A Study of Bacterial Flora on White Coats among the Health Care Workers

Matseti Sai Vamshi Krishna[1], T. Jaya Chandra[2]

[1]Intern, GSL Medical College, Rajahmundry, South India.
[2]Professor, Department of Microbiology, GSL Medical College, Rajahmundry, South India.

ABSTRACT

BACKGROUND

The white coat to medical profession is like skin to a human. It plays an important role in spreading nosocomial infections, as it may become contaminated with bacteria that could spread to patients. This study was undertaken to find the flora on white coats among the health care workers.

METHODS

This study was conducted in the Department of Microbiology, GSL Medical College. The study participants were divided into four groups: students, interns, post graduates (PGs) and faculty. Participants white coat was sampled using two saline-moistened swabs. The first swab was taken from the cuff and second from the pocket mouth and processed in microbiology laboratory for culture and sensitivity testing.

RESULTS

Total 60 samples were collected, 15 from each group. *Staphylococcus aureus*, coagulase negative *Staphylococcus*, *Micrococcus*, *Pseudomonas* species, *Klebsiella* species, *E. coli* were isolated. Maximum microorganisms were isolated from PGs followed by interns, faculty and students. No significant drug resistance was detected.

CONCLUSIONS

Staphylococcus aureus was the predominant organism isolated from the white coats. Gender wise, statistically there was no significant difference among the isolates. The isolates showed good sensitivity for the commonly used antibiotics.

KEYWORDS

Flora, Medical, Participants, White Coats

BACKGROUND

The white coat to medical profession is like skin to a human. It is a symbol of recognition, power, and brings reliability to the field of medicine. These coats play an important role during conversation and also during treatment. Further, these will create faith on the medical professionals and also easy identification. With these, white coats can be a huge asset to the medical field. Hence, white coat ceremony becomes a part of curriculum in many health care institutions to welcome freshers.[1,2] Moreover, the coat is fixed as white to represent the features of honesty as well as purity to the profession. But the utility of the white coat is not proper because these are being used in canteens, cafeterias, lecture halls etc. Hence there is chance to spread nosocomial infections because same coat is being used even for patient care also. Due to the threat of hospital acquired infection (HAI) as well as to prevent the spread of these, in September 2007 white coats ban policy was taken among the British hospitals.[3,4,5] With this a study was undertaken to find the flora on white coats among the health care workers.

METHODS

Study was conducted in the department of Microbiology, GSL Medical College, approved by the institutional ethics committee. The study participants were divided into four groups: students, interns, postgraduates (PGs) and faculty. A printed questionnaire was given to the participants and they were asked to fill. Then the participants white coats were sampled using two saline-moistened swabs. Due to more contamination, cuff and pocket mouth were chosen for sample collection.[6,7] The first swab was taken from the cuff and second from the pocket mouth. The samples were labelled and transferred immediately to the Microbiology laboratory for culture and sensitivity testing. The swabs collected were directly inoculated on blood agar and nutrient agar, incubated aerobically at 37^{0}C for 24 hours and then examined for bacteria growth according to standard protocol.[8,9] Bacterial identification was done by assessing colony characteristics, Gram reaction and with the help of the following five tests: (1) catalase and coagulase, (2) haemolysis, sugar fermentation and other biochemical tests including indole production, citrate utilization and urease activity, (3) triple sugar iron (TSI) agar tests (for glucose, sucrose and lactose fermentation), (4) gas and hydrogen sulphide production tests, and (5) oxidase tests.[9] Bacterial isolates were subjected to antibiotic sensitivity testing by Kirby Bauer disc diffusion method.[9,10]

RESULTS

During the study period, 15 samples were collected respectively from each group, total 60 samples. The rate of bacterial isolation was 15.5% (12), 28.4% (22), 33.5% (26)

and 22% (17), respectively among the students, interns, PGs and faculty, total 77 strains were isolated. According to this data, it was clear that predominant strains were isolated from PGs followed by interns, faculty and students (Table 1). Stain wise, S. aureus was the predominant isolate (40%; 31) followed by coagulase negative staphylococci (CoNS) (26%; 20), Micrococcus (18%; 14), Klebsiella (6.4%; 5), Pseudomonas (5%; 4) and E. coli (4%; 3) (Table 1). Gender wise, the rate of isolation was 49% (38) and 51% (39) respectively among the male and female. Group wise, among the male, the rate of isolation was 6.4% from students, 19.4% from interns, 14.2% from PGs and 9% from faculty. Among the female, the rate of isolation was 9% from students, 9% from interns, 19.4% from PGs and 10% from faculty (Table 2).

