

## **Herbal Curative Wound Dressings: Potential for the Future of Nigerian Medical Textiles**

**Ojo, E. B., Adiji, B. E And Fagbenro, F. Moyosore**

Industrial Design Department, Federal University of Technology, Akure, P.M.B. 704, Ondo State, Nigeria

[Bolajokoadiji@gmail.com](mailto:bolajokoadiji@gmail.com), [moyofagbenro@gmail.com](mailto:moyofagbenro@gmail.com)

### **Abstract**

Curative textiles are new and novel in the field of medical textiles and are a combination of regular textile material and external curative components which could either be a natural product or a synthetic compound. The role played by curative textiles is multifunctional combining textile functional properties, protective and curative properties of medicinal compounds. The Ethno pharmacology use of plants has deep roots in human history with over 4,000 plant species available in Tropical Africa alone. Some of these plants have been found to play a very crucial role in wound healing which has encouraged the production of curative wound dressings in other parts of the world. In Nigeria, a number of plants have been identified to possess curative, antimicrobial, anti-inflammatory and antiradical properties, the poor knowledge of proper extraction and delivery mechanisms has limited the use of such plants in medicine as it may be potentially harmful and detrimental to the wound healing process. Most medicinal plants are used in the form of infusions, decoctions, concoctions, tinctures, macerations, poultices, compresses and baths, with little or no literature of modern methods of extraction and use. This paper discusses the possibilities of the production of curative wound dressings from locally sourced plants and herbs, and highlights the advantages and limitations. It also emphasizes the need for research interest in this area.

## 1. INTRODUCTION

Medical textiles and devices are novel and growing sector of Technical Textiles which has gained the interest of a lot of researchers, the growth is widely attributed to advances in textile technology and medical procedures. (Rigby & Anand, 2000; Shanmugavasan, 2011a). One important area of medical textiles is the non-implantable materials which may or may not have contact with skin and consists of wound dressings, bandages, and plasters. Wound dressings are primarily used to cover wounds in order to prevent contamination, infection and to absorb blood and exudate. However, with advances in technology, wound dressings are able to provide additional functions such as initiation and promotion of healing, antimicrobial protection as well as the application of medication.

Wound dressings are made up of composite textile materials which may be woven, knitted or nonwoven. Nonwovens are widely used in medical textiles because of their low cost, ease of production and the various structural properties which can be achieved. Most textiles used in medicine are disposable, hence, it is sensible to use fabrics that are cheap and readily available. modern dressings are based on the concept of creating an optimum environment to facilitate rapid wound healing. Such optimum conditions include a moist environment around the wound, effective oxygen circulation to aid regenerating cells and tissues and a low bacterial load (Boateng et al., 2008). However, it has been discovered that the addition of wound healing agents to dressings greatly increased the function and effectiveness of the material. Silver, herbal extracts and synthetic compounds are some of the agents that have been added to wound dressings to increase its functionality. The focus of this paper is mainly on the addition of herbal extracts for increased wound healing activity.

## 2. MEDICINAL PLANTS

Medicinal plants are plants which contain substances that are therapeutic, some of these substances serve as plant defence mechanisms against microorganism, insects and herbivores, some give plants their peculiar odour (such as terpenoids) and others are responsible for plant flavour (e.g. quinines and tannins) (Ibukun, 2008; Shenoy, Patil, Kumar, & Patil, 2009).

The Ethno pharmacology use of plants has deep roots in human history and is prevalent in Nigeria, with over 4,000 plant species available in Tropical Africa (Tinuola Odugbemi &

Odugbemi, 2008). In Nigeria, Traditional medicine is widely used (about 80% of the population) because it is easily accessible and affordable, only about 35% of the population have access to and can afford modern health care facilities which are not evenly distributed across parts of the country. Besides this, traditional medicine is also viewed to be acceptable from a spiritual and cultural point of view however, there is no uniform system of preparation and use which had led to the abuse and misuse of medicinal plants (Maroyi, 2013; Tolu Odugbemi, 2008)

Traditional practitioners of herbal medicine have used various methods for extraction, but with advances in technology, extraction, purification and assessments methods have been improved which enables herbal medicine to find applications in many interdisciplinary sectors. A lot of medicinal plants have been found to have wound healing activity and are effective in the treatment of wounds. Some examples are:

- i. ***Carica papaya L.* Extract:** commonly known as pawpaw is known to possess antimicrobial, anti-inflammatory, antifertility, anti-hypertensive, diuretic and chronic skin ulcer therapeutic properties. It is also known to have fibrinolytic properties which helps to remove slough from wounds. the aqueous extract of the leaves were found to significantly accelerate wound healing (Mahmood, Sidik, & Salmah, 2005)
- ii. **Neem Extract** applied on fabrics has shown a high level of antimicrobial activity. It is also known to have excellent insect repellent properties(Thilagavathi& Bala, 2007)
- iii. The natural extract of ***Acacia catechu*, *Rubiaceae*** and combination of Acacia and Rubia shows good resistance to microbial activity.
- iv. **Aloe vera** is popularly known to be the ‘silent healer’, it possesses excellent wound healing, anti-inflammatory, antimicrobial and antitumor properties and has been used to develop bandages which are very effective (Sajjad & Sajjad, 2014)
- v. Extracts of the **Morinda** plant have also been found to possess therapeutic properties which aided in wound healing when tested on rats. (Nagori & Solanki, 2011)
- vi. All parts of the ***Moringa oleifera*** tree are edible and have used in the traditional medicine as anti-tumour, anti-pyretic, anti-spasmodic and anti-cardiac agent

It is evident that medicinal plants play a big role in the health and well being of humans, and this role can be maximized in the area of medical textiles.

