IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

DEVELOPMENT OF DISPOSBLE HERBAL UNDER ARM PAD USING NATURAL AGRORESIDUAL MEDIUM

A.Divya[1], T.R.Indumathi[2]

1.B.Sc. Student, Department of Costume Design and Fashion, Dr.N.G.P. Arts and Science, Coimbatore, Tamil Nadu.

2. Assistant Professor, Department of Costume Design and Fashion, Dr.N.G.P. Arts and Science, Coimbatore, Tamil Nadu.

ABSTRACT

Although it generates discolouration and a damp sensation, sweating is a sign of health. The modern man looks for answers to these issues. The design, manufacture, and performance evaluation of a disposable herbal underarm pad are covered in this work. This pad is not designed to prevent sweating; rather, it absorbs sweat and provides a dry feel. The article is divided into three main parts. The first part discusses the design and production of the pad, including a brief history of disposable pads and their use in daily life. The second part analyses the performance of the new pad; it has a dry feel, does not discolour or cause sweat staining, and is comfortable during wear. Finally, the third section discusses possible future designs for disposable underarm pads. The underarm pad consists of nonwoven fabrics skin contact layer, natural fibre core finished with herbal extract and a biofilm made with *Manihot esculenta* starch. To evaluate the performance of the pad, both objective and subjective tests were performed. Thickness and absorption tests were performed for objective evaluation of product. Male and female test volunteers were used for the subjective evaluations. The test volunteers tried the pads on and assessed how well they fit and comfort with the body, whether they deformed while being worn, and whether they felt dry afterward. A questionnaire was also employed to examine the individuals' perspectives on the pads. It was then established that the underarm pads function well in terms of strength and absorption in addition to having a nice fit and feeling dry after use.

Key Words: Hyperhydrosis, Kenaf, *Azadiracta Indica*, *Nyctanthes Arbor-Tristis*, *Manihot esculenta*, disposable underarm pad.

1.INTRODUCTION

Kenaf, known as *Hibiscus cannabinus L.*, is an herbaceous annual plant that grows in a wide range of weather conditions, growing more than 3 m within 3 months . The highest growth rate may up to 10 cm/day [8]. The kenaf crop is a member of the malavaceae family and belongs to the genus *hibiscus*.Kenaf is one of the

type of gongura fibre. The stem of the kenaf plant is straight and is not branched along the stem. It is built up by bark and a core and it is a brittle fibre.Kenaf fibres show much resemblance with jute fibres and are therefore categorised as jute-like fibres by the FAO.[3]

Azadiracta indica A. (commonly known as neem), a member of Meliaceae family, is an Indian medicinal plant. neem has been highly successfully against harmful fungi, parasites and viruses.it has been most helpful in treating a variety of skin problems and diseases including psoriasis,eczema and other persistent conditions. These range from mild itching/redness (dermatitis) to fatal skin cancers and has posed a major health concern. It possesses anti-inflammatory, antibacterial, analgesic, antiviral, antifungal, immunomodulatory and antioxidant activities.[4]

Nyctanthes arbor-tristis is most important in local and traditional medicines especially in India for treating intermittent fevers and obstinate sciatica. *Nyctanthes arbor-tristis* Flowers contain modified diterpenoid nyctanthin, flavonoids, anthocyanins and an essential oil which is similar to that of jasmine.it used for Perfume and also it shows Ant-Bilious Antifilarial Anti-Inflammatory Antioxidant Diuretic Dyspepsia Ophthalmic Sedative activities.[5][6]

Sweating, also called perspiration, is the release of a salty liquid from the body's sweat glands. Sweat commonly appears under the arms, on the feet, and on the palms of the hands, and sweating is an essential function that helps the body stay cool. The number of sweat glands determines how much a person will sweat. The two types of sweat glands, eccrine sweat glands and apocrine sweat glands, produce different types of sweat and serve different purposes. These glands are mainly present in the armpits and around the genital area, and their activity is the main cause of sweat odour, which is caused by the bacteria that break down the organic compounds in the sweat from these glands[10]. Emotional stress increases the production of sweat from the apocrine glands, and the sweat present in the tubules is expelled. Thus, our proposed product is an alternative solution for people with sweating problems.

