

An assessment of the knowledge, attitude and practices on hand hygiene among medical undergraduates at Chamarajanagar, Karnataka: A questionnaire- based study

Trupti B. Naik^{1*}, Meghana B.M¹, Vijaykumar Mane² and Asmabegaum Biradar³

¹Department of Microbiology, Chamarajanagar Institute of Medical Sciences, Yadapura Village, Kasaba Hobli, Chamarajanagar-571313, Karnataka, India, ²Department of Community Medicine, Koppal Institute of Medical Sciences, Near Kidadal Gate, Gangavthi Road, Koppal-583231, Karnataka, India and ³Department of Microbiology, Al Ameen Medical College and Hospital, Athani Road, Vijayapur-586108, Karnataka, India

Received: 02nd February 2023; **Accepted:** 09th June 2023; **Published:** 01st October 2023

Abstract: *Background:* Hand hygiene is one of the simplest and the most important cost-effective measures in the prevention of Hospital-acquired infections (HAIs). HAIs result in high morbidity and mortality besides additional costs. On the other hand, compliance rates of hand hygiene among health-care workers, remains low. *Objective:* To estimate the level of knowledge, attitude, and practices on Hand hygiene among medical undergraduates in the study setting. *Materials and Methods:* A cross-sectional study was conducted among 535 medical undergraduates for duration of 6 months from January 2021 to June 2021 at a government medical college in Chamarajanagar, Karnataka. Data was collected using a pre-tested, semi-structured questionnaire, and statistical analysis was performed with WHO Epi info software version 3.5.4. *Results:* The proportion of students having a satisfactory level of knowledge, attitude, and practices were 512 (95.70%), 447 (83.55%), and 356 (66.54%) respectively and the difference among them was statistically significant. *Conclusion:* The present study finds the Knowledge, Attitude, and Practices (KAP) gap among medical students, emphasizing the need for behaviour change communication for the same.

Keywords: Hand hygiene, Infection, Medical students, Questionnaire.

Introduction

Hand hygiene is one of the most important cost-effective measures to prevent cross-transmission of infectious agents and thereby Hospital-acquired infections [1]. Infections acquired by a patient during hospital care that is not present or incubating at the time of admission are known as hospital-acquired infections (HAIs) [2]. HAIs cause significant obstacles to patient care, including temporary/permanent disability or even death. Recently there is also an increase in the resistance to antimicrobial agents among microorganisms causing HAIs, leading to poor prognosis apart from causing a substantial increase in the cost of the treatment of the patient.

Ignaz F. Semmelweis and Florence Nightingale stressed the importance of hand hygiene in the prevention of HAIs in the middle of the nineteenth century [3]. Any action of hand

cleansing is referred to as Hand hygiene [4]. Health-care workers' hand hygiene compliance has been shown to be as low as 40% [5-6].

Many efforts are being undertaken to address this problem, one of which is the World Health Organization's (WHO) adoption of an evidence-based concept called "My five moments for hand hygiene," which has significantly reduced the problem. Before handling a patient, before performing aseptic and clean operations, after being at risk of exposure to body fluids, after touching a patient, and after touching patient surroundings are the five moments of hand hygiene. This idea has been successfully used to improve healthcare workers' understanding, training, monitoring, and reporting of hand hygiene [7].

Poor adherence to hand hygiene practices may be due to lack of knowledge regarding hygiene practices in the clinical setting, lack of time due to the busy work schedule, lack of readily available facilities, irritant contact dermatitis due to frequent exposure to soap and disinfectants, and failure of higher authorities to implement hygiene practices as an important institutional priority [8].

As a part of their curriculum, the medical students visit wards, laboratories, outpatient departments (OPDs), Labour rooms, Intensive care units (ICUs), etc. during their clinical postings and poor hand hygiene practices among medical students will increase the transmission of HAIs. Also, hand hygiene practices among medical students during the training period, reflects their future hygiene practices as health care workers and gives an opportunity to make necessary corrections if required at this stage itself through proper guidance.

Unsatisfactory knowledge and practices among medical students have been reported by few studies towards hand hygiene practices and there is a paucity of data regarding the same in the South-Asian region [9-11]. Therefore, the present study was undertaken among medical students of one of the government medical colleges in Chamarajanagar with the following objective.

Aims and objectives: To estimate the level of knowledge, attitude, and practices on Hand Hygiene among medical students in the study setting.