All the isolates were sensitive to commonly used antibiotics, no significant drug resistance was detected (Table 3).

Isolate	Students	Interns	PGs	Faculty	Total
Staphylococcus aureus	4 (5)	9 (11)	12 (15.2)	6 (7.6)	31 (40)
CoNS	2 (2.6)	5 (6.4)	8 (10)	5 (6.4)	20 (26)
Micrococcus	2 (2.6)	4 (5)	3 (4)	5 (6.4)	14 (18)
E. coli	2 (2.6)	1 (1.3)	0	0	3 (4)
Klebsiella	1 (1.3)	2 (2.6)	2 (2.6)	0	5 (6.4)
Pseudomonas	1 (1.3)	1 (1.3)	1 (1.3)	1 (1.3)	4 (5)
Total	12 (15.5)	22 (28.4)	26 (33.5)	17 (22)	77 (100)
Table 1. Group Wise Isolation of Various Microorganisms; n (%)					

	Male	Female	Total
Students	5 (6.4)	7 (9)	12 (15.5)
Interns	15 (19.4)	7 (9)	22 (28.4)
PGs	11 (14.2)	15 (19.4)	26 (33.5)
Faculty	7 (9)	10 (13)	17 (22)
Total	38 (49)	39 (51)	77 (100%)
Table 2. Gender Wise Number of Isolates on White Coats; n (%)			

Organism	Sensitivity Pattern
Staphylococcus aureus (n=31)	Penicillin (80%), Ciprofloxacin (75%), Gentamycin (70%), Clindamycin (55%), Cotrimoxazole (80%), Amikacin (100%), Erythromycin (70%), Vancomycin (100%), Amoxiclav (90%).
CoNS (n = 20)	Penicillin (90%), Ciprofloxacin (70%), Gentamycin (70%), Clindamycin (50%), Cotrimoxazole (80%), Amikacin (90%), Erythromycin (70%), Vancomycin (80%), Amoxiclav (90%).
Klebsiella (n =5)	Ampicillin (80%), Piperacillin (60%), Gentamycin (60%), Tobramycin (80%), Erythromycin (80%), Piperacillin Tazobactam (100%), Amoxiclav (60%).
Pseudomonas (n = 4)	Gentamycin (50%), Ciprofloxacin (25%), Amikacin (50%), Ampicillin (50%), Cotrimoxazole (25%), Ticarcillin (100%), Tobramycin (100%), Piperacillin Tazobactam (100%), Imipenem (100%).
Escherichia coli (n = 4)	Ampicillin (100%), Cotrimoxazole (50%), Amikacin (100%), Tetracycline (100%), Amoxicillin (50%), Clavulanic acid (50%), Chloramphenicol (50%), Gentamycin (100%), Cefotaxime (99%).
Table 3. Antibiotic Sensitivity Pattern of Various Isolates	

DISCUSSION

White coat, a symbol of medical profession, brings credibility and purity. It was reported in the literature that white coats contain microorganisms which are the common causative agents of HAI. Similar results were reported in this study also, 94% of the white coats screened were contaminated. Available literature reported the range of white coats contamination was 28.5% to 95%.[3,11] This high bacterial

J. Evid. Based Med. Healthc., pISSN- 2349-2562, eISSN- 2349-2570/ Vol. 7/Issue 16/April 20, 2020

Page 838

contamination of white coats rise question in the healthcare profession. The bacteria which were shed by the patient with whom the health care professional interacted to treat and ability of the microbes to survive on the material used for manufacturing the white coat were reported to be the causes for coats contamination.[12]

In the current study, there was no statistically significant difference (P >0.05) between the rate of white coat contamination among gender; the rate of contamination was 51%, 49% respectively for female and male (Table 2). Gender wise, the rate of isolation was 49% (38) and 51% (39) respectively among the male and female. Group wise, among the male, the rate of isolation was 6.4% from students, 19.4% from interns, 14.2% from PGs and 9% from faculty. Among the female, the rate of isolation was 9% from students, 9% from interns, 19.4% from PGs and 10% from faculty (Table 2). Uneke et al. also reported that white coats of females were slightly more contaminated compared to male but this was also statistically not significant.[13] The reason for the higher whiter coat contamination among the female was not clearly reported in the literature.

