. The extraction process was done with soxhet apparatus methanol solvent and ultrasonic extraction method. The extract shows a zone of inhibition of 0.75cm for Staphylococcus aureus and 0.9cm for E. coli as the zone of inhibition shows variation and E. coli possess higher zone of inhibition than Staphylococcus aureus. The test is also done for the finished fabric which results in bacterial reduction of 90% for Staphylococcus aureus and 92.72% for E. coli. The antimicrobial activity has been evaluated using the AATCC-100 (2019) test technique.

Keywords —Antimicrobial finish, Bamboo non-woven, Dip and Dry, Terminalia Chebula, wound healing, Ziziphus jujuba.

1.INTRODUCTION

Textile materials (fabrics, non-fabrics, knits and composites) have found various end uses in health and medical applications. [1] Don't use too many chemicals to distribute disinfectants on clothing. These chemicals include inorganic salts, organometallics, iodophors (things that slowly release iodine), phenols and thiophenols, antibiotics, heterocyclics with anionic groups, nitro compounds, ureas, derivatives of formaldehyde and amines. However, many of these chemicals are deadly to humans and difficult to break down in the environment. Basal cell carcinoma is a type of skin

cancer. Basal cell carcinoma begins in basal cells - a type of cell in the skin that produces new skin cells as old ones die. Basal cell carcinoma often appears as a slightly transparent bump on the skin, although it can take other forms. Basal cell carcinoma most often occurs on areas of skin exposed to the sun, such as the head and neck. Most basal cell carcinomas are thought to be caused by long-term ultraviolet (UV) exposure from the sun. Avoiding the sun and using sunscreen can help protect against basal cell carcinoma. Bamboo is known as "Lingo Cellulose Bast Fiber" because it is the most common and highly versatile natural cellulosic fiber in the global textile industry. It is well known for its attractive effect, comfort and

flexibility. At high humidity, fiber absorbs water and provides a pleasant feeling on the skin. Like fiber, bamboo is a natural, recycled, biodegradable material. It is not only a green fiber, but also has the natural properties of anti-bacterial and anti-UV, making it a unique textile material in the environment of the 21st century. [2]

'Nothing from the fabric, causing evaporation and cooling. Jujuba leaves used as herbal tea have not yet been studied. Therefore, it is important to deeply analyse the bioactive components of Z. jujuba leaves. Eco-friendly products are in high demand these days. Many studies have been done to use natural herbal extracts for textile finishing because of their anti-bacterial and anti-bacterial properties. Terminalia chebula (Family combretaceae; local name, haritaki) is one of the most famous and widely used plants in traditional medicine of Indian subcontinent. Terminalia chebula has been the subject of in vitro research showing that it acts as a protective barrier to the skin from sunlight and helps to maintain the skin's protective properties. [3]

The effect of topical administration of an alcoholic extract of the green leaf of the plant, Terminalia chebula, on the healing of skin wounds in rats, was evaluated in vivo. T Wounds treated with chebula heal more quickly, as shown by a better rate of closure and a shorter epithelialization time. Biochemical studies revealed a significant increase in protein, DNA and collagen content in the granulation tissue of healing wounds. However there is a story in the Antibacterial work of Ziziphus Jujuba. The aim of the present study was to investigate the antibacterial activity of the leaves of Z. jujuba and Terminalia Chebula as well as a medical system. As in Z. Jujuba leaf has skin rejuvenating properties as it is used in oil for various skin problems. Therefore, this study is based on the investigation of the antimicrobial activity and therapeutic properties of Ziziphus jujuba leaves and Terminalia Chebula nut powder for the treatment of tumour after the end of chemotherapy.