Material and Methods

The present study was a cross-sectional study conducted for duration of 6 months from January-June 2021 among 535 medical students at Chamarajanagar Institute of Medical Sciences, Chamarajanagar. The Institutional Ethics Committee of Chamarajanagar Institute of Medical Sciences, Chamarajanagar, gave their approval. The study's background, purpose, and objectives were explained to all of the students, and they were all encouraged to participate. Students who remained absent on the day of data collection were excluded.

After obtaining informed consent, data was collected using a pretested and semi-structured

questionnaire. The questionnaire consisted of demographic details of participants, "WHO hand hygiene knowledge questionnaire for health care workers" (27 questions) to assess their knowledge component and a set of questions prepared by a thorough review of the literature to assess their attitude (9 questions) and practice (5 questions) components.

The questions in case of attitude component consisted of statements with an option to select either Agree or Disagree and an option to select either Yes or No in case of practices. Further, one mark each was given for correct response in case of Knowledge component, one mark each for response favoring positive attitude in case of Attitude component, and similarly one mark each for correct practices in case of Practice component. All these scores were added separately for each of the different components and a score equal to or more than 50% was considered satisfactory. Epi info software version 3.5.4 was used for statistical analysis.

Results

A total of 535 medical students were included in the study, which consisted of 133, 140, 149, and 113 students belonging to 1st, 2nd, 3rd, and 4th year respectively.

Table No.1 shows the distribution of medical students with correct responses for knowledge on Hand hygiene. As evident from the table, even though the majority i.e. 399 (74.57%) had received some formal training on hand hygiene practices, only 273 (51.02%) believed that unclean hands of health care workers are the main route of transmission of harmful germs between patients and only 211 (39.43%) believed germs present on or within the patient is the most frequent source of HAIs. Most of the students were fairly aware of the times when hand hygiene if undertaken can prevent transmission of germs both to the patient as well as health care workers. Their knowledge on rapidity, effectiveness, harmful effects of different methods of hand hygiene like alcohol-based hand rub and hand wash with soap and water was limited, but the many of them were aware of which methods to be used in different situations for hand hygiene.

Table-1: Distribution of respondents with correct responses for Knowledge on Hand Hygiene practices (N = 535)						
	Questions (correct responses)	Number of students with correct responses in different years n (%)				
		I (n=133)	II (n=140)	III (n=149)	IV (n=113)	Total (n= 535)
1	Did you receive formal training in hand hygiene in the last three years? (Yes)	64 (48.12)	134 (95.71)	102 (68.45)	99 (87.61)	399 (74.57)
2	Do you routinely use an alcohol-based hand rub for hand hygiene? (Yes)	111 (83.45)	133 (95)	134 (89.93)	106 (93.80)	484 (90.46)
3	Which of the following is the main route of transmission of potentially harmful germs between patients? (Health care workers hands when not clean)	54 (40.60)	94 (67.14)	77 (51.67)	48 (42.47)	273 (51.02)
4	What is the most frequent source of germs responsible for health care associated infections? (Germs already present on or within the patient)	71 (53.38)	61 (43.57)	51 (34.22)	28 (31.64)	211 (39.43)
Which of the following hand hygiene actions prevents transmission of germs to the patient?						
5	Before touching a patient (Yes)	122 (91.72)	132 (94.28)	138 (92.61)	110 (97.34)	502 (93.83)
6	Immediately after risk of body fluid exposure (Yes)	107 (80.45)	108 (77.14)	130 (87.24)	101 (89.38)	446 (83.36)
7	After exposure to immediate surroundings of a patient (No)	43 (32.33)	46 (32.85)	33 (22.14)	18 (15.92)	140 (26.16)
8	Immediately before a clean/aseptic procedure (Yes)	97 (72.93)	109 (77.85)	126 (84.56)	104 (92.03)	436 (81.49)
Which of the following hand hygiene actions prevents transmission of germs to the health care worker?						
9	After touching a patient (Yes)	107 (80.45)	124 (88.57)	134 (89.93)	107 (94.69)	472 (88.22)
10	Immediately after a risk of body fluid exposure (Yes)	116 (87.21)	126 (90.00)	122 (81.87)	107 (94.69)	471 (88.03)
11	Immediately before a clean/aseptic procedure (No)	90 (67.66)	31 (22.14)	33 (22.14)	15 (13.27)	169 (31.58)
12	After exposure to the immediate surroundings of a patient (Yes)	107 (80.45)	112 (80.00)	118 (79.19)	101 (89.38)	438 (81.86)
Which of the following statements on alcohol-based hand rub and hand washing with soap and water is true?						
13	Hand rubbing is more rapid for hand cleansing than hand washing (True)	110 (82.70)	118 (84.28)	126 (84.56)	95 (84.07)	449 (83.92)
14	Hand rubbing causes skin dryness more than hand washing (False)	31 (23.30)	24 (17.14)	45 (30.20)	35 (30.97)	135 (25.23)
15	Hand rubbing is more effective against germs than hand washing (False)	79 (59.39)	96 (68.57)	87 (58.38)	70 (61.94)	332 (62.05)
16	Hand washing and hand rubbing are recommended to be performed in sequence (False)	58 (43.60)	53 (37.85)	55 (36.91)	49 (43.36)	215 (40.18)
17	What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands? (20 seconds)	53 (39.84)	54 (38.57)	44 (29.53)	46 (40.70)	197 (36.82)

