Permeability of Non Sterile Latex, Non Sterile Vinyl and Sterile Latex Gloves Immersed in 0.9% Sodium Chloride Solution using Electrical Conductance Test

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INTRODUCTION

The use of gloves has been an essential universal precaution due to an increased concern about the transmission of a disease. A high frequency of hand lesions are undetectable visually. It has been estimated that nearly 10,000 bacteria can pass through a single glove defect in 20 minutes. Defects cause glove permeability. Permeability can be caused by different factors. These factors can be due to the composition of the glove, manufacturer and time of usage. Gloves are made from a variety of materials which include latex, polysoprene, neoprene, vinyl and nitrile. Usually, surgical gloves are initially impermeable to various viruses but the porosity increases with the duration of use. The goal of the gloves is to provide barrier protection without compromising freedom of movement. Since the protective quality of gloves depends on their impermeability, this study investigated the permeability of the different glove types immersed in a 0.9% sodium chloride solution using the Electrical Conductance Test (ECT).

Electrical Conductance Test

[Diagram of ECT]

Fig. 1. Electrical Diagram of ECT

It is used to detect glove permeability by measuring the electrical current that flowed through the circuit with the use of a clamp ammeter. Fig. 1. When the amperereading is greater than zero, it indicates that the electrons are able to pass through the gloves, thereby closing the circuit, which concludes that the tested glove is permeable.

MATERIALS AND METHODOLOGY

[Photo of testing setup]

Fig. 2. Testing of Non Sterile Latex using ECT

A total of 150 samples was done for each type of glove (non sterile latex, non sterile vinyl, and sterile latex), wherein each type of glove had three brands. The ECT was done by placing a 200mL 0.9% sodium chloride solution into the gloves and immersing the glove into a beaker containing 1.5L of 0.9% sodium chloride solution, and thereafter a probe was placed in the glove and another probe into the beaker (Fig. 2). The conductance across the glove surface was then measured by a clamp ammeter. The reading, in amperes, was recorded during the initial placement of the glove in the beaker and after a five minute immersion.

RESULTS

Statistical analysis showed a significant difference in the permeability after a five minute immersion of the glove. Using a two-tailed z test, permeability in the different brands of non sterile latex gloves showed that brand C is less permeable than brand B and brand A (Fig. 3); in non sterile vinyl gloves, brand B is less permeable than brand C and brand A (Fig. 4) and in sterile latex gloves, brand C is less permeable than brand A and brand B (Fig. 5). Among the different glove types, it was found that the non sterile vinyl is less permeable as compared to the sterile latex and non sterile latex (Fig. 6).

CONCLUSION

Conductance serves as a guide to the potential permeability to infectious agents. Permeability is directly correlated to conductivity. Ampere reading is directly proportional to the amount of permeability of the gloves. Among different brands of non sterile latex, brand C offers more protection to infectious agents than brand B and A; for non sterile vinyl, brand B offers more protection than brand C and A; and in sterile latex, brand C offers more protection than brands A and B. Non sterile vinyl gloves offer more protection from infectious agents than non sterile latex gloves. We recommend non sterile vinyl type of glove should be used.

REFERENCES

[List of references]