

A Study of Neem Finish on Beetroot Dyedkhadi Fabric

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ABSTRACT

Antimicrobial finishes on textile are functionally active textile, which may kill or inhibit the growth of bacteria. The Present research aim is to impart antimicrobial finish on dyed khadi fabric by applying Neem Extract. Neem is one of most useful medicine plant and widely available in India. Dyeing treatment on khadi fabric with beetroot dyes has already been produced in our previous work with satisfactory results. The Present Research article main aim to enhance the antimicrobial activity of dyed khadi fabric by using Neem extract which shows antimicrobial activity against two microorganisms *Staphylococcus aureus* and *Escherichia coli*. The finishing application of Neem extraction was carried out with citric acid and acetic acid as cross-linking agent. Neem Powder extracted by followed ethanol and aqueous extraction method and also the finished samples has been analyzed for their durability of the finish by standard methods. There were no bacteria found on the surface of the treated fabrics and shows an appreciable zone of inhibition against *Staphylococcus aureus* and *Escherichia coli*. The combinatorial plant extracts of beet root and neem, show a very good zone of inhibition when compared to individually. Ethanol neem extract powder showed better antimicrobial activity. Furthermore detailed investigation of antimicrobial activity discussed in next sections of the article.

Keywords: *Natural Dye, Beetroot, Khadi, Neem, Antimicrobial.*

INTRODUCTION

Health and hygiene is getting more concerning in today's world. Textiles are greatly involved to maintain good health and hygiene (Thilagavathi, G. & Rajendra kumar, K. 2005). Textiles materials such as cotton are prone to degrade due to various microbial attacks and can cause bad odours and health related problems. Antimicrobial finish on textiles can protect the wearer against the microbes ((Kavitha, S., Annapoorani, G. S. & Shanthi. 2014). A number of Indian herbs do contain antifungal, antiviral and antibacterial properties. Neem, which is widely available in India, has good medicinal values (Ayekpam, J. & Vasugi, N. 2020). It is typically grown in tropical and semi-tropical region. *Azadirachta indica* (Neem) is a tree in the mahogany family Meliaceae (Ahmed, A., Azad, H. & Hashmat, I. 2012). Neem is also named Indian Lilac and Margosa. Neem trees now also grow in islands located in the southern part of Iran. Its fruits and seeds are the source of neem oil (Roshan, A. and Verma, K. N. 2015). The neem plant has enormous properties and various applications. Parts of neem tree are applied directly on wound or skin as paste for wound healing and skin care. The bark, leaves, root and stem of plants can be used for special purposes. They are cheap and can be used as raw material for required application (Soe, A. A. & Tun, O. 2019). Neem is anti-allergic, anti-scabic, anti-inflammatory, insecticidal and with other natural biological activity. In our study we have studied the dye ability of beetroot dyes on cotton fabric followed by application of neem finish for antimicrobial activity.

LITERATURE REVIEW

Extraction of Neem Twigs Fibre

It has been told in this paper that neem was a natural ingredient and does not harm humans, birds as well as insects. Neem is a medicinal plant and easily found everywhere in India. Neem twigs fibre had been extracted from the neem twigs by the process of water retting. The pool retted fiber showed antibacterial activity and several functional groups like Esters, Fluorides functional group, Alkali (C-H group) (Ayekpam, J. & Vasugi, N. 2020).

Extraction and application of antimicrobial agents using neem and siriyanagai leaves for home furnishing

In this study extraction was taken from siriyanagai and neem leaves. In this study, it was found that both neem and siriyanagai leave treated sample were found to be having antimicrobial activity against Staphylococcus aureus and Escherichia coli (Kavitha, S., Annapoorani, G. S. &Shanthi. 2014).

Development of eco-friendly antimicrobial textile finishes using herbs

Many herbs had been used in this paper for antimicrobial test such as Neem leaves, tulsi leaves, prickly chaff flower and pomegranate rind. Neem leaves had been maximum antimicrobial activity against both Staphylococcus aureus and Escherichia coli than other herbs. Pomegranate and prickly chaff flower have lower antimicrobial activity than neem. Antimicrobial activity of tulsi leaves was in medium range (Thilagavathi, G., Rajendrakumar, K. &Rajendran, R. 2005).

MATERIAL AND METHODS

Material selection and sourcing:

- a) Beetroot powder was procured from Amazing Enterprise, Bangalore.
- b) Khadi fabric is taken from Khadi Ashram, Panipat. With following fabric specifications: GSM-140, Thread count-16, EPI-60 and PPI-40.
- c) Neem powder already obtained from Amazing Enterprise, Bangalore.
- d) Ethanol obtained from ChangshuHongsheng fine Chemical Co., Ltd.
- e) Citric acid and Acetic acid obtained from Thermo Fisher Scientific India Pvt. Ltd.

