
Introduction

1. INTRODUCTION

Textiles are an integral part of everyone's life. It has grown to modify every atom of a fibre, yarn and fabric extensively in the field of medicine, health care products and in the technical textile sector. Textiles are developing into interdisciplinary high-tech products with interesting changes. At the beginning, the growth of textiles had its eye over economical and functional needs, but in the era of innovative textiles, there is an increasing demand for safety and healthcare textiles. Health and hygiene are the primary requirements for human beings to live comfortably and to work with maximum efficiency. The highest level of hygiene is sometimes difficult to achieve because of microorganisms, which are a part of our everyday life. The human pathogenic microbes like bacteria, fungi, viruses and nematodes can cause serious infections in people. The human symptoms of microbial exposure are an array of physical and systemic reactions affecting the skin, mucous membranes, eyes, upper and lower respiratory tracts and muscles. These reactions can be either short or long term, acute or chronic affecting health and well being of humans, as stated by White (2009). Antibiotics play a vital role in curing all the diseases caused by the environment. Since the infections caused by bacteria have become resistant to commonly used antibiotics, it has become a major global health care problem in the 21st century, as remarked by Saikia et al. (2008).

Health care associated infections are due to transmission of diseases from patients to healthcare workers and vice versa. Many harmful organisms of blood borne bacteria and viruses such as *Pseudomonas*, *Candida*, *S. aureus* and *E. Coli* are present in hospital locations which are conducive for growth of the microorganisms, as expressed by Thilagavathi and Kannaian (2008). The bacteria population doubles every 20 to 30 minutes under ideal conditions, killing almost 50,000 people every day. This situation is alarming both in developing and developed countries, as revealed by Velmurugan et al. (2010). Today's health care professionals prefer a healthy environment to treat their patients, as reported by Chaudhary and Borkar (2009). The textiles have the potential to be suitable barriers but they are also affected by the microorganisms. Garments of healthcare workers are a significant contributor to the spread of infections since they are easily contaminated, as revealed by Fattah et al. (2010) and Gao and Cranston (2008).

In order to protect mankind from pathogens and to avoid cross infection, a special durable hygienic antimicrobial protection finish has to be applied on the textile materials, as remarked by Vyas et al. (2010). The antimicrobial finishes are recognized as very beneficial in preventing bio-deterioration of technical textiles particularly natural fibers from moulds, mildew or rot inducing fungi on the textiles when exposed to weathering and to impart durable freshness, as described by Bairagdar and Katkar (2010). Antimicrobial finish can protect the wearer from infections by finishing the textile fabrics with antimicrobial agent. Synthetic antimicrobial agents are very effective against the range of microbes and give durable effect on textiles, but are not eco friendly. It also causes side effects on hosts which include hypersensitivity, depletion in beneficial gut, mucosal microorganisms, immuno suppression, skin irritation, allergic reactions and action on non-target microorganisms, as remarked by Sathianarayanan et al. (2010).

The growing awareness of environmental problems coupled with the toxicity associated with synthetic based finishes bring a promising prospect for herbal finishes and to investigate the cheaper extraction technology of colorants from nature's renewable sources, as revealed by Tiwari et al. (2010) and Hiremath et al. (2010). This in turn, can result in designing of herbal finished health care products to heal and prevent specific diseases. The herbal antimicrobial finishes from medicinal herbs have been the current vogue and they promote a healthier and physically active life style. It can protect the wearer by controlling the microorganisms for aesthetic, hygiene or medical reasons.

Ayurveda is an ancient medical treatise summarizing the art of healing and prolonging life free from harmful side effects. Medicinal plants form the back bone of ayurvedic medicine and in the last few decades it has been subjected to very intense pharmacological studies, as highlighted by Packialakshmi (2010). Officially more than 3000 plants are recognized for their medicinal values. The medicinal value of these plants lies in a chemical substance known as phytochemicals such as alkaloids, flavonoids and tannins. They are the precursors for the synthesis of complex chemical substances that produce a definite physiological action on the human body. Many of the plants used for dye extraction are classified as medicinal and some of these have recently been shown to possess remarkable antimicrobial activity, as stated by Manonmani et al. (2009).

Today consumers around the globe are interested in sustainable environment friendly products with natural healing and it is creating demand for safe and healthy clothes, as remarked by Jain (2010). It is necessary that antimicrobial finishes should be eco-friendly, biodegradable, non-toxic to the manufacturer, user and the environment, as revealed by Joshi et al. (2009) and Sher (2009). The herbal antimicrobial agents are incorporated within the textile material to prevent the transmission of pathogenic microorganisms and it should be capable of counter attacking the development of odour from the bacterial decomposition due to perspiration in clothing. The use of herbal antimicrobial agents have been known for decades but it is only over the last five years that they are being actively promoted for textile materials in the finish sector and very rapidly they are taking hold of the position of chemical substances, as described by Srivastava (2010).

Cotton is the number one natural fiber used in health care textiles. The natural textile fibers are most susceptible to microbial attack than synthetic fibers due to their porous and hydrophilic nature, as revealed by Anita et al. (2010). The inherent properties of cotton provide ideal environment and room for the growth of microorganisms because of its ability to retain moisture which can deteriorate the mechanical strength of the fabric, produce stains, unpleasant odour, discoloration in the fabric and a reduction in the performance properties of textile substrates when the fabric is worn next to the skin and poses danger to living and non living matter.

Considering these facts a research entitled “**APPLICATION OF SELECTED HERBAL ANTIMICROBIAL FINISH ON COTTON FOR HEALTH CARE PRODUCTS**” has been designed and developed.

The objectives of the research are

- To extract the herbal solutions from selected medicinal herbs.
- To find out the antimicrobial efficacy of the selected extracted herbal solutions against disease causing microorganisms.
- To analyze antimicrobial activity of the extracted herbal solutions against the commercial antibiotics and evaluate their shelf life.
- To optimize the parameters for herbal extraction and process of applying the extracts on cotton textile materials.
- To develop herbal antimicrobial health care products and evaluate their performance.