ANTIBIOGRAM ANALYSIS OF PATHOGENIC BACTERIA ISOLATED FROM HUMAN NAILS

Sidra Farooq[1], Aqdas Zoreen[2], Muhammad Saqib Ishaq[3], Moin Ud Din[4], Muhammad Sohail[5], Amjad Khan[6], Faheem Ullah[7]

ABSTRACT

OBJECTIVES

The objective of this study was to isolate bacteria from human nails of public of Peshawar and perform antibiogram analysis of isolated bacterial species.

METHODOLOGY

For this study, a total of 25 samples were collected from nails of students of Abasyn University, Peshawar. These samples were cultured on Nutrient agar, Eosin Methyl Blue dye agar and Mannitol Salt agar and were identified by Catalase, Oxidase, Triple Sugar Iron, Citrate, and Indole tests.

RESULTS

It was found that 60% of collected hand samples were contaminated with 47% Staphylococcus aureus (S. aureus) and 53% Escherichia coli (E. coli). Antibiogram analysis showed that the most potent antibiotic for E. coli and S. aureus was Ciprofloxacin (22mm and 26mm respectively) while less effective antibiotic was Cefixime having zone of inhibitions 13mm for E. coli and 10mm for S. aureus.

CONCLUSION

The results concluded that mostly the human nails are contaminated due to environmental factors and thus, require good hygienic practices to prevent different transmission of different infection.

KEYWORDS: *Antibiogram, Cefixime, Ciprofloxacin, E. coli, S. aureus*

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Correspondence
[3]Muhammad Saqib Ishaq, Assistant Professor, Abasyn University, Peshawar
: +92-332-9116867
: saqib.ishaq@abasyn.edu.pk
[1]Assistant Professor, Abasyn University, Peshawar
[2]Lecturer, Abasyn University, Peshawar
[4]Student, Abasyn University, Peshawar
[5]Student,Abasyn University, Peshawar
[6]Lecturer, Abasyn University, Peshawar
[7]Student,Abasyn University, Peshawar

INTRODUCTION

Microorganisms are widely distributed all over the world be it air, water, soil and even human body. Human body is said to be the shelter of millions of bacteria, viruses, fungi and other many other invisible organisms.[1] The hand acts as a significant transmission platform for different microbes, including the enteric species[2]. Hand washing has long been recognized as an important procedure in preventing the transmission of disease.[3] Contaminations of hands play a significant role in fecal-oral transmission of diseases. The unhygienic habits of most of the people result in the varied infections through hands and fingernails. Eighty percent of the diseases related to the poor domestic and private hygiene. One in every of the ways of healthy living is hand hygiene.[4] The hands are the parts of the human body that are in most contact with the outside world. People use their hands for a variety of activities every day. It is extremely easy to encounter different microbes and to transfer them to other objects and maybe even people. Surprisingly, fingernails harbor the most bacteria found on the human hands.[5] Healthcare worker's hands are the most common vehicle for the transmission of healthcare- associated pathogens from patient to patient and within the healthcare environment. Hand hygiene is the leading measure for preventing the spread of antimicrobial

resistance and reducing healthcare-associated infections (HCAIs), but healthcare worker compliance with optimal practices remains low in most settings. Available evidence highlights the fact that multimodal intervention strategies lead to improved hand hygiene and a reduction in HCAI.[6] Microbes may still occur under fingernails when hands are washed. Higher microorganism populations (2 to 3 log CFU / fingernail) 10 happen commonly under the nails and are often harder to remove than at other hand places. Determination of prevalence of Enterobacteriaceae in the mouths of chronic nail-biters may be useful for clinicians. The predominant aerobic bacterial flora of the large intestines of man and animals is composed of non-sporing, non-acid-fast, Gram-Negative bacilli.[7] Most infection control guidelines recommend that fingernails are kept short. This facilitates cleaning but it has also been shown that longer nails have increased numbers of microorganisms. Long nails are also more likely to tear gloves, thereby breaking the barrier.[8] Bacteria found in nails are very much like those present on hands with the difference that there are fungi and bacilli also under the nails. Normal floras of the skin include Pseudomonas aeruginosa, Staphylococcus aureus and Streptococcus mitis etc. Staphylococcus aureus is a normal flora that is found under the clean fingernails. P. aeruginosa is associated with green nail syndrome, resulting in greenish discoloration of the nail plate. Proteus species cause Black paronychia. Staphylococci and Streptococci may be found as secondary invaders of infection. [9] There is now sufficient evidence to recommend that artificial nails constitute an infection risk in high-risk areas and should not be worn in clinical areas, though further investigations are necessary to better define the risks involved.[10] The aim of the current study was to perform antibiogram analysis of bacterial species isolated from human nails.

