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Research article

EFFECTS OF HAND WASH AGENTS: PREVENT THE LABORATORY ASSOCIATED INFECTIONS

*Singh Gurjeet, Urhekar AD, Raksha.

Department of Microbiology, MGM Medical College and Hospital, Sector-18, Kamothe, Navi Mumbai, Maharashtra, India.

*Corresponding author **e**mail: gurjeetsingh360@gmail.com

ABSTRACT

Background: The aim of this study was to find out the prevalence of bacteria and their antimicrobial susceptibility pattern in hands of the laboratory workers. Laboratory associated infections are an occupational hazard for laboratory workers in the microbiology laboratory. The workers can expose to infection if they do not properly wash their hands before taking food. **Materials:** Swabs from 35 laboratory workers was taken before and after applying the different disinfectants. The swabs were directly inoculated onto blood agar, MacConkey agar and nutrient agar. Inoculated plates were incubated at 37ºC for 24 hours. The antibiotic sensitivity testing was done by Kirby Bauer disc diffusion method according to CLSI guidelines. **Results:** This study detects the major pathogenic bacteria in hands i.e. *Staphylococcus aureus* (40.58%), CoNS (21.74%), *Klebsiella oxytoca* and *Pseudomonas aeruginosa* (8.70%) were isolated. **Conclusion:** This study helps to minimize the infections by proper hand washing and also minimizing the spread of infection from one person to others.

Keywords: Hand hygiene, Disinfectants, Laboratory workers, *Staphylococci*, antibiotic sensitivity test.

INTRODUCTION

Hand washing is an easiest and simplest method to prevent the laboratory acquired infections (LAI) among workers. Proper hand washing can minimize the infections in clinical and nonclinical settings.[1]

Laboratory associated infections (LAI) is a documented occupational hazard for laboratory workers in microbiology laboratory [2]. Most studies have emphasized the prevention of airborne or droplet acquisition. There is scanty information on the risks of bacterial contamination of laboratory surfaces, many of which are not easily amenable to surface decontamination with disinfectants [3]. Similarly, there are few data to document the transfer of bacteria to the hands of laboratory technicians while processing and observing bacterial cultures [4]. Contamination of hands of laboratory workers can pose health risk to self and to other laboratory staff and contaminate cultures if proper care of hand is not followed.

Hand washing with soap and water is a universally accepted practice for reducing bacterial burden and transmission of potentially pathogenic microorganisms. Use of soap cake is already discontinued in health care facilities.

Liquid soap can become contaminated with bacteria during storage and poses a recognized health risk factor. [5] Similarly drying of hands with a towel is to be avoided and hot air dryers have been recommended.

To provide such evidence, we studied the dynamics of bacterial contamination of the hands of laboratory staff. Study findings should help identify situations associated with high contamination levels and ultimately improve hand-cleansing practices [6-8].

A good amount of work on hand hygiene and disinfection is available for health care workers dealing with patients, however less studies have done for laboratory staff.

MATERIALS AND METHODS

This prospective study was carried out at Department of Microbiology, MGM Medical College and Hospital, Navi Mumbai, from September 2012 to February 2013.

The total 36 laboratory workers were selected for this study. Exclusion criteria: Skin disorder or any wounds persons are excluded from the study. The 36 laboratory workers were divided into 3 groups in each12. Group A was Technician, Group B - PG students and Group C - laboratory attendants Swab was moistened with sterile saline and swabbing the over the hand and space between the fingers before and after applying the different disinfectants. Each hand rub was rubbed into the hands until dry. The swabs were directly inoculated onto blood agar, MacConkey agar and nutrient agar. Inoculated plates were incubated at 37ºC for 24 hours. The isolated bacteria were identified by standard Microbiological methods. All isolated *Staphylococcus aureus* were tested for MRSA by disc diffusion method. The antibiotic sensitivity testing was done by Kirby Bauer disc diffusion method according to CLSI guidelines [12].

RESULTS

Table 1: shows group wise distribution of laboratory workers.

Groups	**Growth rate of microorganism (%)**	
	Before hand wash	**After hand wash**
Lab technicians	7 (100)	2(14.29)
PG students	24 (100)	11(78.57)
Lab attendants	4(100)	1(7.14)
Total	45	14(100)

Table 2: bacteria isolated from hands before and after cleaning with disinfectants.

