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RESEARCH PAPER

AN ASSESSMENT OF SKIN BACTERIA FLORA OF SOME OCCUPATIONAL GROUPS IN EKPOMA, EDO STATE, NIGERIA

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ABSTRACT

The study examined the bacteria species associated with the skin of different occupational groups in Ekpoma, Edo State, Nigeria. A total of one hundred (100) swab samples were collected from four different occupational groups in Ekpoma, and cultured on Nutrient and Blood agar, and incubated at 37°C. Bacteria isolates were identified based on macroscopic and microscopic examinations, as well as the catalase, oxidase and coagulase tests. The results showed that the rate of bacterial isolates from the skin of various occupational groups for the population under study was 64%. Out of the 25 samples collected from each occupation, 11(44%) were positive for students, 21(84%) were for bike riders, 12(48%) for office workers, and 20 (80%) for bricklayers. Bike riders appeared to be the occupation with the highest skin-bacterial isolates, followed by bricklayers, office workers and students. *Staphylococcus spp.* was the bacteria isolated the most with a total number of 64 for all the occupational groups. The distribution of isolates per occupational group were 3.67±2.36 for students, 21.0±9.50 for bike riders, 4.0 ±3.61 for office workers and 6.67±5.35 for bricklayers. Therefore, there is the need to develop newer methods of identifying, monitoring and assessing skin infections because of the distribution of isolates in different occupational groups.

Keywords: Bacteria, Colonization, Ekpoma, Occupational, Skin

INTRODUCTION

Bacteria are usually regarded as pathogens, potential pathogens, commensals, symbiotic or innocuous symbiotic organisms. The skin flora, more properly referred to as the skin microbiota, are the microorganisms which reside on the human skin (Grice *et al.*, 2009). The normal human skin is colonized by huge numbers of bacteria that live as commensals on its surface, but sometimes pathogenic bacteria not normally found on the skin may colonize the skin and lead to disease (Hay and Adriaans, 2004). Apart from these pathogenic organisms, a wide range of bacteria land fortuitously on the skin, but are unable to multiply (Hay and Adriaans, 2004). When the skin is inflamed or abnormal, it is often difficult to determine whether an organism isolated is causing or contributing to the observed pathology especially when the skin is damaged or the immune status of the subject is impaired. When the immune system of a subject is impaired, bacteria usually regarded as non-pathogenic in body surface may assume the role of opportunistic pathogens (Dahl, 1993).

Within a given bacteria specie, there may be strain differences in virulence. Some bacteria strains tend to cause disease, perhaps due to greater adherence to epithelial cells or enzyme production. There are some studies investigating skin flora on healthy and ill population to identify any possible relationship between disease and microbial flora of the skin (Zell *et al.*, 2008). Advances in microbiology and immunology are revising our understanding of the molecular mechanisms of microbial virulence and the specific events involved in the host–microbe interaction. Current data contradict some historical classifications of cutaneous microbiota and suggest that these organisms may protect the host, defining them not as simple symbiotic microbes but rather as mutualistic (Berlau *et al.*, 1999). There is evidence however, that the skin



creates antimicrobial peptides like cathelicidins that control the proliferation of skin microbes. Cathelicidins not only reduce microbe numbers directly, but also cause the secretion of cytokines that induces inflammation, angiogenesis, and re-epithelialization under the influence of vitamin D3 (Schauber and Gallo, 2008).

Naturally, the superficial layer of the skin is acidic (pH 4-4.5) due to lactic acid in sweat and produced by skin bacteria (Lambers *et al.*, 2006). At this pH, mutualistic flora like *Staphylococci*, *Micrococci*, *Corynebacterium* grow, but not transient bacteria such as Gram negative bacteria like *Escherichia* and *Pseudomonas* or Gram positive ones such as *Candidaalbicans* (Lambers *et al.*, 2006). Another factor affecting the growth of pathological bacteria is that the antimicrobial substance secreted by the skin is enhanced in acidic condition (Lambers *et al.*, 2006). In alkaline conditions, bacteria cease to be attached to the skin and are more readily shed. It has been observed that the skin also swells under alkaline conditions and the pores open up allowing move to the surface (Lambers *et al.*, 2006). This study intends to determine the bacteria species associated with the different occupational groups and to compare the bacteria species present in the different occupational groups.

MATERIALS AND METHODS

Study Area: This study was carried out in the Ekpoma, Esan West Local Government Area of Edo State. Edo state lies between longitude 06° 04'E and 06° 43'E and latitude 05° 44'N and 07° 34'N with a land mass of 17, 450 sq.km located in the South-South geopolitical zone of Nigeria with a population of 3.1 million people. Ekpoma is a semi- urban town with the major occupation of farming, trading, civil servants and students (World Gazzetter, 2007).

Study Population: Participants selected included; 1) Students of Ambrose Alli University and residing in Ekpoma and its environs; 2) Office workers/civil servants in Ekpoma and environs; 3) Commercial motorcycle riders (Bike riders) in Ekpoma and environs; 4) **Brick layers** (masons) in Ekpoma and environs involved in building houses and other structures using cement.

Sampling Technique: Simple random sampling technique was used to select the subjects for this research.

Ethical Permission: Ethical approval was obtained from the Health Research Ethics Committee, Ambrose Alli University, and informed consent was sought from the various individuals.

Inclusion and Exclusion Criteria: The listed occupational groups (Students, Office workers, Bike riders and Brick layers) with no obvious signs and symptoms of any underlying illness were included in this study. Other occupational groups were excluded from the study.

Study Design: This study was a descriptive/ analytical study.

Sample Size/Specimen Collection: One hundred subjects were enrolled for this study without skin infection with 25 samples from each of the four (4) occupational groups in Ekpoma, Edo State. Samples were taken using sterile cotton swabs from skin of subjects.

