MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2024.12.875.880

OPEN ACCESS

Key Words
Cross sectional study, india, KAP study, medical students, nosocomial infection

Corresponding Author
Vyshali Gnanavel,
Department of Community Medicine, Sree Mookambika Institute of Medical Sciences kulasekaram, Kanyakumari, Tamilnadu, India
vyshalignanavel@gmail.com

Author Designation
[1]Professor
[2]Post Graduate
[3]Head of the Department

Received: 15th October 2024
Accepted: 25th November 2024
Published: 31st December 2024

Citation: Vishnu G. Ashok, Vyshali Gnanavel and C.S. Jayasree, 2024. Knowledge, Attitude and Practice of Nosocomial Infections Among Undergraduate Medical Students in Rural Kanyakumari District: A Cross Sectional Study. Res. J. Med. Sci., 18: 875-880, doi: 10.36478/makrjms.2024.12.875.880

Knowledge, Attitude and Practice of Nosocomial Infections Among Undergraduate Medical Students in Rural Kanyakumari District: A Cross Sectional Study

[1]Vishnu G. Ashok, [2]Vyshali Gnanavel and [3]C.S. Jayasree
[1-3]Department of Community Medicine, Sree Mookambika Institute of Medical Sciences kulasekaram, Kanyakumari, Tamilnadu, India

Abstract
Nosocomial infections, or hospital-acquired infections (HAIs), represent a critical public health concern, particularly in healthcare settings where infection prevention and control (IPC) practices may be inconsistently applied. Medical students, as future healthcare providers, must possess adequate knowledge, positive attitudes and appropriate practices to effectively prevent and manage HAIs. To evaluate the level of knowledge, attitude and practice (KAP) regarding nosocomial infection prevention among undergraduate medical students at Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu. A cross-sectional study was conducted over a two-month period involving 152 MBBS students. Data were collected using a validated, semi-structured questionnaire assessing three domains: knowledge, attitude and practice related to nosocomial infections. The study revealed that 54.6% of participants had good knowledge, 38.2% demonstrated a positive attitude and 62.5% reported good practices concerning nosocomial infection prevention. Knowledge and practice levels improved significantly with academic progression, particularly among final-year students and interns. However, attitudinal scores remained suboptimal across all academic years and several misconceptions regarding infection transmission and PPE usage were identified.

INTRODUCTION

Nosocomial infections, also known as hospital-acquired infections (HAIs), are infections that occur in a patient during the process of care in a hospital or other healthcare facility which were not present or incubating at the time of admission, as defined by the World Health Organization[1] . These infections remain a significant global health burden, affecting over 1.4 million people globally at any given time[2], with the Centers for Disease Control and Prevention (CDC) estimating that nearly 1 in 31 hospitalized patients in the U.S. develops at least one HAI every day[3]. HAIs contribute substantially to increased morbidity, prolonged hospitalization, antimicrobial resistance and economic costs despite being largely preventable through evidence-based infection prevention and control (IPC) measures[4,5]. Clinical health workers play a vital role in implementing IPC practices, and their knowledge, attitude and practice (KAP) directly influence infection outcomes[6]. However, several studies have documented wide variability in awareness and compliance with standard protocols, including hand hygiene, sterilization, environmental sanitation and personal protective equipment (PPE) use[7,8]. A systematic review noted that hand hygiene compliance rates in hospitals rarely exceed 40%, even in high-income countries[9] and attitudinal barriers such as risk perception and workload have been identified as key obstacles[10]. In a South Indian tertiary care center, 78% of healthcare workers had satisfactory knowledge of HAIs, but only 42% practiced hand hygiene before patient contact and merely 36% used PPE consistently, indicating a gap between awareness and implementation[11]. Additionally, many studies emphasize the lack of continuous training, institutional enforcement, and supportive supervision as major barriers to sustained adherence to IPC[12,13]. Despite the availability of WHO and CDC guidelines, there remains a paucity of data that integrates all three KAP dimensions and investigates their interrelation within different clinical cadres and departments[14]. This study seeks to bridge these gaps by providing a comprehensive assessment of KAP among clinical health workers, grounded in current international standards. Its novelty lies in simultaneously analyzing knowledge levels, attitudes, behavioral motivators and real-world practices in a single study population. This integrated approach aims to inform more targeted, effective interventions and institutional policies to reduce nosocomial infections and improve patient safety outcomes.