	Questions (correct responses)	Number of students with correct responses in different years n (%)				
		I (n=133)	II (n=140)	III (n=149)	IV (n=113)	Total (n= 535)
Which type of hand hygiene method is required in the following situations?						
18	Before palpation of the abdomen (Rubbing)	87 (65.41)	95 (67.85)	97 (65.10)	101 (89.38)	380 (71.02)
19	Before giving an injection (Rubbing)	84 (63.15)	112 (80.00)	102 (68.45)	68 (60.17)	366 (68.41)
20	After emptying a bed pan (Washing)	112 (84.21)	120 (85.71)	133 (89.26)	93 (82.30)	458 (85.60)
21	After removing examination gloves (Rubbing/ Washing)	133 (100)	137 (97.85)	142 (95.30)	110 (97.34)	522 (97.57)
22	After making a patient's bed (Rubbing)	36 (27.06)	39 (27.85)	39 (26.17)	36 (31.85)	150 (28.03)
23	After visible exposure to blood (Washing)	113 (84.96)	121 (86.42)	124 (83.22)	104 (92.03)	462 (86.35)
Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?						
24	Wearing jewellery (Yes)	90 (67.66)	99 (70.71)	85 (57.04)	88 (77.87)	362 (67.66)
25	Damaged skin (Yes)	126 (94.73)	138 (98.57)	143 (95.97)	112 (99.11)	519 (97.00)
26	Artificial fingernails (Yes)	120 (90.22)	117 (83.57)	125 (83.89)	102 (90.26)	464 (86.72)
27	Regular use of a hand cream (No)	85 (63.90)	86 (61.42)	101 (67.78)	57 (50.44)	329 (61.49)

Table-2: Distribution of respondents with positive responses towards Attitude on Hand hygiene practices (N = 535)

	Statements (Positive Responses)	Number of students with Positive responses in different years n (%)				
		I (n=133)	II (n=140)	III (n=149)	IV (n=113)	Total (n= 535)
1	I adhere to correct hand hygiene practices at all times (Agree)	108 (81.20)	116 (82.85)	123 (82.55)	91 (80.53)	438 (81.86)
2	I have sufficient knowledge about hand hygiene (Agree)	97 (72.93)	103 (73.57)	124 (83.22)	95 (84.07)	419 (78.31)
3	Sometimes I have more important things to do than hand hygiene (Disagree)	103 (77.44)	115 (82.14)	100 (67.11)	72 (63.71)	390 (72.89)
4	Other priorities make hygiene more difficult at times (Disagree)	86 (64.66)	101 (72.14)	99 (66.44)	67 (59.29)	353 (65.98)
5	Wearing gloves reduces the need for hand hygiene (Disagree)	60 (45.11)	53 (37.85)	77 (51.67)	52 (46.01)	242 (45.23)
6	I feel frustrated when others omit hand hygiene (Agree)	100 (75.18)	94 (67.14)	75 (50.33)	71 (62.83)	340 (63.55)
7	I am reluctant to ask others to engage in hand hygiene (Disagree)	69 (51.87)	84 (60.00)	105 (70.46)	61 (53.98)	319 (59.62)
8	I feel guilty if I omit hand hygiene (Agree)	105 (78.94)	112 (80.00)	92 (61.74)	73 (64.60)	382 (71.40)
9	Adhering to hand hygiene practices is easy in the current setup (Agree)	105 (78.94)	105 (75.00)	88 (59.06)	86 (76.10)	384 (71.77)

Table No. 2 demonstrates the distribution of respondents with positive responses towards Attitude on Hand hygiene practices. Majority i.e. 438 (81.86%) of the medical students in the present study were willing to adhere to correct hand hygiene practices at all times, most of them i.e. 419 (78.31%) admitted to having sufficient knowledge about it and the many i.e. 384 (71.77%) even admitted to having optimum conditions in the study setting, for easy compliance to hand hygiene practices.