METHOLODOGY

A total of 25 samples were collected from the students of Abasyn University, Peshawar. The samples were collected from human nails by using sterile swab sticks. The swab stick was moistened with normal saline and was rubbed over proximal, medial, and distal surface of nails. The samples were then brought to Microbiology Research Laboratory, Abasyn University, Peshawar for further processing. The collected samples were streaked on Nutrient agar, Eosin Methyl Blue dye agar and Mannitol Salt agar. The plates were incubated at 37°C for 24 hrs. The isolates were identified by using Standard Microbiological Procedures i.e., Colony characteristics, Gram staining, Colony counts and Biochemical tests (Catalase, Citrate, Indole, TSI, Oxidase). Agar well diffusion method was used for evaluating the antibiotic susceptibility of the isolated bacterial species.

RESULTS

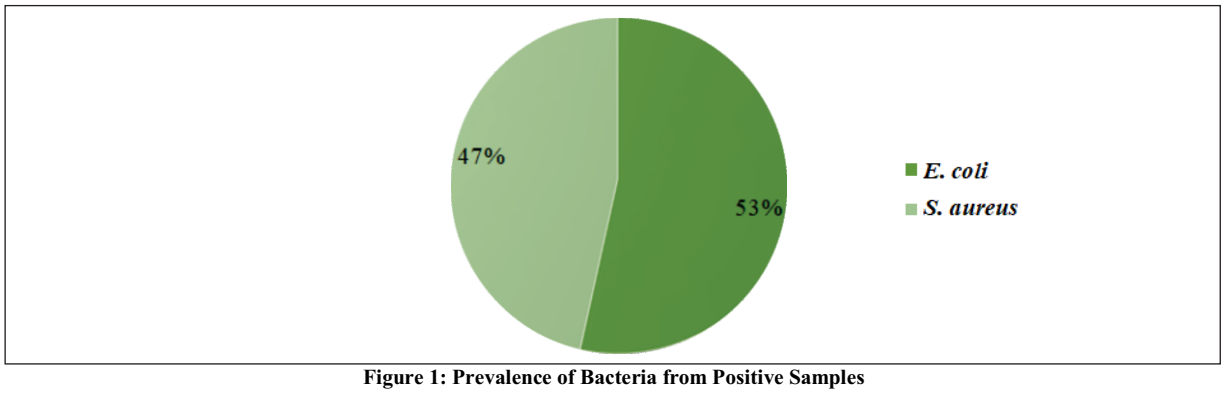

Figure 1: Prevalence of Bacteria from Positive Samples

Table 1: Structural and Morphological Characteristics

Isolates	Microbial Growth (Nutrient Agar)	Shape	Gram Staining
E. coli	Greyish white	Rod	- ive
S. aureus	Golden-yellow colonies	Spherical	+ ive

Table 2: Biochemical Test of Isolated Species

Identified Organism	Catalase	Oxidase	Urease	Coagulase	Indole	TSI	Gram Stainin	Butt Shape	Citrate
E. coli	+	-	-	-	+	Acidic g+ve	-	Yellow	-
S. aureus	+	-	+	+	-		+	-	+

Key; + = Positive, - = Negative, Yellow = Acid Production, Pink = Alkaline, G = Gas

Table 3: CLSI Standard Values of Showing Resistance, Susceptibility and Intermediate Value

