

Herbal Handkerchief as an Remedy for Community Acquired Methicillin Resistant Staphylococcus Aureus

VIMALIN HENA J., SUDHA S.S., KAVITHA S., PADMANABHAN D., ASARUDEEN A.

INTRODUCTION

Community acquired MRSA is a silent killer pathogen which is afflicting the school going children from the age of 5-10 years. Treatment of this nasal colonizer is very difficult as they are found to be resistant to almost all of the commonly used antibiotics. So it is necessary to search for a remedy which will be more effective and also ecofriendly. At this present scenario the importance for herbal textiles has been increased considerably. So the main scope of this research is to develop Handkerchief by applying herbs on the fabric which are found to have antibacterial activity against CAMRSA so that as in schools pinning of kerchiefs is a must so this act may prevent the spread of CAMRSA.

In this research work natural medicinal herb neem was extracted and treated on cotton fabrics of knitted, woven and non oven by three techniques such as direct application, pad dry-cure process and micro encapsulation technique. The developed herbal fabric was tested as per AATCC standard (American Association of Textile Chemist and Colourist) such as parallel streak method (AATCC test method 147-1988)⁶, Hohenstein modified test method challenge test (JISL 1902) and wash durability test using the herbal treated curative fabric, one curative product was designed and that was neem- Handkerchief (face wiper). There is a tremendous scope for this novel concept of curative garments in future.

J. Vimalin Hena,
Dr. S.S. Sudha,
S. Kavitha
D. Padmanabhan,
A. Asarudeen,
Hindusthan College of Arts and Science,
Hindusthan Gardens, Behind Navaindia,
Coimbatore - 28.

Specialty Contributed to 'The Antiseptic'
Vol. 10 No. 11 & P: 557 - 559

Neem

The biological name of neem is *Azadiracta indica* and it belongs to the family of *Maliaceae*. The bark, leaves, flowers, seeds, oil of this plant has been used for treating various ailments in traditional medicine. The leaves contain nimbin, nimbinene, 6-desacetyl nimbinene, nimbandiol, nimbolide and quercetin. They are useful in vitiated conditions of pitta, burning, sensation, leprosy, skin diseases, leucoderma, pruritus, ulcers, boils and eczema. The leaves and its constituents have been demonstrated to exhibit immunomodulatory, anti-inflammatory, anti-hyper glycaemic, anti-oxidant, anti-mutagenic and anti-carcinogenic property.

MATERIALS AND METHODS

Culture: Staphylococcus aureus

Fabric Selection

100% gray cotton fabrics of knitted, woven and non woven were used for the study. They have been chosen for applying the antimicrobial agents with a view to assess the versatility and wide applicability of the agents. At all stages of the fabric development eco friendly process was adopted without using any chemicals.

Identification and Selection of Medicinal Herb

The neem plant was identified and collected from Tamilnadu Agricultural University (TNAU) Coimbatore based on its standard property.

Methodology to Obtain Neem Extract

Aqueous and solvent Extraction (Methanol)

Fresh plants got were washed in distilled water and the leaves alone were plucked carefully from the plant. Infected leaves were avoided and only healthy leaves were collected and dried at room temperature and then powdered and stored at 4°C in

a stoppered bottle and this was used for further testing³.

Extraction of Aqueous Component Cold Aqueous Extraction

10g of each flower and leaves air dried powder was weighed and soaked separately in 50ml cold water in a conical flask stoppered with rubber cork and left undisturbed for 24 hrs and then filtered off using sterile filter paper (what man no: 1) into a sterile conical flask and subjected to water bath evaporation, where the aqueous solvent was evaporated at its boiling temperature 100°C. The extract was got with the help of muslin cloth and was subjected to centrifugation at 5000Xg for 5 mts and the supernatant was obtained and stored at 4°C for further use.

Hot Aqueous Extract

10g of each flower and leaves air dried powder was weighed and soaked separately in 50 ml of hot water which was then boiled for 30 mts and kept in a conical flask for 24 hrs undisturbed and then filtered off using sterile filter paper in a sterile conical flask and subjected to water bath evaporation, where the aqueous solvent was evaporated at its boiling temperature 100°C. The extract was got with the help of a muslin cloth and was subjected to centrifugation 5000Xg for mts and the supernatant was stored at 4°C for further use.