Table No. 3 demonstrates the distribution of respondents with good hand hygiene practices in the present study. Majority i.e. 419 (78.31%) of the students consider hand hygiene as an essential part of their role and the many i.e. 342 (63.92%)

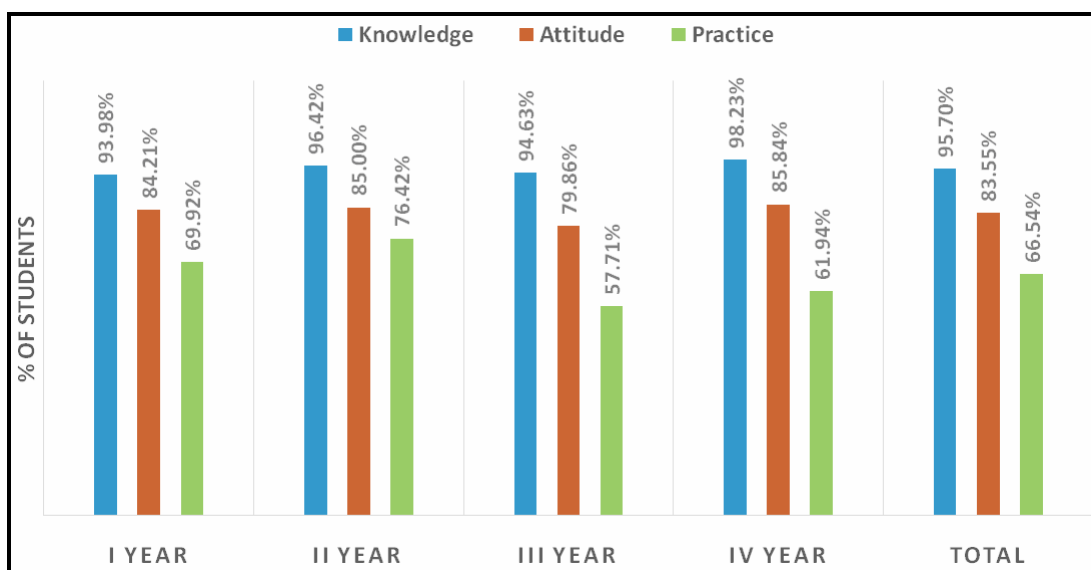
agreed that the Infection prevention team of the Institution has a positive impact on their current hand hygiene practices as evident from the table.

Figure No. 1 shows the distribution of respondents with satisfactory knowledge, attitude, and practices towards Hand hygiene. As seen in the table, the proportion of students with a satisfactory level of knowledge in the present study was 512 (95.70%) and it came down to 447 (83.55%) of them having a satisfactory level of knowledge and still fell to 356 (66.54%) of students practicing good hand hygiene practices, and this difference was found to be statistically significant ($P < 0.05$).

Table-3: Distribution of respondents with Good Hand hygiene practices (N = 535)

	Statements (positive responses)	Number of students with good hand hygiene practices in different years - n (%)				
		I (n=133)	II (n=140)	III (n=149)	IV (n=113)	Total (n = 535)
1	Sometimes I miss out on hand hygiene simply because I forget it (No)	77 (57.89)	85 (60.71)	63 (42.28)	56 (49.55)	281 (52.52)
2	Hand hygiene is an essential part of my role (Yes)	114 (85.71)	117 (83.57)	100 (67.11)	88 (77.87)	419 (78.31)
3	The frequency of hand hygiene required makes it difficult for me to carry it out as often as necessary (No)	79 (59.39)	92 (65.71)	82 (55.03)	59 (52.21)	312 (58.31)
4	The infection prevention team have a positive influence on my hand hygiene (Yes)	97 (72.93)	99 (70.71)	76 (51.00)	70 (61.94)	342 (63.92)
5	Infection prevention notice boards remind me to do hand hygiene (No)	41 (30.82)	51 (36.42)	71 (47.65)	45 (39.82)	208 (38.87)

