

# DEVELOPMENT OF MEDICAL TEXTILE PRODUCTS USING BAMBOO FIBRE

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**Abstract:** *The research work deals with the development of baby diapers and surgical bandages made from pure bamboo fibre. Baby diapers were prepared using bamboo fibre as a core material. Antibacterial activity tests have been carried out on baby diapers against S.aureus and E.coli bacteria. The strongest antibacterial activity was found in diapers produced from pure bamboo fibre. The diapers were subjected to various tests to study their performance. Upon an analysis of the results, it was found that the performance of diapers produced from pure bamboo is superior in quality. Gauze fabric was produced using bamboo yarn. Biopolymers were coated separately on the gauze fabric to improve the wound healing and antibacterial performance of the bandage. The antibacterial activity of the polymer coated samples was evaluated against S. aureus and Proteus bacteria. The results show excellent antibacterial activity.*

**Keywords:** *Bamboo, Baby Diaper, Bandages, Biopolymers & Wound Healing*

## 1. Introduction

A baby diaper utilizes cellulose fluff combined with super-absorbent polymer (SAP) to create an absorbent core, which acts as a storage structure in the product. Research works on Design and Evaluation of a Clothing System for use in the care of Premature Infants have been carried by (Kwok *et al.*, 1997; Kwok *et al.*, 1998). In some products, wet laid cellulose tissue may be used as a containment wrap around the cellulose pulp (Edward, 2001; Mahperd *et al.*, 2001). Diapers come into contact with the skin and thus consumers are concerned about whether this will cause dermatitis. The water transport properties and handle of diapers are considered to be related to both diaper dermatitis and wearing comforts (Campbell, 1987; Campbell *et al.*, 1987; Cottenden, 1988; Cottenden *et al.*, 1998). Bamboo is a renewable resource that can provide a viable source of energy when the cycle of its plantation and usage is properly scheduled. Pyrolysis of bamboo in the absence of air provides bamboo tar and bamboo charcoal (BC), the latter of which is used as an effective adsorbent for removal of humidity and odors and as a convenient solid fuel. Bamboo charcoal has a number of beneficial characteristics, including high electric conductivity and self-lubricity, and can be used as a friction material and an electromagnetic shield material (F. C. Yanga *et al.* 2009).

## 2. Experimental Procedure

### 2.1 Materials

Bamboo fibres were procured from Super Spinning Mills Ltd., Coimbatore. Chitosan polymer was obtained from Central Institute of Fisheries Technology, Kerala. Calcium alginate and sodium alginate was procured from Otto komi, Mumbai. Other materials such as SAP, polypropylene based nonwoven fabric, plastic sheets and adhesive were sourced from the market.

### 2.2 Preparation of Baby Diapers

Bamboo fibres were opened using the Shirley opener. The bottom sheet used was polypropylene film, which helps the baby clothing dry and provides leakage protection. It is a nonporous, hydrophobic substance. About 5 g of SAP was sprinkled over the bottom layer of the diaper. About 12 g of fibre (accurately weighed) was compressed and placed between the top two sheets of 15 cm x 35 cm polypropylene nonwoven fabric and a bottom sheet of the same size. After placing it accordingly, all sides of the diaper were sealed.

### 2.3 Performance Testing of Baby Diapers

The diapers are subjected to tests such as absorption capacity, liquid strike-through, acquisition time under load and diaper rewet under load to study their performance. From the test results, it is found that the performance of diapers produced from pure bamboo is superior in quality.

## 2.4 Antibacterial Activity

The antibacterial properties are very important for underwear garments, because a large amount of bacteria reside between apparel and human skin, which are harmful to humans. It is found that the pure bamboo fibre shows 100% bacterial reduction. Scientists have found that bamboo contains a unique anti-bacteria and bacteriostasis bio-agent. This substance naturally imparts anti- bacteria and deodorization functions (*Wang et al., 2005*)

## 2.5 Preparation of Gauze Fabric and Polymer Coating

Gauze fabric was produced using gauze bandage loom. The fabric was scoured and bleached as per the standard procedure. Biopolymers such as chitosan, sodium alginate and calcium alginate were coated separately on the gauze fabric using pad dry cure technique.

## 2.6 Antibacterial Test

The polymer coated fabric samples were tested for antibacterial activities against *S. aureus* and *Proteus* bacteria according to agar diffusion standard test method. The polymer coated bamboo samples show an excellent antibacterial activity.

## 3. Conclusion

The baby diapers made of bamboo fibre perform well with respect to absorption capacity, liquid strike-through, acquisition time under load and rewet under load. The polymer coated bamboo gauze fabrics are quite suitable as surgical bandage for wound healing.

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