Underarm pads first appeared on the market as washable and disposable. Disposable hygiene products such as pads should have good and comfort properties and be aesthetically pleasing and protective. Designers of nonwoven hygiene products are faced with challenges such as wicking moisture to an absorbent layer where the liquid can be absorbed, distributed uniformly, and held inside the product. The edges of the pad are heat stacked to join the three layers together. The product contributes to personal hygiene. This study consisted of three parts: the design phase, the product performance phase and the design of a special material for hyperhydrosis patients. The negative effects of sweating, such as wetness, unpleasant odours, and stained garments, are undesirable. These methods are not convenient for everyone. Therefore, the objective of this research was to design and produce disposable user-friendly underarm pads capable of preventing the negative effects of sweating such as wetness, infections and garment discoloration and thereby reducing dry cleaning costs of expensive garments.

2. MATERIALS AND METHODS

2.1 Selection of Fabric (Upper Layer)

Plate 1:Cotton spunlace fabric

Winner Pure Cotton, one of the leading biodegradable non-woven fabric producers in China, can assist you in creating different spunlace non-woven fabric products for a range of applications, including sanitary usage, cosmetics use, and home care use, among others.[2]

2.2 Selection of Fibre (Middle (Core) layer)

Plate 2:Kenaf fibre

Raw kenaf got from **GO GREEN NATURAL PRODUCTS** - Natural Fibers, Synthetic Fiber Manufacturer from Chennai, Tamil Nadu, India.

Maximum length of fibre-2.5m. [1]

2.2.1 Softening Process

(Plate3:fibre boild with NaOH)

(Plate4:semi dried fibre)

(Plate5:fluffy fibre)

(Plate6:non-woven core material)

- Fibre chopped (maximum 25mm)before boiling with NaOH.
- NaOH dissolved in 1500 ml of water for 100 g of fibre. Raw kenaf fibre boiled for 3hours with NaOH in the ratio of 10:100(gram)and dry the fibre
- After dried grind the fibre for covert it into soft and fluffycore.
- It helps to increase absorbency and softening the fibre without any damage.
- Fibre converted into spunlace fabric using wetlaid method. core material is ready for finishing with herb.

2.3 Selection of Fabrication

2.3.1 Wet laid Non Woven

Spun lace is a non-woven product made using a manufacturing method where High-speed water jets are used in spun lacing to impact the fibre, causing the strands to entangle and form knots.High-pressure liquid stream is performed on the dry laid web, a nonwovens fabric is formed by entangling the staple fiber. Using this method a core fibre was converted into fabric.

2.4 SELECTION OF HERB

2.4.1 .Azadirachta Indica

Neem flower was dried and powdered. powder added to the boiled water and extracted. dip the core fabric into it and dry it in shadow.

Plate 7:*Azadirachta indica* (powder of flower)

2.4.2 Nyctanthes Arbor-Tristis

Plate 8 a: *Nyctanthes* flower 8b: flowers soaked in aqueous solution

For extracting essence soak the flower in aquous for 2 days. The well soaked flower filtered with white fabric.during filtration do not sqeeze the flower it may give a difference in fragrance essence.

The essence was sprayed on core fabric for fragrance and dry it in shadow.

2.4.3 Selection of Finishing Technique

Dip And Dry Method-using this method core fabric was finished with neem flower extract

Spraying Method-using this method core fabric was finished with *Nyctanthes* flower extract for fragrance.

2.5 Selection of **Bio film (Bottom Layer)**

Bio degradable cassava starch film for avoid sweat spreading on fabric. Purchased from **'REGENO'** Tirupur, Tamil Nadu.

2.6 Selection of Adhesive Tape

Fashion adhesive tape was used. Biodegradable and non-toxic adhesive.

Plate 9: Adhesive tape

2.8 DESIGN AND DEVELOPMENT OF PRODUCT

hieght of the design -4.9 inches

width on top of the design -3.7 inches

width on bottom of the design -3.1 inches

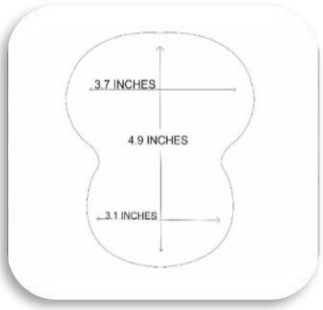


Fig 1:design Plate 10: product

2.9 Analysis of Finished product

Thickness test is an ultrasonic thickness gauge works by measuring how long it takes for a sound pulse to travel through a material and reflect from a internal surface, this is then displayed on a digital screen.