### 3. CURATIVE TEXTILES

Curative textiles are multifunctional as they not only provide protective and antimicrobial properties, but also aid healing. Antimicrobial textiles are only protective/preventative in nature and their support is only secondary to the healing process.

Such textiles can be produced by coating herbal extracts (or active plant chemicals) that have antimicrobial activity, based on the idea that textiles coated or impregnated with herbal extracts possess the inherent curative and antimicrobial properties of the plant and the functional properties of textiles. (Adetutu, Morgan, & Corcoran, 2011; Boateng et al., 2008; Chah, Eze, Emuelosi, & Esimone, 2006; Shanmugavasan, 2011a). Curative textiles are a step ahead of preventive textiles as they are a merger between textiles and curative components which can be classified into two

- i. curative function performed by the regular textile material
- ii. textiles augmented with external curative components.

Common methods of coating include shear spreading, dip-dry, pad-dry-cure, spray drying and microencapsulation. printing and digital coating are more modern methods and have been found to be equally effective. (Shanmugavasan, 2011b)

#### **3.1 POTENTIAL FOR CURATIVE TEXTILE PRODUCTION IN NIGERIA**

The practice of traditional medicine in Nigeria is believed to be as old as man. The Yorubas believe that the origin of traditional medicine revolves round deities like *Orunmila*, *Osanyin*, *Olubikin*, *Osanyinbikin* and *Ajigbeakuro-Odunko*. It is believed that *Orunmila* practiced divination where causes of diseases, what to do and sometimes what plants to use were revealed while *Osanyin* is the only man who had full knowledge of medicinal plants and their uses and dealt solely with finding herbal cures to diseases (Tolu Odugbemi, 2008).

In Nigeria, over 600 plants species have been identified as medicinal plants possessing many properties including antimicrobial, curative, therapeutic, anticancer, antipyretic, contraceptive, anthelmintic, haemostatic among others. With the knowledge of aqueous and solvent extractions, extracts can be obtained from these plants for various purposes.

Table 1: some popular plants know to aid healing of wounds and skin related conditions

S/N	SPECIE NAME	COMMON/LOCAL NAME	PARTS USED	MEDICINAL PROPERTIES
1	<i>Acacia nilotica</i>	Acacia, siyi, sie	Fruits, bark	Antimicrobial, curative
2	<i>Acalypha fimbriate</i> <i>Acalyphagodseffiana</i> <i>Acalyphahispida</i> <i>Acalyphawilesiana</i>	Jinwinini, jiwene	Leaves, twigs	Antimicrobial, curative for skin infections
3	<i>Achileamillefolium</i>	Yaro, yarrow	Flowers, leaves, seeds	Haemostatic, wound astringent
4	<i>Aervalanata</i>	Eweowo, aje, efun-ile	Whole plant	Curative for ulcers, wounds and snake bites
5	<i>Aframomumgranumparadisi</i>	Ata-ire, atare, alligator pepper	Leaves, seeds	Curative for wounds and skin infections
6	<i>Baphianitida</i>	Irosun, camwood	Leaves, bark, roots, twigs	Curative for skin diseases
7	<i>Bambusa vulgaris</i>	Oparun, bamboo	Leaves, young shoots	Skin rashes of HIV/AIDS
8	<i>Caloncoba echinate</i> <i>Caloncoba glauca</i>	Ntuebi Kakandika	Bark, roots, seeds, leaves	Skin lesions, and skin infections
9	<i>Cosmos sulphureus</i>	Ododo-imiesu, yellow cosmos	Leaves, flowers	Antimicrobial, astringent, wounds

10	<i>Dorateniaprorepens</i>	Alaifo, aloifo,	Stem,twig, leaves	Antipyretic,antimicrobial, wounds
11	<i>Erythrophleumsuaveolens</i>	Erun obo	Stem, bark, leaves	Wounds and skin diseases
12	<i>Ficusasperifolia</i>	Sand paper plant, ipin	Leaves, root	Wounds
13	<i>Hibiscus sabdariffa</i>	Zobo	Leaves, flowers	Wounds
14	<i>Ipomoea batatas</i>	Odunkun, sweet potato	Leaves, tubers	Boils and wounds
15	<i>Jateorhizamacrantha</i>	Atutu	Leaves, roots	Curative for snake bites, ulcers, wounds and cuts
16	<i>Leonotisnepetifolia</i>	Agberulori, lion's ears	Leaves, roots	Wounds, skin diseases, anthelmintic
17	<i>Mariscusalternifolius</i>	Ranransa, ikeregun	Stem	Curative for wounds
18	<i>Oncoba spinose</i>	Gbonsere, snuff box tree	Roots, leaves	Wounds
19	<i>Phaulopsisfalcisepalia</i>	Apa-ogbe	Whole plant	Wounds, skin parasites
20.	<i>Trichilaheudelotii</i>	Akorere	Roots, leaves	Wounds and ulcers

Source (Tolu Odugbemi, 2008)

#### 4. CONCLUSION

The purpose of wound care is to reduce the risks factors that inhibit wound healing, enhance the healing process and reduce the occurrence of wound infections. Many medicinal plants have been used traditionally for wound dressings and healing however these practices are still quite crude. Using better equipment and techniques, extracts containing active compounds can be obtained from these plants and incorporated through various coating techniques with woven

textile materials all of which can be locally sourced. This can also encourage the cultivation of these plants on a larger scale which will make these plants easily accessible for research. There is potential for Nigeria to produce its own locally produced wound dressings however more research is still needed in this field.

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