According to the Indian tradition, the females do not have pockets for their dress. Hence, the white coat pocket for the female is usually a store house to place some of their personal items also. This may not be a practice by all the female HCWs, but a significant number. This could be the reason for the higher white coat contamination among the female. In this study, the rate of CoNS isolation was 26%. CoNS is a floral member, was considered as non-pathogen. But the rate of isolation of Gram-negative bacilli was less (11.4%; Table 2) in this report, but these were potentially infectious. Srinivasns et al. also reported that Coagulase negative Staphylococci is one of the predominant isolates.[14] Whereas no Gram negative were reported by Wong et al.[7]

Being a tertiary health care setup, the participants who were involved in this research had more working areas in the form of referrals, interaction with colleagues etc. Hence, we could not analyse the data by considering working area that is operation theatres, outpatient unit category, ICUs etc.

As a part of study protocol, the participants were asked to give the reason for wearing white coats. Like other reports, majority (55%) of them answered as institutional policy and 35% for professional appearance.[7,8] In continuation, 46% participants mentioned that they wear white coat in hospital, 22% mentioned while interacting with patients and 17% reported that they use continuously which includes non-clinical areas such as library, canteen etc. Majority (82%) of the study participants aware that white coats are the important sources of HAI. This is another interesting feature in this research.

Due to COVID 19 pandemic, currently, not only white coat wearing custom, even the personal protective measures in the form of regular hand wash, use of sanitizer custom had developed among the HCWs and also public. Hence a study in the current scenario is recommended. This surely may bring a significant difference in the rate of isolation of bacteria among the HCWs.

CONCLUSIONS

Staphylococcus aureus was the predominant organism isolated from the white coats of health care workers. Gender wise, statistically, there was no significant difference among the isolates. No significant drug resistance was observed, most of the isolates showed good sensitivity for the commonly used antibiotics.

REFERENCES

[1] Noor F, Jayanthi RS. The study of microbial flora on doctors white coats in tertiary care hospital in outskirts of Hyderabad, Telangana, India. Int J Res Med Sci 2016;4(7):2705-2712.

[2] Huber S. The white coat ceremony: a contemporary medical ritual. J Med Ethics 2003;29(6):364-366.

[3] Hegde BM. Sad demise of the doctors' white coat. JIACM 2008;9(1):13-14.

[4] Treakle AM, Thom KA, Furuno JP, et al. Bacterial contamination of health care workers' white coats. Am J Infect Control 2009;37(2):101-105.

[5] Landry M, Dornelles AC, Hayek G, et al. Patient preferences for Doctor Attire: the white coat's place in the medical profession. Ochsner J 2013;13(3):334-342.

[6] Loh W, Ng VV, Holton J. Bacterial flora on the white coats of medical students. J Hosp Infect 2000;45(1):65-68.

[7] Wong D, Nye K, Hollis P. Microbial flora on doctors' white coats. Br Med J 1999;303(6817):1602-1604.

[8] Chandra TJ, Prasanna TL, Venkateswar Rao A. A study on isolation and identification of nosocomial infections causing bacteria on mobile phones of health care workers. Calicut Medical Journal 2011;9(1):e2.

[9] Cheesbrough M. District laboratory practice in tropical countries. Cambridge University Press 2005.

[10] World Health Organization. Manual for the laboratory identification and antimicrobial sensitivity testing of bacterial pathogens of public health importance in the developing world. Geneva: World Health Organization 2003. WHO/DCS/CSR/RMD/2003.6.

[11] Banu A, Anand M, Nagi N. White coats as a vehicle for bacterial dissemination. J Clin Diagn Res 2012;6(8):1381-1384.

[12] Chacko L, Jose S, Isac A, et al. Survival of nosocomial bacteria on hospital fabrics. Indian Journal of Medical Microbiology 2003;21(4):291.

[13] Uneke CJ, Ijeoma PA. The potential for nosocomial infection transmission by white coats used by physicians in Nigeria: implications for improved patient-safety initiatives. World Health Popul 2010;11(3):44-54.

[14] Srinivasan M, Uma A, Vinodhkumaradithyaa A, et al. The medical overcoat-is it a transmitting agent for bacterial pathogens? Japanese Journal of Infectious Diseases 2007;60(2-3):121-122.

J. Evid. Based Med. Healthc., pISSN- 2349-2562, eISSN- 2349-2570/ Vol. 7/Issue 16/April 20, 2020

Page 839