Wicking test is one of the test methods used to determine liquid moisture transmission performance of fabrics**.**

3.RESULT AND DISCUSSIONS

3.1. PHYSICAL TESTING

3.1.1 Thickness test

The thickness of the sample was tested and the results 18-20mm.

3.1.2 Wicking test

Sweat overproduction must be absorbed and contained by the absorbent layer. The length of time that a pad's absorption capability should last is specified (6-9 hours).

3.2 ANTIMICROBIAL TEST

3.2.1 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 incubator and fungal cultures were incubated at 27°c for 3-5 days. Each suspension of test organism was subsequently stroke out on nutrient agar media and pota6to dextrose agar. Bacterial cultures then incubated at 37°c for 24 hours and fungal incubated at 27°c for 3-5 days. A single colony was transferred to nutrient agar media slants were incubated at 37°c for 24 hours and potato dextrose slant were incubated at 27°c for 3-5 days. 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 18-20 hours for bacterial culture.

Well Diffusion method

The antibacterial activity and antifungal activity of crude extract extracts was determined by Well Diffusion method (Bauer *et al*., 1996). MHA plates were prepared by pouring 20ml of molten media into sterile petriplates. After solidification of media, 20-25µl suspension of bacterial inoculums was swabbed uniformly. The sterile paper discs were dipped into required solvents then placed in agar plates. Then 10-50 µl of plant extract was poured into the wells. After that, the plates were incubated at 37°C for 24 hours. Assay was carried into triplicates and control plates were also maintained. Zone of inhibition was measured from the edge of the well to the zone in mm. The tested cell suspension was spread on mullerhinton agar 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 24 hours and control was also maintained. Zone of inhibition was measured from the clear zone in mm.

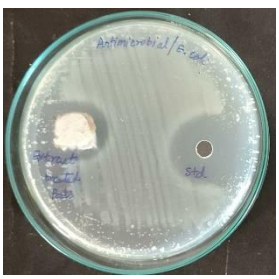
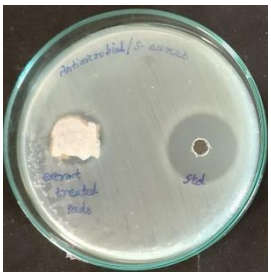
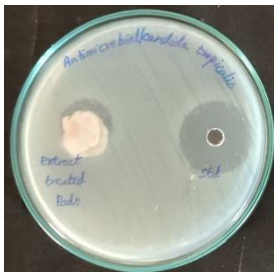
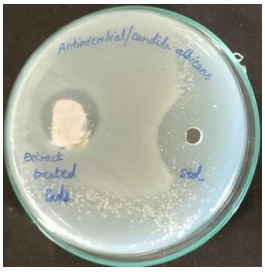





Plate11:*E.coli* Plate12:*S.aureus* Plate13:*candida tropicalies* Plate14:*candida albicans*

Antibacterial activity was performed by agar diffusion method. Van der Watt *et al.*, 2001. The stock culture of bacteria*(E.coli* and *Candida albicans)* were received by inoculating in nutrient broth media and grown at 37 % for 18 hours. The agar plates of the above media were prepared. Each plates was inoculated with 18 hours old cultures the bacteria were swab in the sterile plates. Placed the extract treated cloth and untreated cloths were placed. All the plates were incubated at 37ºC for 24 hours 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 concentrations or plant extracts against Gram positive, Gram negative bacteria. The extracts exhibited antibacterial activities against tested microorganisms.

Organisms	***E.Coli***	***S.aureus***	***Candida albicans***	***Candida tropicalies***
Extract treated cloth	0.8 cm	0.5	0.7 cm	0.7 cm
Standard (Bacteria-Chloramphenicol) Fugues-Fluconazole	1.0 cm	1.0 cm	0.9 cm	1.0 cm

The result find extract treated cloth having antibacterial activity against the *E.Coli* and *Staphylococcus aureus.* Also extract treated cloth having anti-microbial activity against the *Candida albicans* and *Candida tropicalies.* The result shows the given specimen shows Anti-microbial activity.

