CHAPTER 8

DEVELOPMENT OF CURATIVE BANDAGES BY
COATING PLANT EXTRACTS

8.1 INTRODUCTION

This chapter deals with the coating of the plant extracts on bandage surface. This research postulates that the active chemicals from the plant extract are likely to penetrate the skin aided by the sub-bandage pressure. The bandage becomes multi-functional and is expected to be more effective in its curative ability. Oily extracts were microencapsulated and coated on bandage fabric surface. Powdery extracts were coated by two methods namely weft coating and fabric coating.

8.2 COATING OF OILY EXTRACTS OF D.viscosa AND Z.jujuba

The preparation and the coating method for the oily extracts of D.viscosa and Z.jujuba are discussed in this section. The extracts were coated on compression bandages. Compression bandage substrate was chosen as the ailment which they act upon needs compression therapy.

8.2.1 Preparatory Process for Coating

Retention of the active matter during coating and sustained release during usage of bandage being the intention, microencapsulation technique of the extract and subsequent coating has been chosen for this research work. Trials were done to coat the extract on the bandage fabric. Dip-dry, pad-dry-
cure, spray-dry and brush coating methods were found unsuitable due to the high viscosity of the extract. Practical difficulties such as dissolution of the extract in a solvent, staining on the skin, prolonged drying time, improper drying have also been faced.

8.2.2 Microencapsulation (Orifice – Ionic Gelation Process)

The plant extract was used as the core material. Sodium alginate was taken as the wall material as it is a natural and commonly used wall material. Microcapsules containing plant extract were prepared by using 1% weight/volume low viscosity sodium alginate. Approximately 3% of sodium alginate solution was prepared. 10 ml of oily extract was added to the polymer solution and mixed thoroughly to form smooth viscous dispersion by adding 10 ml of polysorbate 20, an emulsifying agent commercially available as Tween 20®. The oil-polymer mixture was sprayed into 0.5M 98% pure calcium chloride solution using “Pilot Type 64” model spray gun. The nozzle bore of the gun is 1.5 mm. The spray gun was held vertically over the calcium chloride solution 45 cm above the level. The droplets were retained in calcium chloride for 15 minutes for hardening of the capsules. The microcapsules were obtained by decantation in a centrifuge of make Remi R-8C and repeatedly washed with 99% pure isopropyl alcohol followed by drying at 45°C for 12 hours in a hot air oven. The microscopic image of the capsule is shown in Figure 8.1.
The wax applied on the weft yarn during weaving was removed by soaking the fabric in boiling water bath for 20 minutes followed by squeezing and repeated washing with distilled water. Then the fabric was dried. The coating bath liquor was prepared by taking 10 ml of microcapsules in 30 ml of distilled water. 3.2g of citric acid was added to the bath as binder. The Material:Liquor ratio was kept at 1:20. The dewaxed bandage fabric was kept dipped in the above bath at room temperature for 30 minutes. The fabric was dried at room temperature without squeezing for 48 hours. The control and bandage fabric coated with microcapsules of D.viscosa are shown in Figure 8.2. The same procedure was used for Z.jujuba.
8.3 COATING OF POWDERY EXTRACTS OF M.oleifera, C.deodara AND C.paniculatus

Dry extracts from the parts of plants M.oleifera, C.deodara and C.paniculatus were coated on elastic fixation bandages for treating inflammation. The coating was done in two ways namely weft coating and fabric coating to ascertain the better method as the elasticity of the bandage should not be affected due to coating. Both the methods are discussed in the sections below. In case of fabric coating, significant loss of extensibility was noticed for a pick-up percentage of nearly 10%. The pick-up percentage was varied by varying the soaking time to get optimal pick-up so that there is no significant drop in extensibility.
8.3.1 Yarn Coated Bandage

Attempt was made to coat the yarn wound on perforated tubes in a package dyeing machine. This method required high volume of extract and was not practically feasible. As an alternate the cotton yarn to be coated was knitted as a narrow width tubular fabric as an intermediate. This intermediate fabric was coated with each the extracts of M.oleifera, C.paniculatus, C.deodara with material to liquor ratio 1: 15 at room temperature. The intermediate fabric was soaked into a bath of 50% weight/volume solution of the respective plant extract for 30 minutes for better absorption before padding. The soaked fabrics were padded at slow speed using a padding mangle with a pressure of 1.5 lb/in² and the coated intermediate fabrics were dried at atmospheric conditions (Figure 8.3). The yarn was unravelled from the dried intermediate fabric and wound on cops individually and was used as weft material for weaving fixation bandages.

![Figure 8.3 Padding method to coat plant extract on intermediate fabric](image)

8.3.2 Fabric Coated Bandage

The fabric coating was carried out using exhaust method. The woven bandage fabric with treated with each of the extracts of M.oleifera, C.paniculatus, C.deodara by exhaust method with material to liquor ratio 1: 15 at room temperature. The fabric samples were loaded into a bath of 50%
weight/volume solution of the plant extract and were allowed to soak for an hour. The soaked fabric was later washed with water without and dried squeezing at atmospheric conditions. The soaking time was varied by trials to find an optimum pick-up for which the loss of extensibility in coated bandages is negligible.

8.4 CONCLUSION

The curative bandages were developed by coating with plant extracts by various methods. The evaluation of the coated bandages is discussed in the subsequent chapters.