CHAPTER 5

CONCLUSIONS AND FURTHER SCOPE OF RESEARCH

5.1 Conclusions

Following conclusions have been derived from the present study:

1. The mass density of fabrics increases due to deposition of nano cellulose material on the fabric surface. This increase in weight depends on the concentration of nano cellulose solution and the amount of cross linking material used for the coating. The increase in weight of fabric also depends on the type of fabric and its structure.

2. The effect of nano cellulose concentration of the coating solution on the increase in fabric weight shows that there is substantial increase in mass density of fabric with initial increase of the concentration up to 20gpl. However further increase in the solution concentration marginally affects the mass of fabric. The addition of cross-linking agent also shows the increase in weight of fabric depending on its concentration. The optimum concentration of cross-linking agent can give better adhering of nano cellulose to the fabric surface.

3. In case of woven fabric there is marginal increase in the weight of the fabric as compared to that of nonwoven fabrics. Among spun laced nonwovens the increase in weight is substantial in case of embossed fabric compared to the plain fabric.

4. The coating of fabrics can improve the protection behavior but it also affects physical and other mechanical characteristics of the fabric such as tensile strength, air permeability, water permeability, stiffness etc.

5. The tensile strength of coated fabrics shows the improvement in all the fabrics. Overall increase in tensile strength in woven cotton fabric is in the range of 10 to 15%, and the increase in strength of nonwoven is in the range of 20 to 30 %.

6. In all the cases, compared to original fabric, the air permeability of the fabric has been reduced after the coating treatment. The woven cotton fabric shows about 7 to 10% reduction in the air permeability depending on the nano cellulose concentration. The plain nonwoven shows 15 to 30% reduction in air permeability whereas embossed nonwoven fabric did not show any consistent behaviour regarding air permeability.

7. The bending modulus is also adversely affected in case of coated fabrics. Woven fabrics shows lower modulus compared to nonwoven fabrics. Plain nonwoven viscose fabric show less bending modulus as compared to that of embossed nonwoven.

8. The water repellence of all the fabrics shows improvement after the coating treatment. The woven fabric and embossed viscose fabric have shown poor or satisfactory water repellence after the treatment. Only plain nonwoven viscose fabric samples have shown good water repellence after the treatment.

9. The culture test results show that the neem seed oil solution treated fabrics, generally resist the growth of bacteria. In case of the plain viscose fabric samples treated with 30gpl nano cellulose concentration and 10gpl cross linking agent concentration the bacterial growth is found minimum.

Overall it can be concluded that the use of medical garments made of nano cellulose coated fabrics has high potential for providing the protection to the medical personnel and the patients as well. The production of synthetic polymeric materials and dispose them after the use pose high risk to mankind due to various possible pollutions as compared to that of biodegradable cellulosic materials. The use of cotton and cellulosic materials in the medical textiles is environment friendly and helpful in reduction in environment pollution. The reusable medical textiles and surgical gowns made from coated woven fabrics are more safe, comfortable and economical in long run. The disposable medical textiles made from nonwoven seems cheaper but overall costly and more likely to generate huge amount of waste which can adversely affects the environment which in turn versions health issues.

5.2 Future scope:

The further research in this area cab be carried out considering following aspects:

1. Coating of fabrics can also be done using micro cellulose materials to compare the performance of nano cellulose coating.
2. Other antibacterial natural materials may be used to improve anti-bacterial property of the surgical gown.
3. Similar coating treatments may be carried out for other hospital accessories to improve the bacterial resistance for the protection purpose.
4. Costing study may be carried out considering the bulk production of coated fabrics using different coating materials and processes to enhance the properties of surgical gown.
5. Other technologies may be used for binding nano cellulose to the fabric surface instead of chemical binder.