5.2.2.CYTOTOXICITY ACTIVITY:

Cell line

The human skin cell was obtained from National Centre for Cell Science (NCCS), Pune and grown in Eagles Minimum Essential Medium containing 10% fetal bovine serum (FBS). The cells were maintained at 37^0C, 5% CO2, 95% air and 100% relative humidity. Maintenance cultures were passaged weekly, and the culture medium was changed twice a week.

Cell treatment procedure

The monolayer cells were detached with trypsin-ethylene diamine tetra acetic acid (EDTA) to make single cell suspensions and viable cells were counted using a hemocytometer and diluted with medium containing 5% FBS to give final density of $1x10^5$ cells/ml. One hundred microlitres per well of cell suspension were seeded into 96-well plates at plating density of 10,000 cells/well and incubated to allow for cell attachment at 37^0C, 5% CO_2, 95% air and 100% relative humidity. After 24 h the cells were treated with serial concentrations of the test samples. They were initially dissolved in neat dimethylsulfoxide (DMSO) and an aliquot of the sample solution was diluted to twice the desired final maximum test concentration with serum free medium. Additional four serial dilutions were made to provide a total of five sample concentrations. Aliquots of 100 µl of these different sample dilutions were added to the appropriate wells already containing 100 µl of medium, resulting in the required final sample concentrations. Following sample addition, the plates were incubated for

an additional 48 h at 37^0C, 5% CO_2, 95% air and 100% relative humidity. The medium containing without samples were served as control and triplicate was maintained for all concentrations.

MTT assay

3-[4,5-dimethylthiazol-2-yl]2,5-diphenyltetrazolium bromide (MTT) is a yellow water soluble tetrazolium salt. A mitochondrial enzyme in living cells, succinate-dehydrogenase, cleaves the tetrazolium ring, converting the MTT to an insoluble purple formazan. Therefore, the amount of formazan produced is directly proportional to the number of viable cells.

After 48 h of incubation, 15µl of MTT (5mg/ml) in phosphate buffered saline (PBS) was added to each well and incubated at 37^0C for 4h. The medium with MTT was then flicked off and the formed formazan crystals were solubilized in 100µl of DMSO and then measured the absorbance at 570 nm using micro plate reader.

The percentage cell viability was then calculated with respect to control as follows

% Cell viability = [A] Test / [A]control x 100

The % cell inhibition was determined using the following formula. % Cell Inhibition = 100- Abs (sample)/Abs (control) x100.

Nonlinear regression graph was plotted between % Cell inhibition and Log concentration and IC50 was determined using Graph Pad Prism software.

Control

Treated

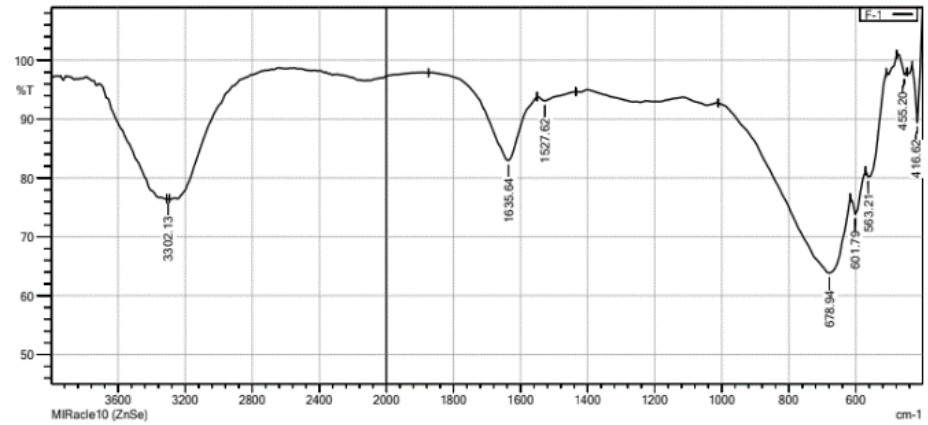
Cytotoxicity report:

The given cloths are treated with normal Human Skin Cell lines. The given specimen shows non toxic for human skin cells. The report is recommended to using the following specimen for human consumption