Bacteria	Ciprofloxacin			Gentamycin			Amoxicillin			Amikaci			Cefixime		
	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R
E. coli	>21	16-20	>15	>15	13-14	>12	>18	14-17	>13	>18	14-17	>13	>14	16-18	>15
S.aureus	>18	14-16	>12	>15	13-14	>12	>17	14-15	>13	>15	13-14	>12	>12	11-10	>10

*S = Standard, I = Intermediate, R = Resistant

Table 4: Antibiogram Analysis of E. coli and S. aureus

Isolates	Ciprofloxacin	Gentamycin	Amoxicillin	Amikacin	Cefixime
E. coli	22 mm	16 mm	12mm	20mm	13mm
S. aureus	26 mm	15 mm	11mm	12mm	10mm

DISCUSSION

Human hands play major role in transmission of different microbes. Transmission of microbes leads to spread of different diseases. Human hands and fingers are re-contaminated with different types of microbes due to frequently in contact with outer world.[11] The bacterial contamination as well as the resistance developed by these bacterial species is very contagious.[12] In this study, A total of 25 samples were collected from hands of nails of students of Abasyn University, Peshawar. Out of 25 samples, 15 (60%) were positive and 10 (40%) were negative. The bacterial species isolated and identified were Escherichia coli and Staphylococcus aureus by using plate culture method and biochemical characteristics. These findings were supported by other studies as well.[13,14,15] The isolated bacterial species were subjected to antibiogram analysis, a total of five antibiotics were used as shown in Table 3. according to CLSI guidelines. Table 4. shows the antibiogram analysis of isolated species against selected antibiotics. Different classes of antibiotics were used to determine the susceptibility profile of the isolated bacterial species. The results showed that Ciprofloxacin (22mm) and Amikacin (20mm) were most effective against E. coli followed by Gentamycin (16mm) whereas for Amoxicillin (11mm) and Cefixime (13mm) resistance was observed. Similarly for S. aureus, the most potent antibiotic was Ciprofloxacin (26mm) followed by Gentamycin (15mm) while for Amoxicillin (11mm), Amikacin (12mm) and Cefixime (10mm) resistance was observed. Quantitative differences in the composition and density of microflora in different areas of the hands of 26 adult volunteers was determined. In quantitative cultures from five subungual spaces in 26 subjects, coagulase-negative Staphylococci were the dominant organisms, with Staphylococcus epidermidis, S. hemolytic and S. hominis being the most frequently isolated species whereas in the current study two bacterial species were isolated and identified from the nails i.e., E. coli and S. aureus.[16,17,18] From the results of the current study, it is thus recommended that; For accurate analysis, the sample size should be increased so that more bacteria should be isolated and identified from nails. Furthermore, different, and diverse groups of antibiotics should be used for antibiogram analysis. It is also recommended that proper personnel hygiene should be followed, to prevent diseases.

CONCLUSION

From current study it is concluded that of out of 25 samples, 15 samples were contaminated with different type of bacteria including E. coli (53%) and Staphylococcus aureus (47%). Furthermore, antibiogram analysis showed that the most potent antibiotic for E. coli and S. aureus was Ciprofloxacin (22mm and 26mm) while resistance was observed against Cefixime i.e., E. coli (13mm) and S. aureus (10mm).

LIMITATIONS

Although a satisfactory response was achieved in the study convenience sampling potentially jeopardizes the generalizability of the findings. The open-ended questionnaire, on the other hand, can let patients explain more in detail their experiences. As a result, it is advised that open-ended questions be used in future research to assess patient responses.

CONFLICT OF INTEREST: None

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CONTRIBUTORS

1. **Sidra Farooq** - Supervision; Final Approval
2. **Aqdas Zoreen** - Data Analysis/Interpretation
3. **Muhammad Saqib Ishaq** - Critical Revision; Final Approval
4. **Moin Ud Din** - Data Acquisition; Drafting Manuscript
5. **Amjad Khan** - Critical Revision
6. **Faheem Ullah** - Drafting Manuscript