MATERIALS AND METHODS

Study Design: Cross sectional study.

Study Setting: Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari District, Tamil Nadu, South India.

Study Duration: Two months between March and April 2024.

Study Participants: MBBS students of Sree Mookambika institute of medical sciences, kulasekharam.

Inclusion Criteria: MBBS students willing to participate in the study of >18 years of age and giving consent.

Exclusion Criteria: MBBS Students those who are not willing to give consent will be excluded.

Sample Size Calculation:
Calculated using the
Formula:
$N=(z^2\times p\times q)/d^2$
$=3.84\times 91\times 9)/20.70$
$=151.93$
˜ 152

Sample Size: 152.

Data Collection Process: Data collection began after obtaining informed consent from the participants. A pre-designed, semi-structured, validated questionnaire was used to collect data from the students. Questionnaire containing three sections carrying knowledge Attitude and practice of nosocomial infections among medical students

Data Entry: Data was collected through Google Forms and entered in Microsoft Excel.

Statistical Analysis: Data was analysed using SPSS (version.20).

RESULTS AND DISCUSSIONS

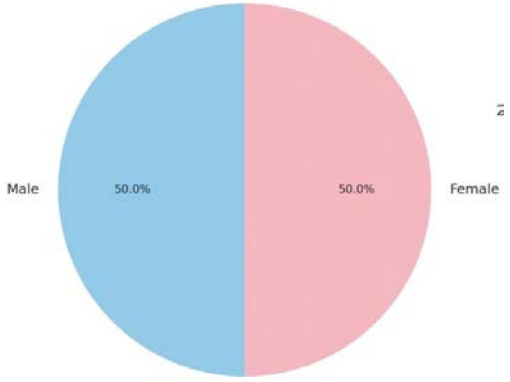

Fig. 1: Gender Distribution of Study Participants

Baseline Characteristics:
Interpretation: The gender distribution among the 152 study participants is exactly equal, with 50% male (76 participants) and 50% female (76 participants).

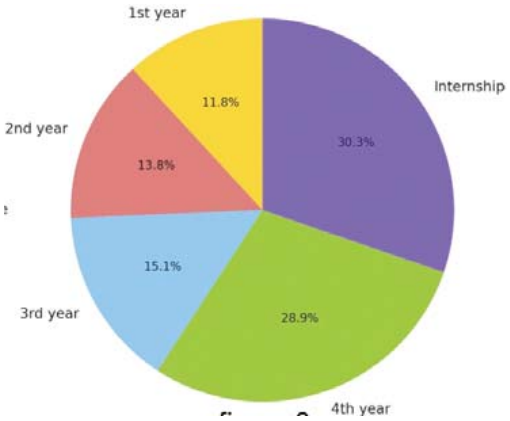

Fig. 2: Distribution Based on Occupation (Academic Year)

Interpretation: Participants are spread across five academic groups. The majority are from: Internship (30.26%) and 4th Year (28.94%), together making up over 59% of the total. The lowest representation is from 1st Year (11.84%).

(Table 1) shows The majority of medical students demonstrated strong knowledge of nosocomial infections. Most respondents (95.39%) correctly identified that nosocomial infections are acquired within hospital environments. A large proportion (84.21%) recognized common nosocomial infections such as ventilator-associated pneumonia, tuberculosis, urinary tract infections and gastroenteritis. Additionally, 76.97% Identified HBV, HCV, Staphylococcus aureus and Pseudomonas aeruginosa as frequent causative agents. In terms of prevention, 86.18% agreed that gloves should always be used as contact precautions and 84.86% understood that standard precautions include protective gear and hand washing. About 78.94% acknowledged that the choice of personal protective equipment (PPE) should be influenced by the patient's diagnosis. Some misconceptions were noted. Only 36.84% correctly identified as false the exaggerated claim that the risk of HIV transmission from a needle stick injury is 10-20%, when in reality it is far lower. Nonetheless, the importance of hand hygiene was well appreciated, with 86.18% recognizing its role in preventing infections. Similarly, 87.5% supported the use of N95 masks for airborne infections and 84.21% affirmed the necessity of surgical masks during procedures. Awareness of environmental hygiene was moderate, with 73.68% acknowledging the need to clean stethoscopes after each use and 82.23% agreeing that personal items like mobile phones and pens can transmit infection.