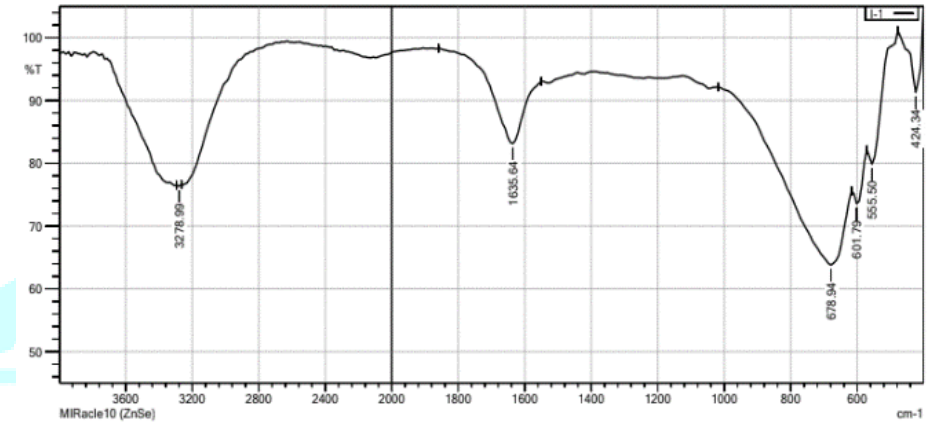
FTIR T:

The given Sample-I heaving 8 Peaks are present and sample-II Present 6 compounds are present. Peaks are representing the Active sites or Active components are present In given Plant extract. Due to the presence of Active components responsible for Antimicrobial properties.

Azadiracta indica **(Table-1)**



Nyctanthes arbor-tristis **(Table-2)**



FTIR –ANALYSIS

Azadirachta indica

The FTIR spectra peaks of *Azadirachta indica* (neem flower)extract mediated were observed at 3302.13cm^{-1} indicates(N-H stretching vibration)alphatic primary amine;1635.61cm^{-1} indicates (C=C,N-H stretching vibration)conjugated alkene and amine;1527.62cm^{-1} indicates (N-O stretching vibration) Nitro compounds;678.94cm^{-1} indicates (C-Br stretching vibration, C=C bending vibration)halo compound and alkene.

Nyctanthes arbor-tristis

The FTIR spectra peaks of *Nyctanthes arbor-tristis*(flower) extract mediated were observed at 3.278.99cm^{-1} indicates (O-H stretch)alcoholic compound;1635.64cm^{-1} indicates (C=C,N-H stretch) conjucated alkene and amine;678.94cm^{-1} indicates (C-Br,C=C stretch)halo compound and alkene.

6.**CONCLUSION**

Thus the under arm pad has been developed and tested according to AATCC Standards. this pad posses anti microbial,cytotoxity properties. These are cheaper and eco friendly product that are sustainable as well as hygienic . these pads do contain hydrophobic layer . developed under arm pad uses cotton and kenaf, hence it is very cost effective. No chemicals are used in this pad and the development process also. Hence it is the healthier and cheaper option for both men and women.

REFERENCES:

1. https://www.indiamart.com/go-greenproducts-chennai/?utm_campaign=imob_company_share&utm_medium=social&utm_source=social
2. https://amzn.eu/d/5VNPXdf
3. panelRozyanty Rahman, Syed Zhafer Firdaus Syed Putra.Tensile properties of natural and synthetic fiber-reinforced polymer composites**.**
4. Kapoor LD et al. Survey of Indian plants for saponins, alkaloids and flavonoids, II, Lloydia. 1971;34:94.
5. Sandhya Kumari TD et al. Antioxidant and Anticancer Activities of Nyctanthes Arbor-Tristis, International Journal of Pharmacy and Pharmaceutical Sciences.(2012; 4(4):212-15).
6. https://www.florajournal.com/archives/2016/vol4issue4/PartA/4-5-2-720.pdf
7. Istanbul Technical University, Architecture Faculty, Department of Industrial Product Design, Istanbul, Turkey
8. MS, RM, MFA, and ZM designed the experiments. MS, DA, MFA, and MZA performed the experiments. ZM supervised the work. MS, RM, and ZM wrote the paper (original draft, reviewing, and editing). All of the authors analyzed the datahttps://www.frontiersin.org/articles/10.3389/fmats.2020.00026/full
9. G. Nerkar, Professor, Editor in Chief, Current Trends in Pharmacy and Pharmaceutical Chemistry G. S. Chakraborthy, Professor and Principal.
10. https://dergipark.org.tr/en/pub/tekstilvekonfeksiyon/issue/24761/261747