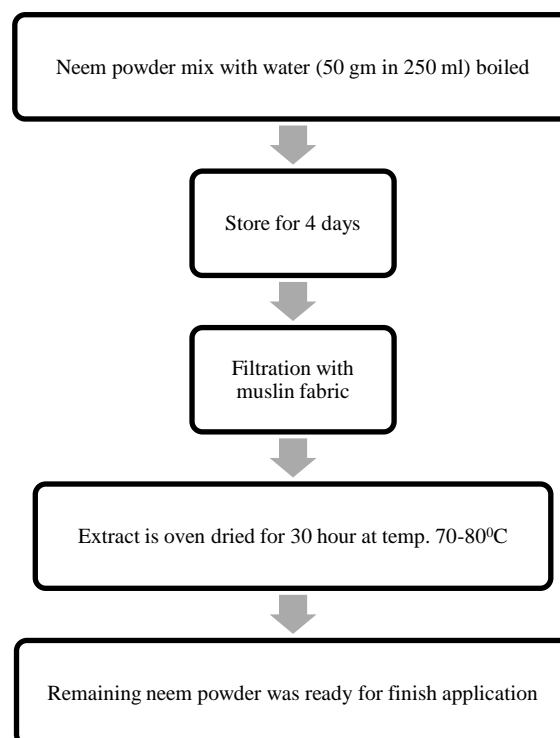
Dye Application method

Optimized Beta vulgaris dyeing recipe and dyeing conditions as applied on khadi fabric using water bath shaker machine are listed below:

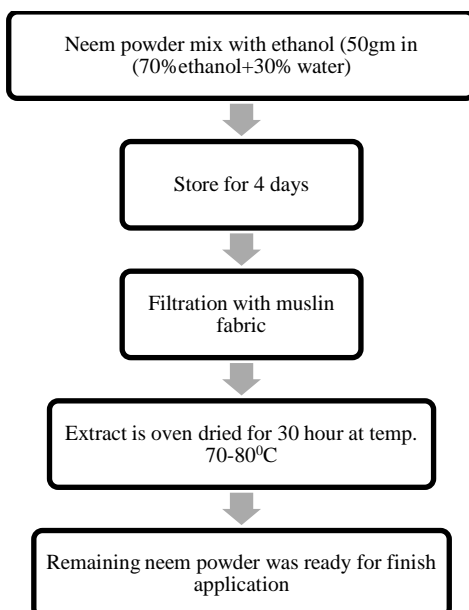
MLR	: 1:40
Beta vulgaris	: 25 gpl
pH	: 5-6.5
Temp.	: 90 ⁰ C
Time	: 60 min.

Extraction method of neem

a) Water Extraction



b) Ethanol Extraction



Method of Application of Neem finish



Antimicrobial finish on khadi fabric carried out by using pad-dry-cure method. Firstly, the khadi fabric was immersed into the neem extracted solution of 7 g/l for 15 minutes. Acetic acid was added to maintain the level of pH 5.5. Material to liquor ratio was of 1:30 used based on the weight of fabric. After that fabric is taken out and padded on auto padder mangle. The fabric is then dried at 80°C for 5 minutes and cured at 120°C for 3 minutes on oven. To achieve the better antimicrobial activity on the treated khadi fabric, 10% citric acid based on the weight of the sample are used as cross-linking agent.

Preparation of treated sample and Discs for Antimicrobial Activity test

The antimicrobial activity of treated khadi fabric is determined by agar disc diffusion method. Casein acid hydrosate (17.2 g), Beef Extract Powder (2 g), Starch (1.5 g), Agar (17 g) are dissolved in 1000 ml distilled water. All flasks are autoclaved at 121°C for 20 minutes and cooled in a 45 to 50°C water bath. Pour the freshly prepared and cooled medium into glass or plastic, flat-bottomed Petri dishes on a level, horizontal surface to give a uniform depth of approximately 4 mm. This corresponds to 60 to 70 ml of medium for plates with diameter of 150mm and 25 to 30 ml for plates with a diameter of 100 mm. The agar medium should be allowed to cool to room temperature. After cooling, bacteria suspension of each bacterial strain (0.02 ml) is added and poured into sterilized Petri dishes. A representative sample of each batch of plates should be examined for sterility by incubating at 30 to 35°C for 24 hours or longer. After overnight incubation, antibacterial activity of each treated sample is determined.