(Table 2) shows Attitudes of medical students were largely positive but showed some variability. A strong majority (68.4%) believed that nosocomial infections could lead to fatal outcomes. Furthermore, 77.63% supported the idea that effective hand hygiene could prevent such infections and 73.02% attributed nosocomial infections to poor hand hygiene and improper PPE removal. When it came to treating infectious patients, 79.60% agreed that special precautions should be taken for patients with HBV, HCV, or HIV. However, only 56.57% believed HIV-positive patients should be treated in isolation wards, while 19.07% disagreed, reflecting differing perspectives. A large majority (82.23%) recognized the importance of vaccination for healthcare workers. However, 30.92% erroneously believed that PPE is unnecessary for vaccinated workers, showing a misconception about PPE's role as a physical barrier. Most respondents (80.92%) understood the importance of reviewing a patient's medical and antibiotic history to mitigate multidrug-resistant infections. Regarding safety practices, 62.5% agreed that used needles should not be recapped and 73.02% affirmed that hand hygiene reduces infection transmission. Most students (77.63%) saw infection prevention as a key part of their professional responsibility, though only 54.60% believed that boiling linens was an appropriate alternative if a washing machine was unavailable

(Table 3) shows Overall, the reported practices of students aligned with recommended infection control behaviors. About 78.94% wore gowns or aprons when managing contaminated materials or infected patients. Similarly, 76.31% practiced hand hygiene before handling new patients. Use of masks when treating TB-suspected patients was reported by 79.60% and 82.23% followed proper disposal guidelines for infectious waste and leftover samples. Instruments sterilization practices were also strong, with 76.97% using pre-sterilized instruments. Hygiene of personal protective clothing was maintained by 80.2% of students who cleaned their uniforms regularly. Lastly, 71.05% used dedicated, easy-to-clean shoes in sterile environments like operating rooms and aseptic units, suggesting room for further improvement in footwear hygiene compliance.

KAP Level of Medical Students: Pie charts representing the KAP (Knowledge, Attitude and Practice) levels of medical students based on the data (fig: 3.4.5)

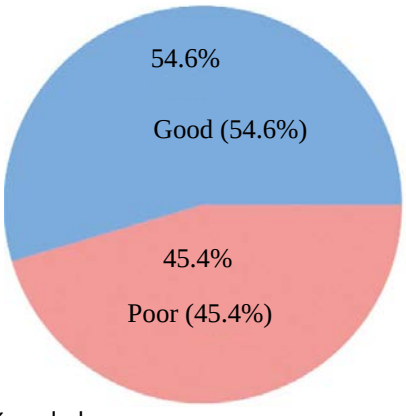

Fig. 3: Knowledge

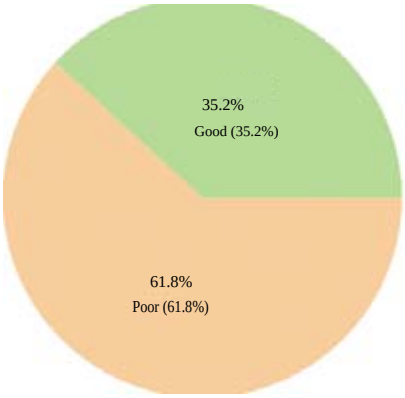

Fig. 4: Attitude

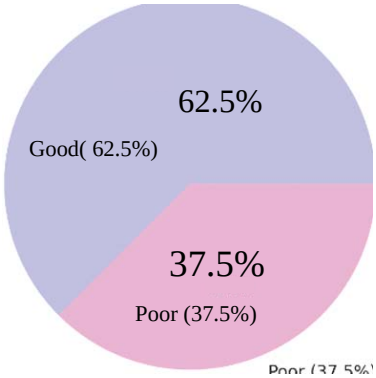

Fig. 5: Practice

Knowledge: 54.6% Good, 45.4% Poor
Attitude: 38.2% Good, 61.8% Poor
Practice: 62.5% Good, 37.5% Poor