Solvent Extraction

Methanol Extract

10g of each leaf and flower air dried powder was weight and was placed in 100ml of organic solvent (methanol) in a conical flask and then kept in a rotary shaker at 190-220 rpm for 24 hrs after 24 hrs it was filtered with the help of muslin cloth and centrifuged at 5000Xg for 15 mts. The supernatant was collected and

the solvent was evaporated to make the final volume of one-fourth of the original volume, giving a concentration of 40 mg/0.1ml. It was stored at 40°C in air tight bottles for further studies.

Antibacterial Assesment of the Neem Extract

Anti bacterial assay was performed by two methods

1. Agar Disk Diffusion

In the agar disk diffusion method the test compound ie the flower and leaves aqueous and organic extract were introduced into a disk 0.7cm (hi-media) and then allowed to dry. Thus the disk was completely saturated with the test compound. Then these disks were placed directly on the surface of MHA plates swabbed with the test organism and the plates were incubated at 37°C for 24 hrs⁴.

2. Agar Well Diffusion Method

Muller Hinton agar plates were prepared and wells of 6mm were cut and swabbed with different cultures and the cut wells were then filled with 50µl of both aqueous and solvent extracts of flowers and leaves separately and the plates were kept for incubation at 37°C for 24 hrs².

Satisfactory result was obtained from the neem extract so it was used for the application onto the cotton fabric.

Application of Neem Extract on Cotton Fabric

The neem extract was treated on cotton fabric of knitted, oven and non oven using three techniques.

1. Direct application
2. Pad-dry cure process
3. Micro encapsulation

Direct application method:

In this method the herb is directly packed in between the layers of fabric and designed.

Pad-dry cure process:

A solution which has got neem extract to 10% of fabric weight, material liquor ratio of 1:10, wet pick up of 75% fabric weight was prepared and the fabric impregnated in the finishing solution for 5 mts at room temperature. The fabric was padded

by the three soft padding machines for 2mts and after padding, the fabrics were taken, dried and cured⁸.

Micro Encapsulation Method

The micro capsules are produced using neem extract and alginate 3% of herb extract was added to the polymer solution and mixed thoroughly to form smooth viscous dispersions. This was sprayed in to 0.5m calcium chloride solution by means of a sprayer. The droplets were retained in calcium chloride for 15mts. The microcapsules were obtained by decanting and repeated washing with isopropyl alcohol followed by drying the neem extract mixed with sodium alginate to form gel was put into the feed of the spraying gun and was then attached to the air compressor to shoot fine capsules into the calcium chloride solution.

The prepared microcapsules was applied on the fabric material by laboratory scale padding mangle. In this method a solution with ML ratio of 1:10, citric acid-2gms/100ml and equal volume of water was added and the fabric was immersed in and worked for 30mts at 50°C. Citric acid is used as a fixing agent. After finishing time the fabric was removed, squeezed and dried in an oven and cured.

Antibacterial Activity of Neem Coated Fabric

According to ATCC standards the neem coated fabric was assed qualitatively for Antibacterial activity using three different methods

1. Agar diffusion test
2. Parallel streak method
3. Wash durability test

Agar diffusion test:

In this method swatch of the neem coated test fabric (20mm dm) with round shape was placed in intimate contact onto the surface of MHA which was swabbed with the test culture broth (CAMRSA). And the plate was incubated at 37°C for 24 hrs. After the period of incubation the plate was observed for zone of inhibition around the swatch of fabric.

Parallel streak method:

The neem extract finished fabric is the test material which was placed

centrally onto the surface of the MHA and onto both sides of the fabric parallel line streaking of the test organism was done and the plates were incubated at 37°C for 24 hrs after the period of incubation, the zone of inhibition was observed.

Wash durability test:

This test is done to know the ash durability of the neem coated fabric. This is done to provide a standard of performance for any textile item. The flat fabric specimen was subjected to standard home laundering practices and a choice was provided for hand and machine washing by altering machine wash cycles and temperature and alternative drying process. Evaluation was preformed in comparison with appropriate reference standard.

