

A Review on Development of Medical Disposable Baggage From Jute Blended Fabrics

Emeli Dey¹, Urvashi Choudhary², Rajib Bhattacharyya³, Swapn Kumar Ghosh⁴

¹(Senior Research Fellow, Department of Jute and Fibre Technology, 35, Ballygunge Circular Road, Kolkata-700019, University of Calcutta, India)

²(Junior Research Fellow, Department of Jute and Fibre Technology, 35, Ballygunge Circular Road, Kolkata-700019, University of Calcutta, India)

³(Research Associate, Department of Jute and Fibre Technology, 35, Ballygunge Circular Road, Kolkata-700019, University of Calcutta, India)

⁴(Professor and Head of the Department, Department of Jute and Fibre Technology, University of Calcutta, 35, Ballygunge Circular Road, Kolkata- 700019, West Bengal, India)

ABSTRACT : Worldwide people have become conscious about the detrimental effect of the toxic plastic waste bags, polluting the atmosphere and adversely affecting the ecology. So, researchers, scientists and technologists are in constant endeavour to replace the use of synthetics with natural fibres in the field of packaging technology which has a wide application in the field of medical textiles. This article delineates the development of medical disposable bags and other products from jute blended fabrics, an attempt to replace gradually hundred percent use of synthetics with natural fibres in the field of medical textiles.

Keywords – Disposable, hygiene, jute, recyclable, waste

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I. INTRODUCTION

Medical disposable baggage is a portable bag used by a physician or other medical professional to transport waste medical supplies and medicine generally made of a synthetic thermoplastic material. A disposable medical waste bag having layers of polyethylene film has an open top and a seal at the bottom of the bag [1]. The bag is filled to a desired level with medical waste and is sealed by closing off of the top of the bag by twisting. A normally closed valve is provided on the bag and is engaged temporarily with a coupler which is used in conjunction with the hose of a central vacuum system of a medical facility. After the bag has been sealed by taping, the central vacuum system vacuums or sucks out excess air sealed within the bag thereby substantially decreasing the size of bag. But after its use when such bag is incinerated, it emits harmful gases polluting the atmosphere. Packaging for the myriad of disposable products in healthcare is ubiquitous, with the intention of safeguarding sterility. Significant amounts of individual packaging continue to bring large volumes of waste into the operating room, much of which heads straight for the landfill or medical waste treatment. An additional complexity of recycling materials could interrupt patient flow or surgical procedures [2] [3]. Moreover, the materials being largely medical plastics which are not similar in shape, size, volume. Implementation of medical plastics recycling program carried out to reach environmental services, infection prevention and nursing is fairly expensive. Furthermore, after the surgical procedure is complete and the patient has left the operating room, there is an additional challenge to identify, segregate and capture the recyclables used during the procedure [4].

Attempts have been made to use multi-ply bags which are specially constructed for the contaminated medical waste [5]. Such bags comprise an inner ply formed of a strong impervious plastic material, such as

polyurethane which is tearing resistant to sharp objects, an intermediate ply of fabric material such as cotton which is capable of absorbing liquid medical waste; while the outer ply is formed of strong impervious plastic materials like polyurethane. But such bags, in addition to create safety problems during their production, release harmful gaseous elements on incineration like dioxins, mercury, carcinogenic diethylhexyl phthalate (DEHP) which have negative environmental and human health effects causing endocrine disruption, leading to cancers, birth defects, immune system suppression and developmental problems in children [6] [7]. Moreover, if the cotton used in such bags is not grown organically, high levels of pesticides used in growing such cotton fibres may create human health related problems and imposing thereby the burden of extensive additional treatment of the cotton fibres before being applied as a constituent in manufacturing the multi-ply bags [8]. Worldwide people have become conscious about the detrimental effect of the toxic plastic waste bags, polluting the atmosphere and adversely affecting the ecology. Unanimously, researchers, scientists, environmentalists are thinking of natural and eco-friendly alternatives. In such a scenario, natural bast fibres like jute was considered as a potential candidate to replace partially the harmful synthetics in making medical disposable bags.

II. LITERATURE REVIEW

Jute fibre is biodegradable restoring ecological balance and abating carbon footprint generation, relatively abundant in the Asian countries justifying its economic viability, wide availability of jute fabric structures like woven, nonwoven, knitted, braided, knotted etc. corroborating with the end-use requirement concomitant with the fluid absorbency, air permeability, etc. are some of the favourable properties of jute which accepts its use as a constituent in the medical waste bags. Very recently, National Jute Board, Ministry of Textiles, Government of India in collaboration with Indian Institute of Technology, Kharagpur, West Bengal, India has developed sterilized jute based sanitary pads which could help prevent cervical cancer. Since menstrual hygiene plays a role in development of cervical cancer, which kills more than a lakh women especially among the age group of 15 to 44 years. Researchers believe it will be beneficial to women's personal hygiene. Also, the new line of products could revive the dying jute industry. The product is fabricated from cellulose extracted from jute and its qualities are enhanced with addition of a super-absorbent polymer [9]. Around 500 napkins were distributed among women working in jute mills and schoolgirls in some districts of the state of West Bengal, India for testing. The jute-based napkins were identical to the branded ones and the users were never told about which brands they were using. The feedback was found to be very encouraging. The napkins were made to pass the cyto-toxicity tests to see if there were any bacterial contaminations. But no such elements were traced. Thereafter the napkins were sterilized with ultraviolet rays before being packed. It is expected that the new product, if marketed properly, could tap a portion of the Rs 2,000-crore personal hygiene market for women in India. In another research work carried out by Indian Council of Agricultural Research (ICAR)-National Institute of Research on Jute and Allied Fibre Technology (NIRJAFT), Kolkata, India on sanitary napkins, they defined sanitary napkin as a disposable product comprising of three layers: top, absorbent and barrier layers. The absorbent layer is the key component of the napkin, and the extent to which this layer is able to absorb and retain the fluid determines the efficiency of the napkin. The napkins thus produced were subjected to BIS Test method (IS: 5405-1981) to determine the extent to which it is able to absorb and retain the fluid which measures the efficacy of the developed product. Jute stick and jute fibre were used for making absorbent pulp. Jute sticks were broken into small pieces while jute fibres were cut into small lengths of about 1-2 inches and were used for pulping which was carried out following alkaline sulphite anthraquinone methanol (ASAM) process at 1600 C in a rotary digester for three hours [10]. The napkins thus produced were subjected to BIS Test method (IS: 5405-1981) to determine the extent to which it is able to absorb and retain the fluid which measures the efficacy of the developed product.

III. CONCLUSION

The worldwide environmental concern about the harmful effects of synthetics in the field of medical textiles coupled with the issue of expensive recyclable system has provoked the scientists, researchers and technologists to think about a natural alternative in the making of medical disposables. Though cotton fibres is

extensively used for making medical disposables but due to the presence of fairly large volume of pesticides used in growing cotton fibres which has proved to be deleterious to human health, has made the researchers to incline towards jute another promising member of the cellulose family. Medical disposables like sanitary napkins made of jute blended fabrics have soundly responded and this has shown the researchers to think of more applications of jute in blended forms in the field of medical disposables.

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