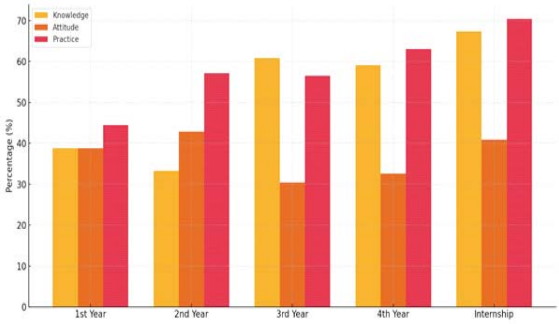

Fig. 6: KAP Levels Based on Year

KAP Levels Based on Year: The bar diagram shows the Knowledge, Attitude and Practice (KAP) levels toward Hospital-Acquired Infections (HAIs) among medical students from different academic years(fig. 6) Here's a detailed interpretation:

Knowledge: There is a progressive increase in knowledge from 1st Year (38.8%) to Internship (67.39%). This indicates that clinical exposure and academic progression significantly enhance students' knowledge regarding HAIs.

Attitude: The trend for attitude is less consistent. It peaks in 2nd Year (42.85%), dips in 3rd and 4th Years (~30-32%) and slightly improves during Internship (40.9%). This suggests that positive attitude doesn't necessarily increase with years and may require focused training or interventions to maintain.

Practice: Practice shows a strong upward trend, starting at 44.49% in 1st Year and increasing steadily to 70.45% in Internship. This reflects that hands-on training and practical exposure during clinical postings have a positive impact on infection control practices.
This study assessed the knowledge, attitude and practice (KAP) of 152 medical students regarding nosocomial infection prevention. The equal gender distribution (50% male and 50% female) allowed for unbiased interpretation across sexes. With a majority of respondents in Internship (30.26%) and Final Year (28.94%), the data predominantly reflects perspectives of students with greater clinical exposure-an important factor in infection control competency. In our study, 54.6% of participants had good knowledge about nosocomial infections. This is consistent with studies from South India and Ethiopia, which reported good knowledge levels in 58% and 60% of students respectively[15-20]. A 2021 study by Gawande *et al.* in Maharashtra reported even higher knowledge levels (67%), particularly in questions related to hand hygiene and standard precautions[21]. Similarly, more than 80% of our participants recognized common nosocomial infections (e.g., UTIs, VAP, TB), mirroring findings from a Delhi-based study that reported 85% awareness among final-year students[22,23]. Only 38.2% of students in our sample exhibited a good attitude towards nosocomial infection prevention. In comparison, Indian studies from Karnataka and Tamil Nadu have shown relatively better attitude scores, around 55-60%[24,20]. In a 2018 study conducted in Puducherry, 70% of students agreed that nosocomial infection prevention is a moral and professional responsibility, which is higher than the 77.63% agreement level in our study regarding the same[25,21]. Practice scores were more promising in our study, with 62.5% of respondents demonstrating good preventive behavior. This finding aligns closely with Indian studies such as one conducted in Kerala, where 65% of students reported consistent hand hygiene and PPE usage[26]. In our cohort, over 78% wore gowns when managing contaminated cases and 82.23% followed proper disposal procedures-similar to findings from a Hyderabad study reporting 80% compliance[22]. However, practices such as cleaning stethoscopes (73.68%) and wearing dedicated footwear (71.05%) showed lower adherence. These are also frequently overlooked behaviors in India, as seen in a study from Mumbai where less than 60% of students cleaned their stethoscopes regularly[27]. While hand hygiene and PPE use may be prioritized in training, subtler aspects of

Table 1: Knowledge of Medical Students on Prevention of Nosocomial Infection

S. No.	Variable	Response	Frequency	Percentage
1	Nosocomial infection is an infection whose development is favoured by a hospital environment.	True*	145	95.39
2	Nosocomial infections include ventilator-associated pneumonia (VAP), tuberculosis, urinary tract infection, and gastroenteritis.	True*	128	84.21
3	Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Staphylococcus aureus and Pseudomonas aeruginosa are the organisms commonly encountered in nosocomial infections.	True*	117	76.97
4	Gloves should always be worn as contact precautions.	True*	131	86.18
5	Standard precautions should include the use of protective equipment and frequent hand washing.	True*	129	84.86
6	Diagnosis influences my decision in choosing choose PPE.	True*	120	78.94
7	The probability of HIV infection following a needlestick injury from an HIV-positive patient is 10-20% per injury.	False	56	36.84
8	Washing hands before and after handling patients helps to prevent infection.	True*	131	86.18
9	Wearing an N95 mask is important when dealing with airborne infections.	True*	133	87.5
10	Wearing surgical masks when doing surgical procedures is vital to prevent infection.	True*	128	84.21
11	Stethoscopes should be cleaned with an antiseptic (e.g., 70% alcohol) after examining each patient.	True*	112	73.68
12	Daily used items like pens, mobile phones, aprons and uniforms acts as carrier for nosocomial infection.	True*	125	82.23

