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Knowledge and Practice of Hand Hygiene Among Dental Undergraduates: A cross-sectional study

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ABSTRACT

Objectives: (1) To decipher the level of knowledge of hand hygiene among undergraduate dental students, (2) to assess the practice regarding hand hygiene among undergraduate dental students and (3) to identify the correlation between level of knowledge and practice of hand hygiene in clinical settings among undergraduate dental students. **Materials and Methods:** A cross-sectional study was conducted among undergraduate dental students from year 3 to year 5. Both validated self-administered questionnaires on hand hygiene knowledge by World Health Organization and questionnaire on hand hygiene practice were distributed to respective class representatives. Data on demographic characteristics were also collected. Prevalence was determined by descriptive statistics. Pearson's correlation test was used to check the association between knowledge level and practice of hand hygiene. **Results:** Two hundred and fiftytwo subjects comprising of 87.7% females and 12.3% males were recruited. Response rate was 100%. Majority of respondents (74.6%) had good knowledge level of hand hygiene while 25.4% had moderate knowledge level. 100% of respondents had good practices of hand hygiene as they follow $\geq 50\%$ in line with the recommended guideline. Level of knowledge were found to have weak correlation to practice of hand hygiene in clinical settings ($r = -0.354$, $p < 0.001$). **Conclusion:** Level of hand hygiene knowledge slightly influences the practice of hand hygiene in the form of negative correlation. Although respondents had good knowledge, there might be other external factors which influences the practice, such as lack of time and high patient workload. Further qualitative study should be conducted to elucidate other factors influencing the practice of hand hygiene among undergraduate dental students.

Keywords: knowledge, practice, hand hygiene, dental students

Abbreviations: COVID-19- Coronavirus Disease 2019, DHP- Dental Health Personnel, HAI- Hospital-Acquired Infections, UiTM- Universiti Teknologi MARA, WHO- World Health Organization

INTRODUCTION

Hygiene, refers to conditions and practices that help to maintain health and prevent the spread of diseases according to World Health Organization (WHO, 1946). Hand hygiene is a general term referring to any action of hand cleansing, which includes handwashing, antiseptic hand rubbing, hand cleansing or hand disinfection. In medicine, dentistry as well as everyday life settings, hand hygiene is appointed as the leading preventive measures to reduce the incidence of diseases and infections outspread.

Nosocomial infections or Hospital-Acquired Infection (HAI) is one of the major concerns in health care centres that causes substantial increase in morbidity, mortality and health care costs among hospitalized patients (Allegranzi & Pittet, 2009). HAI is an infection occurring in patient during the medical care process in health-care facility which was not present before the time of admission (Sharma, 2018). HAI continues to account for complications in 5-10% of admissions to acute-care hospitals in developed countries with sophisticated treatments and technologies (WHO, 2009). Based from a study carried at a university medical centre in Malaysia, the most common HAIs were urinary tract infections (12.2%), pneumonia (21.4%), laboratory-confirmed bloodstream infections (12.2%), deep surgical wound infections (11.2%), and clinical sepsis (22.4%) (Hughes et al, 2005). Health-care workers have been identified as the most common vehicle for transmission of most nosocomial infections from patient to patient and within the health care environment (Alharbi et al, 2019). In dental clinical settings, cross-transmission of microorganisms is an inevitable problem. Transmission could occur either through direct contact with blood, saliva or contaminated treatment water, improper sterilized instruments, or needle stick accidents during dental procedures (de Souza et al, 2006). Dental health personnel (DHP) are at high risk of exposure to the most infectious diseases that colonize the oral cavity and respiratory tract, such as hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), herpes simplex virus type 1, influenza, rubella, and other viruses and bacteria infections (Jones, Davis & Looke, 2017). Hence, DHP needs to implement a proper hand hygiene practices, scrupulous work practices as well as using the personal protective equipment (PPE) such as masks or respirators, gloves, gowns and eye-protection.

Prevention of disease holds major importance, as increased antibiotic resistance results in a rise of untreatable infections (Abreu et al, 2009). Apart from vaccinations, infection control guidelines as well as appropriate precautions may prevent exposure to infections in dental settings (WHO, 2009; Alzyood et al, 2020). Infection control is defined as measures practiced by health care personnel to reduce the risks of transmission of infectious agents to patients and employees (Myers et al, 2008). The risk of HAIs can be reduced by instilling the awareness on hand hygiene, providing proper hand hygiene education, and training (Alharbi et al, 2019; Myers et al, 2008). Hence, strong emphasis should be implemented on education regarding infection control and proper practices of hand hygiene training modules.