Design and Development of Curative product Neem Hand Kerchief

On the basis of the results obtained from the various test's the neem extract was found to have a higher percentage of antibacterial activity and a sample of the curative product (Hand kerchief) was designed and developed. The product has to undergo clinical trials to use it at a larger scale in an ecofriendly manner.

RESULT AND DISCUSSION:

Cotton fiber is preferred for the study as it is the predominant fiber in the fashion area favored for its natural comfort & aesthetic appeal so 100% cotton fabrics of knitted woren & non-woren were selected for the study⁴.

Neem herb is chosen as they have been used traditionally for the treatment of inflammations, infections, fever, skin diseases and dental disorders (Ref)he test organism *Staphylococcus aureus* is sensitive to the Aqueous neem extract by both of the diffusion methods and is shown in Table:1 The test organism *Staphylococcus aureus* is sensitive to the Methanol neem extract by both of the diffusion methods and is shown in Table:2

The activity of neem in the coated fabric too was assayed by agar diffusion and parallel streak method

Table 1: Antibacterial activity of aqueous neem extract

S No	Test organism	Aqueous Neem extract	
		Agar Disk Diffusion	Agar well Diffusion
1	<i>Staphylococcus aureus</i>	+	+

T

Table 2: Antibacterial activity of organic (Methanol) neem extract.

S No	Test organism	Methanol Neem extract	
		Agar Disk Diffusion	Agar well Diffusion
1	<i>Staphylococcus aureus</i>	+	+

Table 3: Antibacterial activity of neem coated fabric.

S No	Test organism	Antibacterial Activity	
		Agar Diffusion	Parallel streak method
1	<i>Staphylococcus aureus</i>	+	+

in which the activity was still specific and this confirms that neem is a good choice to prepare an herbal curative product. The fabric two was assayed for its durability by performing the wash durability test^{5,7}.

From the preliminary screening, we have identified that the aqueous and methanolic extracts of neem has got antibacterial activity against the Community Acquired Methicillin Resistant *Staphylococcus aureus* and so it has been used in preparing a herbal handkerchief which can be used as a preventive measure in the spread of CAMRSA.

REFERENCES:

1. Farombi E.O African indigenous plant with chemotherapeutic potential and

biotechnological approval to the production of bioactive prophylactic agent African Biotech 2:662-667,2003.

2. Ekpendu to, Akshomejee A A, Okogun J1 1994. Anti inflammatory antimicrobial activity. Lett Appl microbial 30: 379-384.

3. Olukoya DK, Idika. N, odugbemi T 1993. Antibacterial activity of some medicinal plant form Nigeria J. Ethnopharmacol 39:69-72.

4. ATTCC manual, Test method-30,1979, Antibacterial activity of fabrics, Defaction of: Agar plate method ,North carolina, 1979.

5. ATTCC manual, Teat method- 100, 1981, Antibacterial finishes on faberics, North carolina, 1986.

6. ATTCC manual, Test method – 124, 1984, Appearance of durable press fabrics after repeated home launderings, North carolina, 1986.

7. The lagarath, G.Kirshna Bala,S.,(2007), "Microencapsulation of herbal extracts for microbial resistance in health care textiles' Indian journal for fibber and Research, Vol.32, No.3, September, P.351.

8. Sunita Dixit and Alra goel, (2007), 'Microencapsulation in textile processing-an overview', Asian Textile journal, Vol.16, No.7,July, P.83.



Start sitting on a bed and turn your head 45° to the right. Place a pillow behind you so that on lying back it will be under your shoulders.

Lie back quickly with shoulders on the pillow and head reclined onto the bed. Wait for 30 seconds.

Turn your head 90° to the left (without raising it) and wait again for 30 seconds.

Turn your body and head another 90° to the left and wait for another 30 seconds.

Sit up on the left side.

Epley manoeuvre

EBM Jul.-Aug.08

All obese patients should receive glitazone, unless contraindicated, to achieve better glycemic control and apprehension of wt gain must be on strict medical supervision
 American Diabetes Association, 68th Scientific Sessions 2008.

ADA-08