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RESEARCH ARTICLE

COVID 19, PALMAR FLORA MODIFICATION AND FACIAL DERMATOLOGICAL LESIONS

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ABSTRACT

There is a frangible balance between skin health and disease. Fomite interaction is a source of microbiome heterogeneity, in regions which have a relatively stable commensal microbiome, and in communion with skin fragility can sway the balance between the commensal and pathogenic microorganisms in favour of the pathogenic microbes. With the prolonged use of alcohol-based hand sanitizers in the current context of COVID 19, causing skin irritation and increasing the chances of transient pathogenic microbes colonizing the hand/palmar surfaces. Also given that the face is on average the most touched region among the hair, face, neck and shoulders (HFNS) regions both in terms of frequency and duration. This could facilitate the increase of facial dermatological lesions specifically and dermatological and mucosal infections generally. More worryingly, this increase microbial transmission could include SARS-COV2 and hence increase COVID 19 infections even though the fomite route of transmission of COVID 19 is reported to be low.

INTRODUCTION

Hand hygiene, one of the pillars of infection control, is one of the most fundamental and extensively used behavioural approaches to stop the transmission of human infections from one person to another, and controlled experiments have shown that it is successful as a community intervention (1). Both health and disease are significantly influenced by the human skin microbiome (2).

Skin and its microbiome: Skin sites can basically be labelled as moist, sebaceous or dry (3,4) whereby a known group of microorganisms occupies each habitat (2). Furthermore, the characteristic of the skin microbiota in healthy people is topographical microbial community differences (4-7). The health and physical appearance of the skin of the human face is important for dermatological purposes. The resident microorganisms that colonize the skin (The microbiota) are crucial for preserving the physicochemical equilibrium of the skin (2). Transient microbes even though are normally only viable for short periods of time could become pathogenic and easily colonize in case of lesions/irritations (8). Bacteria are the most common microorganism in the hand microbiome (>80% relative abundance), followed by viruses and fungi (5%) (7,9). Bacteria on the hand can be divided into two categories, resident and transient (10). The prolonged use of alcohol-based hand sanitizer during the COVID 19 pandemic (in part due to phobia) might modify the resident flora permitting the proliferation of

pathologic bacteria at the expense of commensal bacteria and hence causing more dermatological lesions especially facial dermatological lesions.

Self-touching and Surfaces: Self-touching could encourage the spread of germs from surfaces to mucosa or between body parts (1,11). This can be seen in the healthcare system where the palmar flora modification in healthcare workers (HCWs) which might contain more antibiotic resistant bacteria strains, has no role with antibiotic consumption but rather patients and inanimate objects in the hospital setting (1,10). Different respiratory viruses, including SARS-CoV-2, have been modelled for fomite-mediated transmission (1,12,13). This self-inoculation mechanism could have a profound effect as a route of microbial transmission. HCWs have a high prevalence of skin irritation, perhaps because of the need for frequent hand sanitization in hospitals (8,14). Studies have revealed that healthcare workers' hands are highly contaminated with bacteria (8). Hence the maintenance of healthy skin is crucial especially for HCWs. In particular, the preservation of lipids, fatty acids and resident microbial flora is important (8,15). More pertinently, continuous use of alcohol disinfection has been linked to unfavorable skin consequences as itchiness, burning, and dryness (8,16). The reason for these skin side effects is because alcohol disinfectants, which are by definition germicidal, can react with the intercellular lipids of the stratum corneum, causing lipid solubilization, fluidization, and extraction.

However, this reaction can be slowed down by emollients like glycerol (17,18). Through repeated contact with contaminated ambient surfaces, the hands play a crucial role in the transfer of the microbiome, and it has been demonstrated that a typical hand surface contains more than 150 distinct species-level bacterial phylotypes (11,19).