Handwashing, is defined as a vigorous, brief rubbing together of all surfaces of lathered hands, followed by rinsing under a stream of water (Utomi, 2005). To date, hand hygiene still remains the primary measure to reduce HAI and the spread of antimicrobial resistance across all settings, from advanced health care systems to local dispensaries in developing countries (Thakker & Jadhav, 2015; Thivichon-Prince et al, 2014). Besides, there are surplus scientific evidence which supports the observation that, hand hygiene by itself can significantly reduce the risk of cross-transmission of infection in healthcare facilities if properly implemented (Chauhan, Pandey & Thakuria, 2019). However, achieving high levels of hand hygiene compliance among DHP has been an ongoing challenge. Previous study documented unsatisfactory level of knowledge, practice and low attitude towards hand hygiene among undergraduate dental students with regards to the sources and transmission of germs and appropriate hand hygiene methods (Sharma, 2018; WHO, 2009; Pittet et al, 2000; Garner, 1986). Majority of them were unaware that unhygienic hands of DHP was the main route of germ transmission in clinical setting and the frequent source of germs for HAIs was from patients. A wholesome

dental education with emphasize on hand hygiene knowledge plays a crucial role in providing dentists with adequate comprehension and attitudes related to infection control measures (Afolaranmi & Code, 2018). A formal hand hygiene education can impose positive impacts on the practice and will result in high compliance level among undergraduate dental students (Sharma, 2018). Furthermore, knowledge assessment as well as regular evaluation of hand hygiene practice should be recommended to ensure undergraduate dental students retain their knowledge and hand hygiene practice throughout the clinical years (Hamadah et al, 2015).

Handwashing has received considerable attention during the Coronavirus disease 2019 (COVID-19) pandemic. Similar to HAIs, hand hygiene was emphasized as a crucial measure to prevent disease outbreak for healthcare workers (Ma et al, 2020). COVID-19, the new strain of coronavirus that was first reported in Wuhan, China has been declared a global pandemic and still ongoing presently. The virus is most likely to spread in small droplets such as saliva or nasal discharges and direct contact by touching or shaking hands with an infected person. It is also known that people infected with COVID-19 might spread the virus to others before experiencing the symptoms themselves. In recent times, there are now several vaccines that are in use. Nevertheless, COVID-19 has been a stark reminder aimed both to healthcare workers as well as to general public regarding the importance of basic, yet paramount infection control measures such as hand hygiene (Cole & Barnard, 2021). There has been a proliferation of public health messages through various sources about the correct techniques for handwashing. Images and short videos through social media, television, radio, print ads and billboards are all being utilized to convey beneficial message to the public regarding effective handwashing as a crucial step to be practiced in order to break the chain of infection of COVID-19 (Alzyood et al, 2020).

The World Health Organization (WHO) has introduced an evidence-based concept and guidelines on hand hygiene in healthcare to improve understanding, training, monitoring, and reporting of hand hygiene among healthcare workers (Alharbi et al, 2019). This concept and guidelines have been extensively used in the training of professional health workers but is rarely given adequate attention in the undergraduate curriculum. Thus, it is crucial for this present study to be carried out in order to further understand the level of knowledge and quality of practice of hand hygiene among dental undergraduates.

MATERIALS AND METHODS

Study design and participants

This is a cross-sectional study conducted among dental students in UiTM Sungai Buloh Campus. Ethical approval was obtained prior to conducting this study (Ref no: REC/05/2020 (UG/MR/153)). The inclusions criteria include all students from year 3 to year 5 in academic year while postgraduate students and all dental students from year 1 to year 2 were excluded from the study sample.

Sample size calculation

Epi-Info Software was used to calculate the sample size for this study. Margin of error was set at 5% and expected frequency at 53.5% (Swetah & Pradeep Kumar, 2015). From the calculation, the minimum number required to satisfy all objectives of this study is 192 students. However, all students from respected years were recruited to participate in this study, $n = 252$ subjects, thus no sampling methods were applied. A total of 252 subjects were recruited for this study.

Research Tools

A validated World Health Organization hand hygiene questionnaire (WHO, 2009) and a validated self-administered questionnaire on the practice of hand hygiene were used in this study (Jemal, 2018). The additional demographic information added were age, race, gender, and year of study.

