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Effect of Face Surgical Mask Application Face Skin Flora, *Staphylococcus epidermidis* As A Symbol

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ABSTRACT

Skin flora is a group of microbiota residing normally skin, it has an important function through the preservation of skin from infection by their natural probiotics or other defending tools. This study aimed to show the effect of surgical masks wearing on skin flora, depending on *Staphylococcus epidermidis* as a bacterial symbol.

The study was done on 20 normal individuals who are wearing surgical mask daily during their performing their normal life activities during COVID-19 global outbreak. Skin swabs before and after mask-wearing were taken from each individual from both genders equally (10 male and 10 female individuals). Bacteriological investigations were done for each swab as soon as at the private lab at Dermatology Private Clinic. These investigations were focused on *staphylococcus epidermidis* as bacteriological skin flora before and after mask application. Results revealed a significant reduction in bacterial numbers after wearing face masks by two genders. the bacterial count was reduced from 1×10^3 to 10^2 bacterial in males and the count was 1×10^2 to 10 cells in females.

In conclusion, wearing masks was affecting skin flora on the face through the reduction of some types of bacterial skin flora, *Staphylococcus epidermidis* her as a sample.

INTRODUCTION

Facemasks are critical components of personal protective equipment (PPE) for healthcare workers, particularly when those workers are dealing with transmitted diseases (Seto *et al.*, 2003). surgical face masks could prevent the transmission of human coronaviruses and influenza viruses from symptomatic individuals (Nancy *et al.*, 2020). Skin microbiota is microorganisms normally residing skin of different sites, aerobic and anaerobic organisms and some fungi like candida. Aerobic bacterial flora resides aerated sites while anaerobic types reside in sites with reduced oxygen sites like axilla and greions (Holand & Boger 2002., Brooks *et al.*, 2013). Flora is of different types, resident flora resides on the skin permanently, while transient flora is found on the skin within a certain period or duration or season (Grice & Segre 2011., Brooks *et al.*, 2013).

Skin flora undergoes shift due to mechanical effects or chemical effects of some detergents and cosmetics particularly in females (Holand & Bogar 2002).

The great majority of these micro-organisms are gram-positive and reside on the skin surface and in the follicles (Grice & Segre, 2011). *Staphylococcus epidermidis* is one of skin bacterial normal flora, coagulase-negative, do not ferment mannitol, and sensitive to novobiocin. It causes catheter-associated infection particularly urinary tract infection (UTI). Also, it may cause endocarditis after their introduction to the bloodstream through a contaminated syringe. these organisms may cause infection to prosthetic devices like an artificial joint, prosthetic heart valve. This is due to the production of extracellular slime material by this organism, biofilm formation acts as a virulence factor (Brooks *et al.*, 2013).

MATERIALS AND METHODS

Twenty adult volunteers from both genders were included in this study following research ethics through the information of volunteers and written consent was taken from each one. inclusion criteria for this group were applied including normal individuals with normal skin and free of skin lesions and skin diseases. exclusion criteria also were followed to avoid patients and immune-compromised individuals like diabetic patients and individuals on chemotherapy or radiotherapy which are affection body flora. The study was done on 20 normal adult individuals from both genders equally (10 male and 10 female individuals) who are wearing Disposable Face Mask (China) daily during their performing their normal life activities during COVID-19

global outbreak during July And August 2020.

Skin swabs before and after mask-wearing were taken from skin covered with the mask from each individual of the study. Bacteriological investigations were done for each swab as soon as at the private lab at Drmatology Private Clinic. These investigations were focused on staphylococcus epidermidis as bacteriological skin flora before and after mask application. Direct and indirect bacteriological investigations were done to confirm the diagnosis of *Staphylococcus epidermidis* using specific biochemical investigations following (Forbes *et al.*, 2007). Direct Gram stain, cultivation on mannitol salt agar, blood agar. both coagulase and npovobiocin sensitivity tests were used to confirm the diagnosis of *Staphylococcus epidermidis*.bacterial counts were calculated using the pour plate technique.

RESULTS

Results revealed a significant reduction in bacterial number after wearing face masks by two genders. the bacterial count was reduced from 1×10^3 to 10^2 bacterial in males and the count was 1×10^2 to 10 cells in females (Table-1). Gram stain showed Gram-positive grape shape cocci. Their biochemical investigations revealed negative coagulase and positive growth on mannitol salt agar without mannitol fermentation. Positive Novobiocin sensitivity test was seen for *Staphylococcus epidermidis*.

Table-1: Number of bacteria cured of cheek skin swabs

Gender	Bacteria number before wearing masks	Bacterial number after wearing masks
Male	1×10^3	1×10^2
Female	1×10^2	1x10

DISCUSSION

Skin flora is important to skin health through their secretions and biological activities. any shift to these flora leads to skin affection like secondary skin infections of

different etiology. This local skin affection is depending on the site of skin whether it is aerated or not (Holand & Bogar 2002., Grice & Segre 2011., Brooks *et al.*, 2013).

My explanation of the significant Reduced bacterial number in both genders can be explained by the fact that wearing a mask leads to profuse sweating on the skin underneath the mask particularly in summer (The time of this study). This sweating causes wash out of normal resident bacteria and other types of normal skin flora. In addition to that Exposure to the skin as well as skin irritation through exposure to skin irritants like skin, local skin reaction to the fibers of mask cloth in some atopic individuals may lead to type one hypersensitivity reaction through shifting of Th cells in individuals leading to an increase of Th2 type imposed in type -1hypersensitivity (Male *et al.*, 2006). This work has supported the work by Schweize suggested that face masks may increase dermabrasion and bacterial shedding (Schweizer *et al.*, 1976., Holand & Bogar 2002., Bouslimani *et al.*, 2019). Reduction in bacterial type in females was more than males, this might be due to their customers to apply cosmetic materials like face skin cream. this cream may affect bacterial activities on the skin and other sites of the body (Holand & Bogar 2002., Bouslimani *et al.*, 2019).

In conclusion, wearing masks was affecting skin flora on the face through the reduction of some types of bacterial skin flora. So we recommend the use of certain types of aerated masks with high filtration efficiency and reduced humidity inside the mask to reduce the harm of such masks on the skin and skin flora.

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