

CHAPTER 5

CONCLUSION

In order to characterize bacterial cellulose (BC) films to be used as wound dressing and topical drug carrier, the BC films were prepared by culturing *Acetobacter xylinum* TISTR 975 in medium containing 8% w/v of 7 sugars i.e, glycerine, mannitol, sucrose, glucose, fructose, lactose and arabinose. This bacterium can grow in media containing lactose and arabinose but it cannot produce BC from these sugars. Among them, the BC film from glycerine has the highest weight, thickness and % yield. The BC films were observed under scanning electron microscope and the films from each sugar have some different in appearance. They compose of fibrils with diameter 100-200 nm. The fibrils have woven into net works and form tutorial pore. The fibrils of BC film from glycerine are not broken and smooth surfaces. The crystallinity of the fibrils was evaluated with X-ray diffractometer. The fibrils from all films show the same pattern of spectrum and the film from mannitol shows the highest % crystallinity (84.38%) while the film from glycerine has the lowest % crystallinity (64.84%). All films are strong with tensile strength between 22.37 to 126.63 kN/m². The pore size of the films was evaluated by using nitrogen absorption method. Most of their pore size diameter is 6-80 nm. At the pore size 20-80 nm, BC film from glycerine show the highest pore volume. This characteristic is advantage if the high amount of drug is loaded into the pore of this film. When the wet BC film contains large amount of water or it is too dry, it is not suitable to use as wound dressing for adsorption of the wound exudates. The results

from this study indicated that when 90% of water contained in wet film was removed it showed the highest water readsorption ability (348%) compared with that of more or less than 90% water removal. If BC wet film is used to adsorb exudates from wound, it should contain certain amount of water. The highest moisture adsorption ability was found in BC film from glycerine. It has the highest moisture adsorption in any relative humidity atmospheres compared with other films. This characteristic is also an advantage because it can maintain wound moisture if it is used as wound dressing. When various BC films used as topical drug carrier, they were loaded with 0.2% w/w chlorhexidine digluconate. They have the drug content 76-87% while BC film from glycerine contains the highest content of drug. The highest drug releasing profile was found in BC film from glycerine. It also has the highest drug release (98.07%) after 24 h. The BC film from glycerine is considered as the most promising film to be used as the wound dressing and topical drug carrier.