Fig-1: Distribution of respondents with satisfactory knowledge, attitude and practices towards Hand hygiene



Discussion

Hand hygiene is considered as an important step in the prevention of the spread of Hospital-acquired infections and also prevents the colonization of multidrug-resistant organisms [12]. Poor hand hygiene among health care workers, which has been linked to the increased spread of infections in hospitals is known for the past 150 years [13-14]. In response to this, the WHO launched the first Global Patient Safety Challenge with the theme "Clean care is safer care" in 2005 [15].

In the present study, the majority 399 (74.57%) of the medical students had claimed to have received formal training on Hand hygiene practices. According to the study conducted by Vinod S. Kamble et. al. in the Gulbarga district of Karnataka, about 85.45% of medical students had claimed to have received formal training in handwashing [5]. On the contrary, only 26.3% of medical students had formal training in hand hygiene practices as reported in a study by Glad Mohesh et. al. in Tamil Nadu [16].

Most of the students 512 (95.70%) in the present study had a satisfactory level of knowledge on hand hygiene practices. There was no statistical difference between the proportion of students having satisfactory knowledge in different years. A study by Krutarth R. Brahmhatt et. al. in Gujarat reports that 76% of participants have moderate knowledge regarding hand hygiene practices in line with the findings of the present study [17]. Few studies, however, have identified an overall improvement in hand-hygiene practices among health care workers by interventions that target improving knowledge [18-19].

The present study found a significant fall in the proportion of students with satisfactory levels of

attitude 447 (83.55%), and further fall in the satisfactory level of practices 356 (66.54%) compared to those with satisfactory levels of knowledge 512 (95.70%), clearly indicating a KAP gap. Similarly, Ariyaratne et al. found that while 83 percent of Sri Lankan medical students had satisfactory (scores over 50%) knowledge on hand hygiene, just 13% had satisfactory attitudes and only 20% had satisfactory practices [10].

A study by Arthi et. al. in South Indian Medical school shows that nearly 85% of the medical students failed to adhere to proper hand hygiene practices although knowledge related to hand hygiene was good [20]. A study by Barroso et al. suggests that knowledge is not a significant predictor of behavior, while a favorable working environment and observation of attending physicians with good hand hygiene practices were reported to be effective strategies that influence hand hygiene practices [21].

In a study by Muhammad Ali Anwar et. al., the majority of participants have considered "lack of sinks, soap, water, and disposable towel" as a major barrier towards hand hygiene adherence [22].

Conclusion

Although nine out of ten people had a satisfactory level of knowledge, only eight had a satisfactory level of attitude, and only six had a satisfactory level of practise. Through good behaviour change communication and the availability of adequate facilities, it is critical to assist students in transforming their knowledge into a positive attitude and, eventually, into favourable practices.

Financial Support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest.

References

1. Nair SS, Hanumantappa R, Hiremath SG, Siraj MA, Raghunath P. Knowledge, attitude, and practice of Hand Hygiene among Medical and Nursing Students at a tertiary health care Centre in Raichur, India. *ISRN Prev. Med.* 2014; 608927.
2. Shinde MB, Mohite VR. A study to assess knowledge, attitude and practices of five moments of Hand Hygiene among Nursing Staff and students at a tertiary care hospital at Karad. *Int. J. Sci Res.* 2014; 3(2):311-321.
3. Dhillon VS. A study to compare the knowledge of Hand Hygiene among Nurses in a public tertiary care and a private corporate Hospital in Amritsar. *Int. J. Sci. Res.* 2016; 5(5):482-486.