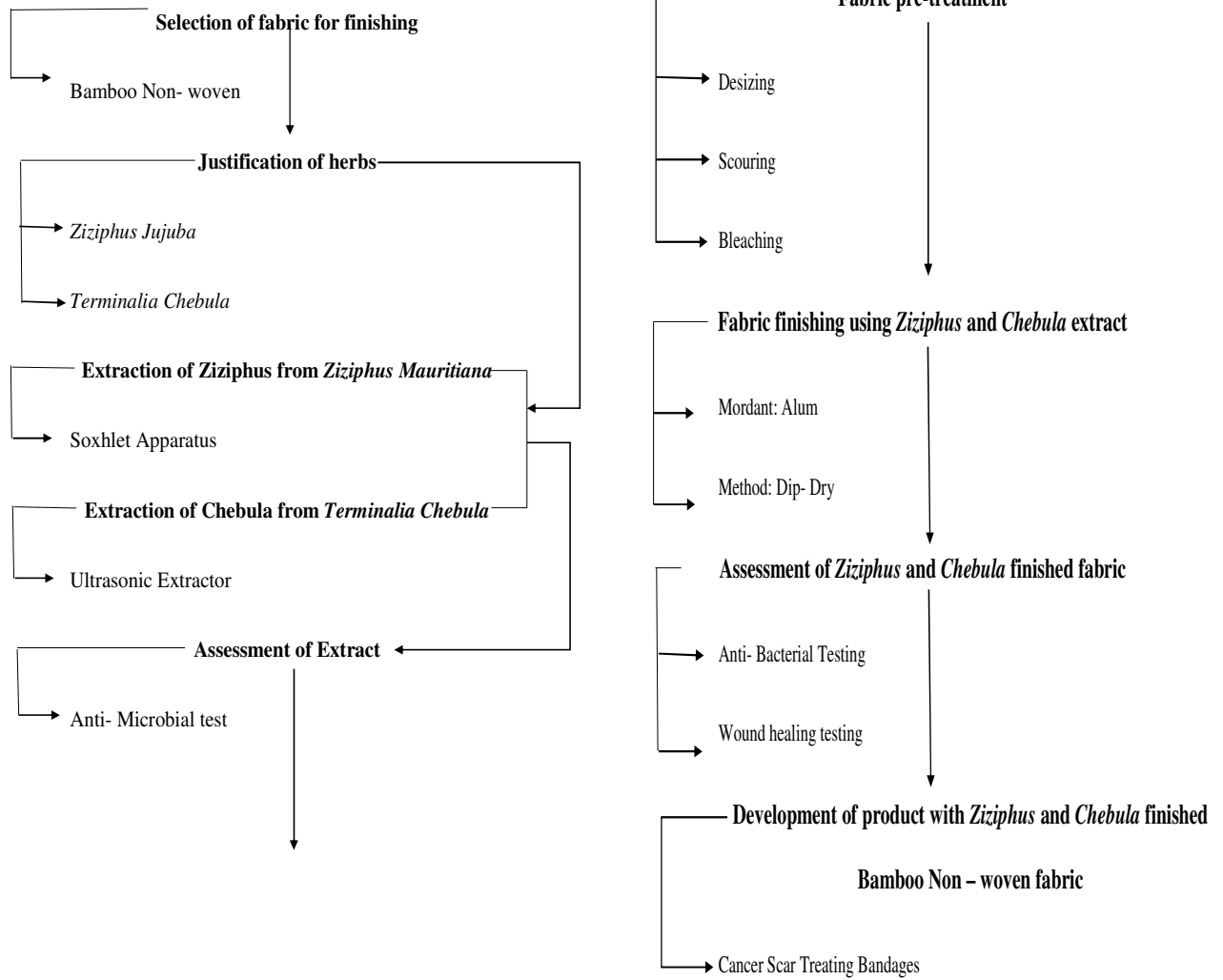
To overcome the above mentioned effects, an antimicrobial finish to improve antibacterial activity which helps in reducing scars, stretch that is

finished in the bandage cloth which is of 100% bamboo. This finishing plays a significant role in wound healing. [4]

2.OBJECTIVES:

- To select the herbs (*Ziziphus Jujuba*, *Terminalia Chebula*) for basal cell carcinoma scar treatment.
- To extract *Ziziphus Jujuba* & *Terminalia Chebula* solution using soxhlet apparatus and ultrasonic extractor.
- To find selected combination of different ratio of selected *Ziziphus Jujuba* & *Terminalia Chebula*.
- To evaluate the selected combination of extract to be finished with antimicrobial activity testing.
- To select bamboo non-woven fabric with 100 GSM.
- To pre-treat bamboo non-woven fabric for finishing with *Ziziphus Jujuba* and *Terminalia Chebula* extracts.
- To evaluate fabric testing – Antimicrobial activity and Wound healing testing.
- To develop product from selected ratio combination of *Ziziphus Jujuba* & *Terminalia Chebula* finished fabric.

