RESEARCH ARTICLE

Burden of bacterial contamination: A cross-sectional study to estimate the bacterial isolates from the surfaces of a bacteriology laboratory

Ranadeep Ghosh¹, Sanjeev Das², Jayashree Konar³

¹Department of Microbiology, Coochbehar Government Medical College, Coochbehar, West Bengal, India, ²Department of Microbiology, Purulia Government Medical College Deben Mahato Hospital, Purulia, West Bengal, India, ³Department of Microbiology, Dr. B.C. Roy Post Graduate Institute, Kolkata, West Bengal, India

Correspondence to: Jayashree Konar, E-mail: jayashreek742@gmail.com

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ABSTRACT

Background: Contamination in a bacteriology laboratory setup may result in erroneous interpretation. Aim and Objective: To estimate the bacterial isolates from different surfaces of the bacteriology laboratory of a tertiary care hospital. Materials and Methods: A total number of 165 samples were taken from different surfaces of the laboratory including tabletops, floor, walls, and workbench tops at the beginning of morning session for consecutive thirty working days (June 2019). Surface swab technique was followed using pre-incubated Nutrient agar (Basal plate), Mac-conkey’s agar (Selective and differential media), and Blood agar plates (enriched media). Aerobic incubation was done overnight at 37°C. Discrete colonies were studied by Gram, Ziehl-Neelsen, and Albert staining followed by the tests for motility and a series of biochemical reactions. Results: Out of 165 collected swabs, growth was observed in 23 (13.93%). Out of these 23 isolates, none was from the workbench top. Majority (47.82% i.e., 11/23) was from the floor. Amongst 23 isolates, 14 (60.86%) were Gram-positive in nature and 7 (30.43%) found to be motile. Isolated bacteria comprised Micrococcus spp. (34.78% i.e., 8/23), Pseudomonas spp. (17.39%,4/23), Coagulase-negative Staphylococcus spp. (13.04% i.e., 3/23), Bacillus spp. (13.04%, i.e., 3/23) and Acinetobacter spp. (21.73% i.e., 5/23). From floor, majority of the isolates were Micrococcus spp. (45.45%, i.e., 5/11) whereas in wall, mostly Bacillus spp. (33.33%, i.e., 3/9) and tabletop, all of the isolates were Coagulase-negative Staphylococcus spp. Conclusion: Vigilant disinfection and maintenance of personal hygiene of laboratory workers are essential to eliminate contamination.

KEY WORDS: Contamination; Bacteria; Disinfection

INTRODUCTION

Contamination may be defined as the undesired invasion of impurities.[¹] Contamination in a bacteriology laboratory setup may result in erroneous interpretation and biased antimicrobial suggestions. Often it becomes challenging to differentiate a true pathogen from the insignificant isolates in contaminated set up especially during interpretation of bloodstream infection isolates such as coagulase-negative Staphylococcus spp., Diphtheroides, Bacillus spp., Pseudomonas spp. Etc.[²,³] This study was performed to estimate the proportion of bacterial contaminants from different surfaces of a bacteriology laboratory.

Objective(s)

The objective of this hospital-based descriptive cross-sectional study was to estimate the prevalence of different...
bacterial isolates from different surfaces of the bacteriology laboratory of a tertiary care hospital.

MATERIALS AND METHODS
The present study was performed in the bacteriology of a tertiary care hospital to isolate and identify the aerobic and facultative anaerobic bacteria having the potential to cause contamination during bacteriological culture. A total number of 165 samples were taken from different surfaces of the laboratory including tabletops, floor, walls, and workbench tops at the beginning of the morning session for consecutive thirty working days (June, 2019). Surface swab technique was done. Nutrient agar plate (Basal plate), Mac-conkey’s agar (Selective and differential media), and Blood agar plates (enriched media) were used in this study. Preincubation of the culture plates was done for half an hour. Aerobic incubation of the inoculated media plates was done overnight at 37°C. For phenotypic isolation, discrete colonies were further selected to study by Gram, Ziehl-Neelsen and Albert staining followed by the tests for motility and a series of biochemical reactions. No human or animal sample or data was utilized in this study and no unethical measure was taken to perform this study.

RESULTS
Of 165 collected swabs, growth was observed in 23 only (13.93%). Out of these 23 isolates, none was from the workbench top and majority (47.82% i.e., 11/23) was from the floor [Figure 1 and Table 1]. Most of the isolates were contributed from floor and wall (The Fisher exact test statistic value is 0.0025, significant at \( P < 0.05 \)). Amongst these 23 isolates, 14 (60.86%) were Gram-positive and rest were Gram-negative and in nature [Figure 2]. Out of these 23 isolates, 7 (30.43%) were found to be motile in nature [Figure 3]. Isolated bacteria comprised of Micrococcus spp. (34.78% i.e., 8/23), Pseudomonas spp. (17.39%,4/23), Coagulase-negative Staphylococcus spp. (13.04% i.e., 3/23), Bacillus spp. (13.04% i.e., 3/23) and Acinetobacter spp. (21.73% i.e., 5/23). From the floor, majority of the isolates were Micrococcus spp. (45.45% i.e., 5/11) whereas in the walls, mostly Bacillus spp. (33.33% i.e., 3/9) and tabletop, all of the isolates found to be Coagulase-negative Staphylococcus spp. [Figure 4].

DISCUSSION
Laboratory contaminants vary according to geographical and temporal distribution. It also reflects the success of infection control practices.\[^4\] Often the contaminants are overlooked and underreported leaving a loophole in the surveillance measures.\[^5\] Kumari et al. have reported Coagulase-negative Staphylococci as the leading contaminants followed by Diphtheroids, isolated from the files used for keeping patient’s record.\[^6\] In a separate study from Kohat university, major contaminants (36.36%) were Staphylococcus epidermidis.\[^6\] On the contrary, in this present study, Micrococcus spp. was
found to be the commonest one followed by *Acinetobacter* spp. No Coryneform bacterium (Diphtheroides) was isolated in this study. In this present study, from floor samples, the majority of the isolates were *Micrococcus spp.* (45.45%) but Vesley et al. (2001), in their study, reported only *Bacillus subtilis* from floor.[7] Similar study performed by Alothman et al in 2009 shows that on the tabletop, several species of Staphylococcus and Diphtheroides were found to be predominant whereas in the present study, from tabletop, only Coagulase-negative *Staphylococcus* were isolated.[9] In this study, only 13.93% surface contaminants were reported and there was no isolate over the workbench top. These findings indicate a satisfactory cleaning practice at the end of the everyday session. In accordance with the previous reports, significant number of the isolates was from floor and wall.[7,9] However, any kind of health care setup contaminants may be the potential cause of Nosocomial infection as well as misinterpretation of results causing in injudicious use of antimicrobials.[9,10] Being a descriptive cross-sectional one, this study lacks analytical evidences and an anaerobic profile could not be done. Anyway, as in most of the health care delivery setups, contamination is often under reported, this type of study may be a simple yet effective measure to evaluate the cleaning and infection control practices.[11]

**CONCLUSION**

*Micrococcus spp.* and *Acinetobacter spp.* seem to be the major contributors in the laboratory contaminant list along with *Pseudomonas spp.* and Coagulase-negative *Staphylococcus*. Thus, vigilant laboratory disinfection, as well as maintenance of personal hygiene of laboratory workers, is the need of the hour to eliminate these types of trespassing micro agents.

**REFERENCES**


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