4. Fatehpuria CM, Pannikar K, Bhagora A, Bunkar GL. A study to assess knowledge on hand hygiene among medical students of a tertiary care hospital of Udaipur, Rajasthan. *Paripex Indian J. Res.* 2019; 8(11):126-128.
5. Kamble VS, Biradar SM, Takpere A, Reddy S. Knowledge of hand hygiene practices among students of ESIC medical college, Gulbarga, Karnataka, India. *Int J Community Med Public Health.* 2016; 3:94-98.
6. Boyce JM, Pittet DD. Guideline for hand hygiene in health-care settings. Recommendations of the healthcare infection control practices advisory committee and the HICPAC/ SHEA/APIC/IDSA hand hygiene task force. *Morbidity and Mortality Weekly Report.* 2002; 23(12):S3-40.
7. Sax H, Allegranzi B, Uçkay I, Larson E, Boyce J, Pittet D. My five moments for hand hygiene. A user-centred design approach to understand, train, monitor and report hand hygiene. *J Hosp Infect.* 2007; 67:9-21.
8. Trampuz A, Widmer AF. Hand hygiene: a frequently missed life saving opportunity during patient care. *Mayo Clin Proc.* 2004; 79:109-116.
9. Jayarajah U, Athapathu, AS, Jayawardane AJ, Prasanth S, Seneviratne SN. Hygiene practices during clinical training: knowledge, attitudes and practice among a cohort of South Asian Medical students. *BMC Med Educ.* 2019; 19:157.
10. Ariyaratne M, Gunasekara T, Weerasekara M, Kottahachchi J, Kudavidanage B, Fernando S. Knowledge, attitudes and practices of hand hygiene among final year medical and nursing students at the University of Sri Jayewardenepura. *Sri Lankan J Infect Dis.* 2013; 3(1):15-25.
11. Herbert VG, Schlumm P, Kessler HH, Frings A. Knowledge of and adherence to hygiene guidelines among medical students in Austria. *Interdiscip Perspect Infect Dis.* 2013; 1-6.
12. Pittet D, Allegranzi B, Sax H et al. Evidence-based model for hand transmission during patient care and the role of improved practices. *Lancet Infect Dis.* 2006; 6(10):641-652.
13. Shorter E. Ignaz Semmelweis: The etiology, concept, and prophylaxis of childbed fever. *Med Hist.* 1984; 28(3):334.
14. Best M, Nuehauser D. Ignaz Semmelweis and the birth of infection control. *BMJ Qual Saf.* 2004; 13(3):233-234.
15. World Health Organization. WHO guidelines on hand hygiene in health care (advanced draft): a summary. Clean hands are safer hands. Geneva: WHO, 2005. Available from: http://www.who.int/patientsafety/events/05/HH_en.pdf
16. Mohesh G, Dandapani A. Knowledge, attitude and practice of hand hygiene among medical students-a questionnaire-based survey. *Unique j. Med. Dent Sci.* 2014; 02(03):127-131.
17. Brahmbhatt KR, Lodhiya KK. Hand hygiene knowledge among undergraduate medical students in Junagadh, Gujarat, India. *Int J Community Med Public Health.* 2019; 6(5):1917-1922.
18. Lam BC, Lee J, Lau YL. Hand hygiene practices in a neonatal intensive care unit: a multimodal intervention and impact on nosocomial infection. *Newsl. Am. Acad. Pediatr.* 2004; 114(5):565-571.
19. Danchaivijtr S, Pichiensatian W, Apisarnthanarak A, Kachintorn K, Cherdungsri R. Strategies to improve hand hygiene practices in two university hospitals. *J Med Assoc Thai.* 2005; 88(10): 155-160.
20. Arthi EAV, Bagyalakshmi R, Anitharaj M, Vijayasree S. Assessment of knowledge, attitude and practice of hand hygiene among nursing and medical students. *Int J Contemporary Med Res.* 2016; 3(4):1203.
21. Barroso V, Caceres W, Loftus P, Evans KH, Shieh L. Hand hygiene of medical students and resident physicians: predictors of attitudes and behaviour. *Postgrad Med J.* 2016; 92(1091):497-500.
22. Anwar MA, Rabbi S, Masroor M, Majeed F. Self reported practices of hand hygiene among the trainees of a teaching hospital in a resource limited country. *J Pak Med Assoc.* 2009; 59(9):631-634.

Cite this article as: Naik TB, Meghana BM, Mane V and Biradar A. An assessment of the knowledge, attitude and practices on hand hygiene among medical undergraduates at Chamarajanagar, Karnataka: A questionnaire- based study. *Al Ameen J Med Sci* 2023; 16(4): 316-322.

This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial (CC BY-NC 4.0) License, which allows others to remix, adapt and build upon this work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

*All correspondences to: Dr. Trupti B. Naik, Associate Professor, Department of Microbiology, Chamarajanagar Institute of Medical Sciences, Yadapura Village, Kasaba Hobli, Chamarajanagar-571313, Karnataka, India. E-mail: truptinaik01@gmail.com