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# INTRODUCTION

Textile tradition in India is rich and diverse, and has approximately India has 2.4% of world's area with 8% of global bio-diversity. In developing countries like India, textile and clothing play a vital role in the part of manufacturing, production, employment and also trade. A truly competitive sector in the country is textile industry. The earliest usage of textiles, most likely felt, dates back to the late stone age, approximately 100,000 years ago. Use of textiles, for healthcare also goes back a long way to centuries before Christ. Report concerning use of cotton, flax and silk in the form of wound dressing and even as sutures, dates back as far as 5000BC. Since then, reference to use of textile in medical application in preceding civilizations, including the Egyptians, Persians, Romans, Chinese and Indian, were plentiful in various literature (Hiller,1927 and King,2001).

Much of the textile use in medical applications remains unchanged till the late nineteenth century. Later depth in technological advancement led to great interest in internal arrangements of natural fibre in order to alter their physical, morphological and medical characteristics. Textile fibres play an important role in health care and medical sector. Textile materials in the medical field have gradually taken up more important roles with varied medical applications. In addition to protective medical apparels, textiles in fibre and fabric form are used for implants, blood filters and surgical dressings (Thomson and McClain, 2001).

The medical textile products are available in woven, knitted and non-woven forms based on the area of application. However, the part played by fibre-based materials has been on the rise in recent years. Medical textile is one of the areas which need massive attention as it is directly associated with human beings (Rajendran and Anand, 2006).

Medical textiles are products used primarily in medical and biological applications for first aid, clinical and hygienic purposes. It consists of all those textile materials in both consumer and medical markets. Since textile has always been a part of the healthcare industry, the amalgamation of fabric technology and medical science has resulted in the term medical textiles (Chinta and Veena, 2012). Textile industries have found their approach into a multiplicity of medical applications after completing numerous researches. Therefore, medical textile has become the fastest expanding sectors of the textile industry. In the field of technical textiles, medical textiles is a constantly growing and rising area. Even in India the growth for medical textiles is growing (Akter et al, 2014). The very main objective of medical textiles is to improve the quality of health care sector through disposable products and enhance the standard in health care sector by minimizing the risk of infections (Flanagan et al, 2011).

The clothes worn close to the skin are now considered as infection control and barrier materials. Antimicrobial textiles with enhanced functionality are being utilized in health and hygiene products. For example, Antimicrobial finishes are used for preventing odour problems generated by bacteria. Microbial infestation is an additional factor that has resulted in the development of antimicrobial finish. Moreover, microbial infestation poses danger to both living and non-living matters. Microorganisms can create problems with fabric raw materials, processing chemicals, wet processes in the mills, roll or bulk goods in cargo space, finished goods in storage and transport, and goods during usage. Microbes are the tiniest creatures that cannot be seen with the naked eye. They include a variety of microorganisms like bacteria, fungi, viruses and algae. Although bacteria and fungi are normal components of the natural environment, they cause specific problems such as staining, discolouration, deterioration, and odour of the fabric. The intrinsic properties of the material fibres offer room for the growth of microorganisms. Besides, the structure of the substrates and the chemical processes may induce the growth of microbes.

In the textile industry, many opportunities are available to add value and improve products by incorporating novelty finishes. The trend now is to protect the

textiles against microbial infestation. Essentially, with a view to protect the wearer, the textile substrate is treated with antimicrobial materials. Additionally, the green minded customers are opting for ecofriendly textile materials or textile materials treated with medicinal herbs. These herbal textiles are not only permanently effective but also skin compatible and eco-friendly (Sathianarayanan et al, 2010). According to history, clothing as a means of protection and healing goes back to the Rigveda, a sacred and ancient Hindu text composed of Ayurvedic scriptures. Until about 100 years ago, people in many parts of India were still using various forms of natural dyeing, in which the clothes are repeatedly dipped in an herb-based preparation after each wash. Medicinal properties of plants have been known to human for centuries. Plants and their products play a vital role in curing various ailments of human being and other animals.

In addition to the primary uses as food and fuel, plants were used for disease control and health management. Ayurveda, Siddha, home medicine and indigenous folk medicine system utilize crude preparations of many herbs for therapeutic purposes. In the development of human culture, medicinal plants play an essential role and they act as a source of traditional medicines. Large number of modern medicines are produced indirectly from plants. Medicinal plants are used in wound healing, pain relieving, anti inflammatory, antipyretic agents, vitalizers, aphrodisiac agents and even for birth control. WHO confirmed that about 80% of the world's population was served by herbal medicines.

Many researches about medicinal properties of plants including antimicrobial properties are going on and many biologically active and significant ingredients were reported from all parts of the world. Tropical countries like India which harbour a greater floral diversity are potent reservoirs of such medicinal plants and a wide variety of experiments are progressing in this field.

The amount of bio-functional textiles with antimicrobial activity has amplified significantly over the last few years. The consciousness of health and hygiene between the people has increased the demand for antimicrobial textiles which have antimicrobial finishes, in particular to shield against fungal diseases.

Antimicrobial treatment for textile materials is necessary to control microorganisms, reduce odour from perspiration, stains and soil on textile material, reduce the risk of cross infection being carried by feet from ward to ward in hospital, control spread of disease and danger of infection following injury, control the deterioration of textiles particularly in fabrics made from natural fibre caused by mildew.