3. METHODOLOGY FLOWCHART



3.1 Extraction of Ziziphus from Ziziphus Mauritiana:

S.no	Ratio	Volume of Solvent – Methanol (ml)	Weight of leaves (Grams)	Temperature (Celsius)	Duration of extraction (Hours)	Concentration (%)
1.	2:10	250ml	50gram	100° C	8hrs	20%
2.	5:10	250ml	125gram	100° C	12hrs	50%

Table 1 - Parameters Ziziphus Jujuba extraction

3.2. Extraction of Chebula from Terminalia Chebula:

S. no	Ratio	Volume of Solvent – Methanol (ml)	Weight of Myrobalan powder	Temperature (Celsius)	Duration of extraction (Hours)	Concentration (%)
1.	3:10	250ml	75grms	80° C	2hrs	30%

Table 2 - Parameters Terminalia Chebula extraction

3.3. Assessment of extractions:

S.no	Extraction	Concentration of extractions selected (%)	Result of Anti-Microbial activity
	Ziziphus jujuba & Terminalia chebula	20% + 30%	No activity found
		50% + 30%	Activity found

Table 3 – Assessment of antimicrobial evaluation for extraction

3.4. Fabric Finishing with Ziziphus and Chebula extract:

Selecte d extract concent ration (%)	Mordant	Mordanting	M e t h o d	Dura tion of dippi ng (Hou rs)	Dr yin g	Dura tion of Dryi ng	Tempe rature (Celsi us)
50% Ziziphus + 30% Chebula	Alum	Meta mordanting	D i p - D r y	4hrs	Hot Air Oven	40mins	30°C

Table 4 – Finishing parameters of Ziziphus Jujuba and Terminalia Chebula extracts

3.5 Assessment of Ziziphus jujuba and Terminalia Chebula finished fabric:

3.5.1 Antimicrobial Activity of finished fabric:

Test organism used	Time Duration (Hours)	Sterilization method	Duration of Sterilization (Minutes)	Standard	Parameter	No. of Swatches	Bacterial reduction (%)
Escherichia Coli	24 hrs	UV Sterilize	10 mins	AATCC 100 - 2019	ATCC 25922	3	92.72 %
Staphylococcus Aureus	24 hrs	UV Sterilize	10 mins	AATCC 100 - 2019	ATCC 6538	3	90%

Table 5 – Antimicrobial activity evaluation for finished fabric

3.5.2. Wound Healing activity of finished fabric:

S. No	Test Parameters	Samples		Remark
		Tested Samples	Market samples (without any treatment normal sample)	
Wound Healing Activities				
A	Itching and irritation test	Nil	Itching and Irritation	Not recommended to use
B	Wound healing time	3 days	18 days and above	Tested sample is best in all its characteristics and curing fast and passes the test