Isolated bacteria	**Total No. (%)**
Staphylococcus aureus (MSSA)	28 (40.58)
Coagulasenegative staphylococci	15(21.74)
Diphtheroids	7 (10.14)
Klebsiella oxytoca	6 (8.70)
Pseudomonas aeruginosa	6 (8.70)
Micrococcus	4 (5.80)
Acinetobacter baumannii	02 (2.90)
Staphylococcus aureus (MRSA)	01 (1.45)
Total	69 (100)

Table 3: Antibiotic sensitivity pattern Gram positive cocci in hands.

Isolated bacteria	A/S (%)	COT (%)	TE (%)	CIP (%)	GEN (%)	RO (%)	L (%)
Staphylococcus aureus (MSSA) n=25	25(100)	8 (32)	25 (100)	25(100)	25(100)	4(16)	19 (76)
CoNS (n=15)	15 (100)	4 (26.6)	15 (100)	15(100)	15(100)	7(46.6)	15(100)
Staphylococcus aureus (MRSA) n=1	0	0	1(100)	1(100)	1(100)	0	0

Abbreviations-A/S=Ampicillin/Sulbactam, COT=Co-Trimoxazole, TE=Tetracycline, CIP=Ciprofloxacin, GEN=Gentamicin, RO=Roxithromycin, L=Lincomicin.

Table 4: Antibiotic sensitivity pattern Gram negative bacteria in hands.

Isolated bacteria	AK (%)	CPZ (%)	OF (%)	CIP (%)	GEN (%)	PF (%)	AMC (%)
Klebsiella oxytoca n=6	6 (100)	6 (100)	6 (100)	6 (100)	6 (100)	6 (100)	0
Pseudomonas aeruginosa n=6	6 (100)	6 (100)	6 (100)	6 (100)	6 (100)	6	0
Acinetobacter baumanii n=2	2 (100)	2 (100)	2 (100)	2 (100)	1 (50)	0	0

Abbreviations- AK=Amikacin, CPZ=Cefoperazone, OF=Ofloxacin, CIP=Ciprofloxacin, GEN=Gentamicin, PF=Pefloxacin, AMC=Augmentin.

DISCUSSION

Total 35 swabs were taken from the laboratory worker's hands before and after applying disinfectants. Out of this 7 samples were taken from laboratory technicians, it showed 100% growth in before applying and 14.29% after applying disinfectants, 24 samples from postgraduate students it showed 100% growth in before applying and 78.57% after applying disinfectants and 4 samples were from laboratory attendants it showed 100% growth in before applying and 7.14% after applying disinfectants (Table 1).

A study reported on hands of 16 volunteers was contaminated with Serratia marcescens. Hand rub A (85% ethanol), hand rub B (60% ethanol), hand rub C (62% ethanol), and hand rub D (61% ethanol) were applied as blinded formulations, each in single applications of 2.4 or 3.6 mL. Hibiclens (4% chlorhexidine gluconate) served as the reference treatment. The general trend toward alcohol-based hand rubs should not overlook evidence of significant differences in efficacy that appear to be related primarily to a product's overall concentration of alcohol [9].

In our study major bacteria were isolated Methicillin sensitive *Staphylococcus aureus* from 28 samples (40.58%), *Coagulase negative staphylococcus* from 15 samples (21.74%), *Diphtheroids* from 7 samples (10.14%), *Klebsiella oxytoca* and *Pseudomonas aeruginosa* from 6 samples (8.70%) each, *Micrococcus* from 4 samples (5.80%), *Acinetobacter baumanii* from 2 samples (2.90%) and *Methicillin resistant Staphylococcus aureus* from 1 sample (1.45%). (Table 2)

A study reported on food safety as very important were less likely to test positive for *S. aureus* on hands ($P < .05$). S. aureus on post-

handling chicken, cutting board and salad was positively associated with *S. aureus* on participants' hands ($P < .05$). Meal preparer's hands can be a vehicle of pathogen transmission during meal preparation [10].