Antimicrobial fabrics have been tested for use in the medical industry for some time. Now, the only antimicrobial fabric being utilized in the field of medicine are nonwoven and disposable. Application of herbals on fabrics opens up new possibilities as herbal treated garments can be utilized in operation theatre fabric and medical gown. Application of herbals used on cotton has a scope in wound healing or wound dressing manufacture.

Among all the natural antimicrobial agents, the plant products comprise the major segment. Healing power of some of the plants have been used since ancient times. Medicinal plants are the gift of nature to cure limitless number of diseases among human beings. The richness of plants on the earth surface has directed to an increasing interest in the study of different traditional medicinal plant extracts as potential sources of new antimicrobial agents. Herbs are abundantly available in nature and are non toxic and inexpensive. Extract from plant parts such as leaves, roots, seeds and flowers display antimicrobial properties. Due to their eco-friendly nature, herbal finishes are gaining significant momentum.

Antimicrobial extracts can be used as textile finishing agents in solvent form or microencapsulation and nanoencapsulation to improve the durability and controlled release of the extracts. This finish is applied in such a way that appearance and feel of the fabric is not altered and no chemical odour remains. These are applied to textile materials for two purposes as to protect the wearer and the fabric itself.

Various methods have been used for antimicrobial finishing of textile materials depending on the particular active agent and fibre type. In general, two different antimicrobial finishing methods can be distinguished. Antimicrobial agents can be either applied in an after-treatment process or incorporated into the polymer solution prior to extrusion or into the spinning bath. Substance embedded within the fibre structure has to migrate to the fabric surface, and should be slowly released during use in order to be active (Heine et al,2007).

Incorporation of antimicrobial substance within a fibre matrix is suitable only for synthetic fibres as after treatment processes for antimicrobial finish of natural, as well as synthetic fibre, conventional, exhaust and pad-dry-cure methods have been used. In addition, methods like padding, spraying, coating and foam finishing have been developed. Many other methods have also been reported, such as the use of nano sized colloidal solutions, nano particles, chemical modification of the biocide for covalent bond formation with the fibre, crosslinking of the active agent onto the fibre using cross-linker and sol gel processes(Coman et al, 2010).

Textile resources and products that have been engineered to meet up particular needs, are appropriate for any medical and surgical application where a mixture of strength, flexibility,moisture and air permeability are required. The medical textile industries have diversified with new materials and innovative designs. In recent times, function of textiles has been started going beyond the typical wound care for example incontinence pads and plasters (Akter et al,2014).

The wound dressing materials are designed to perform a wide variety of specific functions, depending upon the final medical requirement. The most common application for dressings is to cover wounds aseptically to avoid microbial infection and speed up the healing processes. Such dressing material includes light weight knitted or simple open-weave fabrics frequently made from cotton, which are cut into strips and then desized, scoured, bleached and sterilised (Geetu and Sahu,2014).

Wound healing generally requires support at three levels. First, improving general resistance and support mechanisms that could be obtained from rejuvenative, adaptogenic, palliative, antioxidant, cleansing, detoxifying, buffering, and lubricous activities. Second, stimulating the repair and regenerative mechanisms to prolong cell life, cell migration and cell binding, remove skin blemishes, and improve tensile strength or elasticity of the skin, improve moisture-holding capacity of skin. Third, therapeutic and nutritional activities including anti-inflammatory, antiseptic, and antimicrobial, protein and collagen synthesis and increased stability of biomembranes.

The pathophysiology of wound healing in cell lines play an important role to define the basic mechanism of treatment of wound healing. The polyphenols present in the polyherbal extract are capable of promoting rapid epithelialisation of wounds and also the antioxidant and antimicrobial property of the polyherbal extract when compared to the individual herb (Narendhirakannan,2012). Moreover, Nanoencapsulation is a novel technique rapidly evolving and extensively used in chemical, pharmaceutical, food processing and cosmetics industries. In recent years, textile finishing industries also utilize the Nanoencapsulation technique with respect to finishing. Nanoencapsulation is the slow controlled release of the antimicrobial agent to achieve the desired delay until the right stimulus is obtained.

The incorporation of multifunctional values with herbal extracts in textile material has become a special area of interest in recent years. Fibres, yarns, fabric and other structures with added functional value have been created for a variety of applications. Textile resources and techniques have become a significant platform for high-tech inventions. Increasing global competition in the textile sector has generated many challenges for textile researchers across the globe. The rapid growth in technical textiles and their end-uses have created many opportunities for the application of innovative finishes.

Considering these aspects in mind the present study on “**Developing Herbal Antimicrobial Finished Cotton Fabric for Wound Dressing**” has been attempted to finish the cotton fabric with poly herbal extracts and compared to identify the effect of the fabrics against the skin infective pathogens with the following objectives;

- To study the availability of wound dressing in market and their demand
- To select the yarn for weaving fabric for wound dressing
- To select medicinal herbs
- To optimize herbal extract concentration and determination of polyherbal formation
- To treat the woven fabric with polyherbal extract and test the fabric performance.
- To develop a product and evaluation.