Table 2: Medical Students Attitude Regarding Prevention of Nosocomial Infection

S. No.	Variables	Agree n (%)	Neutral n (%)	Disagree n (%)
1	The patient's outcome will be fatalistic due to nosocomial.	104 (68.4)	43(28.28)	6 (3.94)
2	Nosocomial infection can be prevented through effective hand hygiene.	118 (77.63)	16(10.52)	18 (11.84)
3	The reason for nosocomial infection is inadequate hand hygiene and improper removal of PPE.	111(73.02)	32 (21.05)	9 (5.92)
4	Special precautions should be taken for Hepatitis B virus (HBV), Hepatitis C virus (HCV), and HIV-positive patients.	121 (79.60)	22 (14.47)	9 (5.92)
5	Patients living with HIV antigen must be treated in an isolation ward.	86 (56.57)	37 (24.34)	29 (19.07)
6	Vaccination for healthcare workers is a must.	125(82 .23)	19 (24.34)	8 (5.26)
7	PPE is not needed when a healthcare worker is vaccinated.	47 (30.92)	34(22.36)	72 (47.36)
8	Medical history and antibiotic usage history are important for MDR microorganisms.	123 (80.92)	19(12.5)	9 (5.92)
9	Used needles should not be recapped.	95 (62.5)	28 (18.42)	29 (19.07)
10	Performing hand hygiene is less likely to transmit infections to patients.	111(73.02)	25(16.44)	16(10.52)
11	A valuable part of the healthcare worker's role is to prevent nosocomial infection.	118(77.63)	26(17.10)	8(5.26)
12	If no washing machine is available for linen soiled with infective material, the linen can be boiled.	83(54.60)	45(29.60)	24(15.78)

Table 3: Practice of Medical Students on Prevention of Nosocomial Infection

S. No.	Variable	Response	Frequency	Percentage
1	Do you wear a gown or apron when handling contaminated materials or infected or colonised patients?	True*	120	78.94
2	Do you wash your hands before handling new patients?	True*	116	76.31
3	Do you wear a mask while handling TB-suspected patients?	True*	121	79.60
4	Do you discard infectious materials and left-over samples according to the guidelines?	True*	125	82.23
5.	Do you practice cleaning white coats or nursing uniforms regularly after hospital duty?	True*	122	80.2
6.	Do you practice using pre-sterilised instruments?	True*	117	76.97
7	Do you wear dedicated shoes in aseptic units and in operating rooms which is easy to clean?	True*	108	71.05

infection control often need targeted reinforcement. KAP levels clearly improved with academic progression in our study. Knowledge scores rose from 38.8% in 1st Year to 67.39% in Internship, a trend echoed in multiple Indian studies, including a Chennai study which reported the steepest KAP gains during final-year clinical postings[28]. Practice also improved progressively, from 44.49% in the 1st Year to 70.45% among interns. However, attitude levels showed an inconsistent trend, similar to a Coimbatore study that noted a dip in attitude scores during mid-training years due to increased academic stress and desensitization to hospital environments.

Limitations of the Study:

- **Single-Center Design:** The study was conducted exclusively at Sree Mookambika Institute of Medical Sciences, limiting the generalizability of findings to other medical institutions with different educational and clinical settings.
- **Cross-Sectional Nature:** As a cross-sectional study, the findings represent a single point in time and do not allow for the assessment of changes in knowledge, attitude, or practice over time.

Source of Funding: Nil.

Conflict of Interests: Nil.

REFERENCES

1. Health Organization. Report on the Burden of Endemic Health Care-Associated Infection Worldwide. WHO; 2011.
2. Allegranzi B, Bagheri Nejad S, Combescure C, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet. 2011;377(9761): 228-41.
3. Centers for Disease Control and Prevention. HAI Data and Statistics. CDC; 2020.