Table 6 – Wound healing testing parameters for finished fabric

4. Result and Discussion:

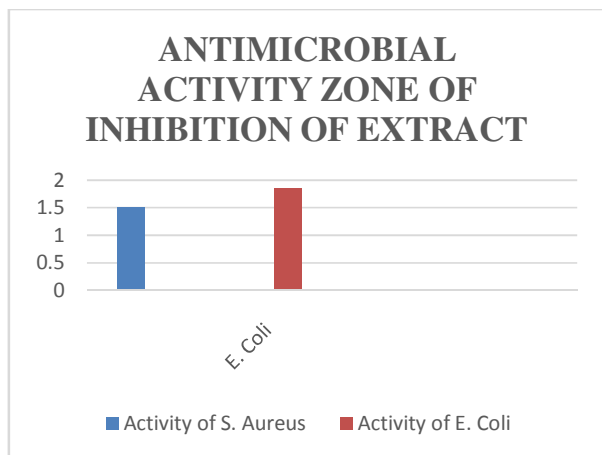


Chart 1 - Antimicrobial activity zone of inhibition of the extract

From the above chart 1, it is observed that the extract shows an antimicrobial activity zone of inhibition of the test organism Staphylococcus aureus and E. coli showed variations. The antimicrobial activity of the extract was analyzed using chemical test and observed Staphylococcus aureus with the value of 1.5cm, E. coli with the value of 1.85cm was found that E. coli has higher values of activity.

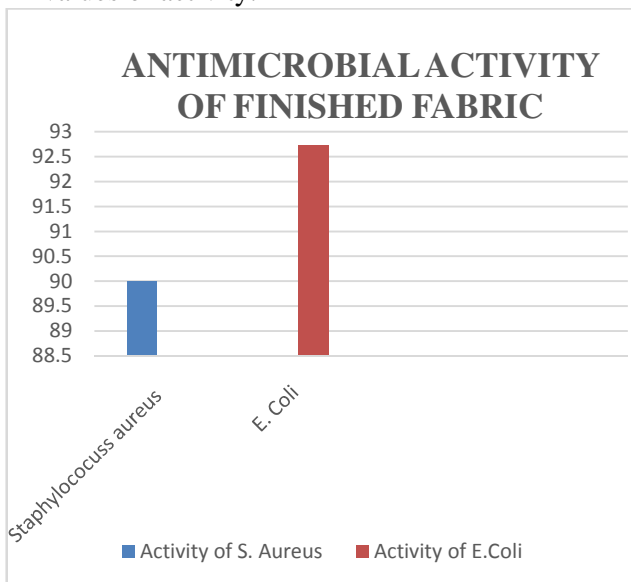


Chart 2 - Antimicrobial activity of finished fabric

From the above chart 2, it is observed that the extract shows an antimicrobial activity zone of inhibition of the test organism Staphylococcus aureus and E. coli showed variations. The antimicrobial activity of the extract was analyzed using chemical test and observed Staphylococcus aureus with the value of 90%, E. coli with the value of 92.72% was found that E. coli has higher values of activity.

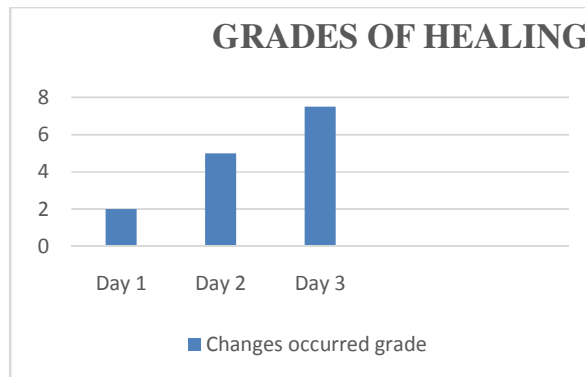


Chart 3 - Grades of wound healing of bandages

From the above chart 3, the developed bandages from the finished non – woven fabric has been tested and the scar healed at the end of 3rd days. The final product is curing wound faster and passes the wound healing characteristics i.e. no itching and no irritation caused. It has absorbency for 400%. It passes the disposability test and the sample is disintegrate, disposable and degradable with no side effects.

5. Conclusion:

Ziziphus Jujuba leaf extract has found to be resistant to microbes and possess wound healing property. Also Terminalia Chebula nut has found to be resistant to microbes and possess wound healing property. Both the extracted was tested using AATCC 100 test standard. Bamboo fabric is one of the most significant fabric that naturally resist UV radiation which is the most important factor that to be noted for cancer patients. Bamboo also possess high antioxidant activity, which also most important parameter to be noted for cancer patients. At the

end of the research it was found that the bamboo fabric which was finished using an extract of *Ziziphus Jujuba* and *Terminalia Chebula* had the ability to control antimicrobial activity and heal the BCC scars after treatment of chemotherapy.

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