Laboratory Analysis: The skin swab sticks were inoculated on each plate of Nutrient and Blood agar by making primary inoculums on a small area of the agar plate and then streaked out. The inoculated media was incubated aerobically at 37°C for 24 hours. Microorganisms were classified on the basis of macroscopic, microscopic and differential tests.

Gram Staining: The skin swab contents and colonies isolated from the samples were carefully placed on a sterile, grease-free microscope slide containing a drop of normal saline and allowed to air-dry. It was fixed by passing over the pilot flame of the Bunsen burner three times. The fixed smear was flooded with Crystal violet for 30 seconds before washing off with tap water. Lugol's iodine was added and washed up after about 30 seconds and subsequently decolorized rapidly using acetone and washed off immediately. Neutral red (Counter stain) was added and washed off after about 60 seconds. The slides were placed in a draining rack for the smear to air dry. After drying, a drop of immersion oil was applied on the smear and viewed microscopically using oil immersion objective (Cheesbrough, 2006).

Biochemical Test: Identification of bacteria was done by carrying out biochemical tests such as catalase test, Oxidase test and coagulase test (Cheesbrough, 2006).



Statistical Analysis: Statistical analysis was done using the Statistical Package for Social Sciences (SPSS), version 17.0. The mean values were determined against the different parameters. Analysis of variance was used to determine any significant difference between the products.

RESULT

The results of the study are based on the microbiological examination of skins for the isolation of bacteria species associated with skin of different occupational groups in Ekpoma, Edo State. A total number of 100 samples were collected, 25 each from students, bike riders, office workers, and bricklayers out of which a total of 64 samples were positive. Out of the 25 samples collected from each occupation, 11 were positive for students, 21 were for bike riders, 12 for office workers, and 20 for bricklayers as shown in Table 1 and 2 that the total number and percentage of positive samples with bricklayers being the highest occupation with bacterial isolates on the skin followed bike riders

Table 3 and 4 shows the distribution of isolates according to occupation and the mean \pm SD of the bacteria isolated from each occupational group. These are illustrated in the tables below.

Table 1: Total number and percentage of the various occupational groups that bacterial were isolated from their skin.

Parameters	Students	Bike riders	Office workers	Bricklayers
No. of samples collected	25	25	25	25
No. of positive samples.	11	21	12	20
Percentage (%)	44%	84%	48%	80%

Table 2: shows the number of positives samples and negative samples.

Parameters	Student	Bike riders	Office workers	Bricklayers	Total
Positive samples	11	21	12	20	64
Negative samples	14	4	13	5	36
Total	25	25	25	25	100



Table 3: Distribution of isolates according to occupation

Parameters	Students	Bike riders	Office workers	Bricklayers
Staphylococcus spp.	7	18	9	14
Streptococcus spp.	-	1	-	3
Micrococci	4	2	3	3
Total	11	21	12	20

DISCUSSION

The study provides the assessment of microbiological examination of skin swab for bacteria species associated with the skin of different occupational groups in Ekpoma, Edo State. From the results obtained, it showed that the rate of bacterial isolates from the skin of various occupational groups for the population under study was 64% which is similar to those of several previous studies by (Berlau *et al.*, 1999; Oluwadiya, 2004; Ogaraku and Onovo, 2007). Out of the 25 samples collected from each occupations, 11(44%) were positive for students, 21(84%) were for bike riders, 12(48%) for office workers, and 20(80%) for bricklayers. Bike riders appeared to be the occupation with highest bacterial isolates on the skin followed by bricklayers, office workers and students. The results also showed that *Staphylococcus spp.* was the highest bacterial isolated with a total number of 64 for all the occupational groups. Dethlefsen and Relman, (2011), reported that Environmental factors specific to the individual, such as occupation, clothing choice and antibiotic usage, may modulate colonization by the skin microbiota. Physiological and anatomical differences between male and female cutaneous environments such as sweat, sebum and hormone production, also partially account for the microbial differences seen between the genders (Giacomini *et al.*, 2009). It is obvious that a relationship exist between the type of bacteria flora carried on the skin and occupation.

For many decades, researchers have been interested in defining the microbial inhabitants of human skin, focusing on descriptive features such as their association with infection (McBride *et al.*, 1977), their stability over time (Evans, 1975), and their interactions with other microbes (Wright and Terry, 1981). Currently, our understanding of the human microbiota is undergoing a dramatic reassessment. The application of high-throughput DNA sequencing to the collection of individual genomes of microorganisms which normally inhabit the human body (the 'microbiome') (Peterson *et al.*, 2009) enables characterization of microbial communities in addition to individual microbes. The estimate of the number of species present on skin bacteria has been radically changed by the use of 16S ribosomal RNA to identify bacterial species present on skin samples direct from their genetic material. Previously such identification had depended upon microbiological culture upon which many varieties of bacteria did not grow and so were hidden to science (Grice *et al.*, 2009).

CONCLUSION

In order to meet the huge challenge of occupational safety in the 21st century, a coordinative and cooperative approach is required. This will be a major task of the public health community and will require the use of new methods of identifying, monitoring and assessing skin infections, including the wide application of the hazard analysis and critical control point system. Both traditional and new technologies for occupational safety should be improved and fully exploited. This needs to be done through public/private partnership, legislative measures where suitable but much greater reliance will have to be placed on voluntary compliance and on education of the different occupational safety tips and care.





RECOMMENDATIONS

It is recommended that establishments must ensure compulsory and proper treatment of staff with active illnesses. They should also train and re-train staff on good hygienic practices, while discouraging behaviours that could aggravate skin-bacteria infestations.

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