4. Weinstein RA. Nosocomial infection update. Emerg Infect Dis. 1998;4(3):416-20.
5. Pittet D, Allegranzi B, Storr J, *et al.* Infection control as a major World Health Organization priority for developing countries. J Hosp Infect. 2008;68(4):285–92.
6. Sax H, Allegranzi B, Chraïti MN, et al. The World Health Organization hand hygiene observation method. Am J Infect Control. 2009;37(10):827-34.
7. Mathur P. Hand hygiene: Back to the basics of infection control. Indian J Med Res. 2011;134 (5):611-20.
8. Erasmus V, Daha TJ, Brug H, *et al.* Systematic review of studies on compliance with hand hygiene guidelines in hospital care. Infect Control Hosp Epidemiol. 2010;31(3):283-94.
9. Kingston L, O'Connell NH, Dunne CP. Hand hygiene-related clinical trials reported since 2010: a systematic review. J Hosp Infect. 2016;92(4): 309-20.
10. Whitby M, McLaws ML, Ross MW. Why healthcare workers don't wash their hands: A behavioral explanation. Infect Control Hosp Epidemiol. 2006;27(5):484-92.
11. Kermalli J, Naik S. Assessment of knowledge, attitude and practice of health care workers towards hospital-acquired infections in a tertiary care hospital. Int J Community Med Public Health. 2021;8(7):3273-9.
12. Nag K, Datta A, Karmakar N, *et al.* A study on knowledge, attitude and practice regarding hospital-acquired infection among healthcare personnel in a tertiary care teaching hospital of Tripura. Int J Community Med Public Health. 2018;5(6):2472-8.
13. Desu PK, Rani CN. Knowledge, attitude and practices regarding nosocomial infections among health care workers in a tertiary care hospital. Int J Community Med Public Health. 2023;10(1):312-6.
14. Masavkar NR, Naikwadi AA. Assessment of knowledge, attitude and practice of nosocomial infection among general practitioners and medical students. Int J Med Sci Public Health. 2016;5(9):1863-7.
15. Suchitra JB, Devi NL. Impact of education on knowledge, attitudes and practices among various categories of health care workers on nosocomial infections. Indian J Med Microbiol. 2007; 25(3):181-7.
16. Goyal A, Chaudhry D. Effectiveness of structured infection control training on knowledge, attitude and practices among undergraduate students. Indian J Public Health Res Dev. 2019;10(5):349–54.
17. Thomas B, Mathew S, Mathai AK. Awareness of nosocomial infections among undergraduate students in South India. J Infect Public Health. 2019;12(3):420-425.
18. Bekele I, Tadesse S. Knowledge, attitude and practice of health care workers about nosocomial infections in Ethiopia. Ethiop J Health Sci. 2020;30(1):43–50.
19. Gawande U, Khandait H, Zade S. Assessment of knowledge and practice regarding hospital-acquired infection among medical students in Maharashtra. Int J Community Med Public Health. 2021;8(2):891–896.
20. Sharma P, Gupta S. Nosocomial infection awareness among medical students in Delhi. Indian J Med Microbiol. 2020;38(4):566–570.
21. Patel A, Singh R, Kumar V. Misconceptions about HIV transmission post-needlestick injuries: A multi centric study among Indian medical students. Asian J Med Sci. 2021;12(3):65–70.
22. Nair R, Pillai S. Attitude toward infection control across training years in Coimbatore. J Acad Med Sci. 2020;10(1):13–18.
23. Ramesh A, Bhat V. Evaluation of attitude towards infection control practices in Karnataka. J Clin Diagn Res. 2018;12(5):IC05–IC09.
24. Priya R, Muthulakshmi M. Infection prevention awareness among Tamil Nadu medical students. J Educ Health Promot. 2017;6:112.
25. Devi P, Rajkumar R. Moral perceptions of nosocomial infection prevention in Puducherry. South Asian J Med Educ. 2018;2(1):45–50.
26. Kermalli A, Shaikh M, Bhatt P. Understanding of vaccine protection and PPE necessity among Gujarat medical students. J Prev Med Hyg. 2020;61(2):E151–E156.
27. Varghese S, Joseph L. Hand hygiene practices among medical interns in Kerala. Int J Infect Control. 2019;15(1):1–7.
28. Ali M, Singh D. Compliance with infection control practices in Hyderabad medical colleges. Indian J Public Health Res Dev. 2020;11(5):230–234.