The distribution of touches to surfaces is crucial because more than 10% of touch time has been shown to be spent on the hair, face, neck, and shoulders (HFNS). It has been demonstrated that students contacted surfaces with both hands for more than 90% of the time that was monitored in their workplace (11,20). In the same vein, the face exhibited the highest touch frequency among the HFNS regions, accounting for 76.9% of touches and 85.3% of contact time (11). Concerning the duration per touch, regardless of the surface, quick touches of less than 3 seconds dominated however these quick touches were least represented by the face and for a duration that lasted longer than 1 minute, the face had the highest percentage; 4.6% (11) meaning on average a longer duration of contact with the face and hence higher chance of microbial transmission. The fomite route of transmission of COVID 19 is low (21) but this rate could be increased with the long term effect of alcoholic hand sanitizers use in this current pandemic. Furthermore, there is a chance that a living virus will be transferred to these surfaces before it dies if the nostrils or other HFNS parts are frequently touched by an individual (11).

Without or with symptoms, SARS-CoV-2 infected people could infect their surroundings, which would then contaminate the hands of the general public. Perhaps wide spaces are more suited for this kind of transmission. Therefore, in these regions, contamination of the face through the use of objects and hands may be a crucial method of SARS-CoV-2 transmission among the general public (22). Interaction with inanimate objects (fomites) has been shown to be another source of variability in the hand microbiome. A home becomes colonized with its occupant's microbiome, and this microbiome could be matched to light switches in their homes, as well as personal possessions such as cell phones and keyboards, indicating hands are a key vector for microbial contamination of surfaces within the home (9,23)

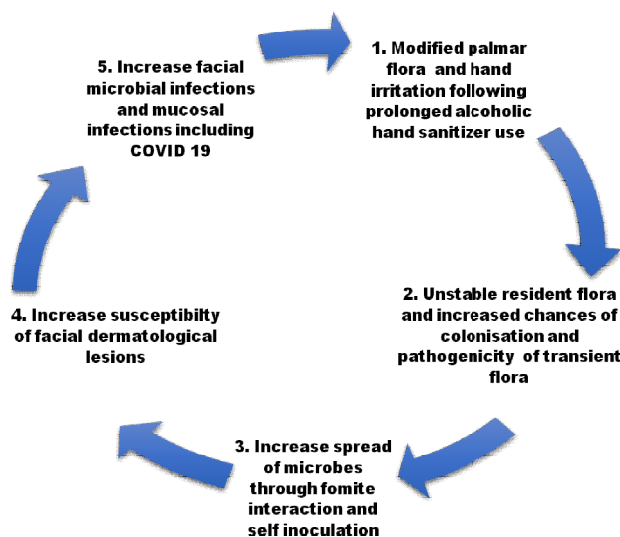


Figure 1. Vicious cycle due to palmar flora modification following prolonged alcohol-based hand sanitizers in the current COVID 19 context

Regarding surfaces, a number of surface characteristics exist and are thought to be crucial determinants of initial bacterial adherence to surfaces (24,25). In general, small air pockets may get trapped in the pores and grooves of a hydrophobic surface when the roughness of the surface increases. Liquids lying on this interface are easily removed and are unable to enter the surface grooves (26). The Cassie-Baxter state, which is the basis for superhydrophobic surfaces, is an

event triggered by the interaction of surface roughness and wettability (26) and is ideal to prevent this transfer of microbes. Hence the use of modified surfaces (like the Cassie-Baxter state) could prevent surface to hand transmission in general and biofilm transmission especially in hospital settings with the risk of nosocomial infections and also in open areas

CONCLUSION

The preventive measures put in place to prevent transmission during the present COVID 19 pandemic are necessary to curb the wave of infection. Though the benefits outweigh the risks, these potential pathologies should not be neglected but rather we should be prepared to face and better tackle them. We fear that this palmar flora modification could increase facial microbial contamination in general and increase COVID19 contamination specifically.

Conflict of Interest: None of the authors have a conflict of interest to disclose

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