Another study reported that under laboratory conditions using liquid soap experimentally contaminated with 7.51 log10 CFU/ml of Serratia marcescens, an average of 5.28 log10 CFU remained on each hand after washing, and 2.23 log10 CFU was transferred to an agar surface. Additionally, the mean number of Gram-negative bacteria transferred to surfaces after washing with soap from dispensers with sealed-soap refills (0.06 log10 CFU) was significantly lower than the mean number after washing with contaminated bulk-soap-refillable dispensers (0.74 log10 CFU; $P < 0.01$). Contaminated soap from bulk-soap refillable dispenser can increase the number of opportunistic pathogens on the hands and may play a role in the transmission of bacteria in public settings [5].

Patient care activities independently ($P<.05$ for all) associated with higher contamination levels were direct patient contact, respiratory care, handling of body fluid secretions, and rupture in the sequence of patient care. Contamination levels varied with hospital location; the medical rehabilitation ward had higher levels (49 CFUs; $P=.03$) than did other wards. Furthermore, because hand antisepsis was superior to hand washing, intervention trials should explore the role of systematic hand antisepsis as a cornerstone of infection control to reduce cross-transmission in hospitals [11].

Our study showed that major isolated bacteria were sensitive to Gentamicin, Ciprofloxacin, Amikacin and Tetracycline and resistant to Roxithromycin, Lincomicin.

A study showed increasing the wash time from 15 to 30 second. The transfer of *E. coli* to plastic balls following a 15-second hand wash with antimicrobial soap resulted in a bacterial on balls handled by hands washed with non-antimicrobial soap. This indicates that non-antimicrobial soap was less active and that the effectiveness of antimicrobial soaps can be improved with longer wash time and greater soap volume. [1].

CONCLUSION

We conclude that the laboratory associated infections can be minimizes by the simple hand washing procedure before taking the food and before and after the work completed. Our study showed that the effect of any disinfectants on hands is satisfactory and it will be better if the procedure repeat twice. In this study many organism isolated out of which many are drug resistant bacteria which can cause the serious infections.

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REFERENCES

1. Janice LF, Nancy DR, George EF, Jeanne MH, Monica Patel, Patrick L. Weidner et al. Alternative Hand Contamination Technique To Compare the Activities of Antimicrobial and Non antimicrobial Soaps under Different Test Conditions. Appl. Environ. Microbiol. 2008; 74(12): 3739-3744.
2. Sewell DL. Laboratory-associated infections and biosafety. Clin Microbiol Rev. 1995; 8(3): 389-405.
3. Harding AL, Brandt Byers K. Epidemiology of laboratory-associated infections. Biological safety: principles and practices.

3rd ed. Washington, ASM Press. 2000; 35 - 54.
4. LSY. Ng, WT Teh, S Ng, LC. Eng, TY. Tan. Bacterial contamination of hands and the environment in a microbiology laboratory. Journal of Hospital Infection. 2011; 78: 231 – 233.
5. Carrie AZ, Esther JC, Sheri LM, Charles PG, Michael JD, James WA et al. Bacterial Hand Contamination and Transfer after Use of Contaminated Bulk-Soap-Refillable Dispensers. Appl. Environ. Microbiol. 2011; 2898-2904.
6. Albert RK, Condie F. Hand-washing patterns in medical intensive-care units. N Engl J Med. 1981; 304: 1465-1466.
7. Doebbeling BN, Stanley GL, Sheetz CT. Comparative efficacy of alternative hand-washing agents in reducing nosocomial infections in intensive care units. N Engl J Med. 1992; 327: 88-93.
8. Jarvis WR. Handwashing: the Semmelweis lesson forgotten?. Lancet. 1994; 344: 1311-1312.
9. Gunter Kampf. How effective are hand antiseptics for the postcontamination treatment of hands when used as recommended?. Association for Professionals in Infection Control and Epidemiology, Inc. 2008; 36(5): 356-360.
10. Dharod JM, Paciello S, Bermúdez-Millán A, Venkitanarayanan K, Damio G, Pérez-Escamilla R. Bacterial contamination of hands increases risk of cross-contamination among low-income Puerto Rican meal preparers. J Nutr Educ Behav. 2009; 41(6): 389-397.
11. Didier Pittet, Sasi Dharan, Sylvie Touveneau, Vale´rie Sauvan, Thomas V. Perneger. Bacterial Contamination of the Hands of Hospital Staff During Routine Patient Care. Arch Intern Med. 1999; 159: 821-826.
12. CLSI document M100-S21’ Wayne, PA: Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Susceptibility Testing; ‘Twenty-First Informational Supplement. 2011; 30(1): 27-51.