RESULT OF ANTIBACTERIAL TESTING BY MUELLER-HINTON AGAR METHOD

Antibacterial testing of *Azadirachta indica* (neem) extracted dye was performed via Muller-Hilton agar method against *E. Coli* & *Staphylococcus*. The result of the antibacterial testing was shown in Fig. 4.1 as below:

Sr. No.	Applying method	Antimicrobial activity	Sample
1	Disk Diffusion	<i>Staphylococcus aureus</i>	
2	Disk Diffusion	<i>Staphylococcus aureus</i>	



3	Disk Diffusion	E.Coli	
4	Disk Diffusion	E.Col	

Fig.1 Result of antibacterial testing by Mueller-Hinton Agar Method against E.Coli & Staphylococcus aureus.

It can be observed from antimicrobial testing that neem extracted in water as well as ethanol, both shows antimicrobial activities. It is pertinent to mention that neem extracted in ethanol and finishing with neem extracts with citric acid as cross linking agent has shown antimicrobial activity. In one study the same thing was found that neem finishing with citric acid was showing better antimicrobial activity. It can be observed that beetroot extracts also give good antibacterial activities.

CONCLUSION

From this study, it has been shown that phytonutrients of neem powder extract contains active components which shows antimicrobial activity against two micro organisms Staphylococcus aureus and Escherichia coli. According to the study, it can be concluded that ethanol extracted neem powder shows better results in antimicrobial activity than water extraction of neem powder. The neem extract finish with citric acid showed better antimicrobial activity. It can also be concluded that treated fabric will protect the skin of wearer.

REFERENCES

- [1]. Abdulzahra, D.M. & Mohammed, F.H. 2014. The Antibacterial Effect of Ginger and Garlic Extracts on some Pathogenic Bacteria Isolated from Patients with Otitis Media. *Int. Res. J. Medical Sci.*, vol. 2(5), pp 1-5.
- [2]. Ahmed, A., Azad, H. & Hashmat, I. 2012. Neem (*Azadirachta indica* A. Juss) - A Nature's Drugstore: An overview. *International Research Journal of Biological Sciences*, vol. 1(6), pp- 76-79.
- [3]. Ahmad, M, Prawez, S., Sultana, M., Raina, R., Pankaj, K.N., Verma, K.P., Rahman, S., 2014. Anti-Hyperglycemic, Anti-Hyperlipidemic and Antioxidant Potential of Alcoholic-Extract of *Sidacordifolia* (Areal Part) in Streptozotocin-Induced-Diabetes in Wistar-Rats, vol. 84, pp 397-405.
- [4]. Ayekpam, J. & Vasugi, N. 2020. Extraction of Neem Twigs Fiber, *SSRG-IJPTE*, volume 7, issue I.
- [5]. Baishya, D., Talukdar, J., and Sandhya, S. 2010. Cotton dyeing with natural dye extracted from flower of Bottlebrush (*Callistemon Citrinus*), vol. 2, pp 377-382.
- [6]. Chairman, K., Jayamala, M., Vijila, C.R., Ranjit, S. 2015. Phytochemical screening and antimicrobial activity of curcuma longa natural dye, *general medicine: Open access*, chairman, et al. general, vol. 3, pp 1567-1572.
- [7]. Chethan, K. K. V., Sukesh & Chandrashekar, K.R., 2011. Inoculation effect of different arbuscular mycorrhizal fungi on growth of *Sidacordifolia*, *Journal of agricultural technology*, vol. 7, pp 1313-1320.
- [8]. Girish, K. and Shankara, B. S. 2008. Neem – A Green Treasure, *Electronic Journal of Biology*, vol. 4(3), pp 102-111.
- [9]. Prusty, A.K., Das, T., Nayak, A., & Das, N.B. 2010. Colourimetric analysis and antimicrobial study of natural dyes and dyed silk, *Journal of Cleaner Production*, vol. 18, pp 16-17.
- [10]. Roshan, A. and Verma, K. N. 2015. A brief study on neem (*Azadirachta indica* A.) and its application- A review, *Research Journal of Phytomedicine*.
- [11]. Elvam, R.M., Singh, A.J.A., Ranjit, Kalirajan, K. 2010. Antifungal activity of different natural dyes against traditional products affected fungal pathogens, vol. 18, pp 1750-1756.
- [12]. Thilagavathi, G. & Rajendrakumar, K. 2005. Development of ecofriendly antimicrobial textile finishes using herbs, *Indian Journal of Fibre & Textile Research*, volume 30, pp 431-436.