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EFFECT OF HYGIENE ON GROWTH AND VARIATIONS OF CULTURABLE BACTERIA IN THE HUMAN AXILLA

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Relevance. The human axilla has a complex microbial system which directly influences body odor, skin health and infection susceptibility. However, the effect of the daily hygiene (frequency of taking a shower, shaving, and the type of products) on the axillary bacteria that can be cultured is not well-quantified. This evidence gap limits the development of science-based hygiene recommendations.

Aim: to determine the correlation between personal hygiene measures and the density, diversity and pathogenic potential of bacteria present in the axillae of 25 healthy volunteers.

Materials and methods. The research involved the cross-sectional study of 25 individuals (14 males, 11 females; 18-73 years of age; mean age 29.4 years). Sterile swabs were used to sample the upper axillary region of each participant. A questionnaire survey was documented using a structured questionnaire and included parameters of showering frequency, armpit shaving status, primary hygiene products and self-reported odor changes. Samples were cultured on standard agar using the quadrant streak plate method and incubated aerobically at 37°C for 48 hours. The growth of bacteria was semi-quantified (10^1 -10^6 CFU), and the number of individual types of colonies was counted on each plate. Each type of unique colony was stained by Gram. Further identification was done by the use of Sabouraud Dextrose Agar (yeast/fungi detection), Yolk Sac Agar (lecithinase activity), Blood Agar (hemolysis patterns), lactose fermentation media, and oxidase tests. Bright-field microscopy under oil immersion was used to confirm the final confirmation.

Results and their discussion. A total of 55 distinct bacterial and fungal isolates were recovered. Five respondents (20%) experienced no growth - all showered daily and applied deodorant or antiperspirant. Frequency of showering was inversely correlated with bacterial load: participants who showered less than once a day (n=3) had the highest loads (10^5 -10^6 CFU) whereas those who showered more than once a day (n=8) had the lowest loads (10^3 -10^4 CFU). Two participants reported never shaving. The bacteria density in both was high (10^6 CFU each). One non-shaver yielded three distinct Tetracoccus isolates; the other yielded Tetracocci, fungi, and Gram-negative rods. The non-shavers had a significant increase in microbial loads and the abundance of Tetracoccus over shaved people. Clinically relevant findings included alpha-hemolysis (2 participants), beta-hemolysis (1 participant), lecithinase activity (3 isolates), and lactose fermentation (4 isolates). Sabouraud agar was colonized by fungi in six participants (24%), and fungal loads of 10^6 CFU were obtained. Gram-positive cocci dominated (49/55 isolates, 89%); Gram-negative rods were rare (6/55, 11%). Unexpectedly, participants who reported stronger odor when not shaving (n=9) showed lower bacterial diversity (1.89 morphotypes/participant) compared to those noticing no odor difference (n=16), who had higher diversity (2.38 morphotypes/participant). This suggests odor intensity correlates with dominance of specific odor-producing species rather than overall microbial richness.

Conclusions. The axillary microbiota is significantly impacted by personal hygiene. Showering reduces bacterial load; high-density growth (10^6 CFU) is rarely observed after showering. Non-shavers also show a consistently increased level of bacteria loads and Tetracoccus density. Clinically relevant isolates are hemolytic, lecithinase-positive, lactose-fermenting bacteria and often co-colonization by fungi (24%). Interestingly, decreased diversity correlates with stronger odor, an unexpected result with profound implications for our understanding of the biology of body odor. The findings offer a scientific basis of individual hygiene prescriptions and emphasize the risk of infection due to such common practices.