The self-administered questionnaire used in this study assessed the knowledge domain of hand hygiene. The questionnaire was validated by World Health Organization, and it consists of 10 questions. The answers to these questions were multiple choices “yes” or “no” options. Each correct answer was given one point, and an incorrect answer was marked as zero. The maximum score obtainable for knowledge was 25. The scores were calculated and expressed in percentage. An overall score of more than 75% was considered good, 50-74% moderate, and <50% was taken as poor (Thakker & Jadhav, 2015).

The second validated questionnaire used in this study is the practice of hand hygiene, adapted from research paper ‘Knowledge and Practices of Hand Washing among Health Professionals in Dubti Referral Hospital, Dubti, Afar, Northeast Ethiopia’ (Allegranzi & Pittet, 2009). The questionnaire consists of 10 questions in the form of Likert scale with the score ranging from 0 to 4 (0=never, 1=sometimes, 2=often, 3=usually, and 4=always). Total score was calculated by summing up the scores obtained for each question. Participants who responded to the practice questions $\geq 50\%$ in line with the recommended hand washing practice by WHO were recorded to have good practice. Poor hand washing practice were recorded for study participants who responded <50% in line with the recommended hand washing practice (Allegranzi & Pittet, 2009).

Data collection

An e-survey (Google form) was prepared based on the validated questionnaire and distributed to the undergraduate dental students who fulfil the inclusion and exclusion criteria, via text message. The purpose of this research was explained to target respondents prior to data collection. Consent was taken prior their agreement to be in this study. Participants were informed of their rights to withdraw at any time, and their responses would be anonymous and treated confidentially. Respondents were given approximately 10 minutes to answer. Answered questionnaire were then collected for data entry and analysis. Data were collected from August 2020 until January 2021.

Statistical Analysis

IBM SPSS Version 25 was used for data management and statistical analysis. Normality of the numeric data was checked through histogram.

The level of knowledge regarding hand hygiene as well as the practice in clinical settings among undergraduate dental students were analysed by descriptive statistics to obtain the frequency and percentage.

Pearson’s correlation analysis was used to determine the correlation of knowledge level regarding hand hygiene and the practice in clinical settings. Bivariate normality of the data was checked prior the analysis. The strength of correlation was determined according to Colton’s guideline where $r=0.00-0.25$ (little or no correlation), $r=0.26-0.50$ (fair correlation), $r=0.51-0.75$ (moderate-good correlation) and $r=0.76-1.00$ (very perfect correlation).

RESULTS

A total of 252 answered questionnaires were submitted giving a response rate of 100% as shown in Table 1. All of the respondents have experience in the clinical settings. 98.8% of dental students had received formal training on hand hygiene while only 1.2% claimed that they had never received any formal training.

Table 1: Demographic characteristics (n=252)

Variables	n (%)	Mean (SD)
Age	-	23.17 (1.15)
Gender		
Male	31 (12.3%)	-
Female	221 (87.7%)	-
Race		
Malay	248 (98.4%)	-
Others	4 (1.6%)	-
Year of study		
Year 3	75 (29.8%)	-
Year 4	89 (35.3%)	-
Year 5	88 (34.9%)	-
Receive formal training in hand hygiene		
No	3 (1.2%)	-
Yes	249 (98.8%)	-
Use alcohol-based hand rub routinely		
No	42 (16.7%)	-
Yes	210 (83.3%)	-
Knowledge Score	--	20.02 (2.24)
Practice Score		36.10 (3.69)

Based on the data analysis, dental students demonstrated high level of knowledge regarding hand hygiene. Majority of the respondents answered correctly for at least more than half of the total questions. The participants' hand hygiene knowledge result is shown in Table 2. Most of the respondents (74.6%) had good knowledge of hand hygiene while 25.4% had moderate knowledge of hand hygiene. Furthermore, more than half of participants agreed that hand hygiene actions prevent transmission of germs to the health-care worker after touching a patient (98.8%), immediately after a risk of body fluid exposure (97.2%), immediately before a clean or aseptic procedure (92.5%). As much as 70.6% (n=178) agreed that handwashing is more effective rather than hand rubbing, and surprisingly only 17.9% (n=45) answered handwashing does not need to be followed by hand rubbing as the majority are still unaware that handwashing by itself is already efficient. Respondents' knowledge on factors that contribute to harmful germs colonization on hand were good as more than 90% agreed wearing jewellery (96.4%), damaged skin (94.0%) and artificial nails (96.4%) should be avoided in clinical settings.

Results regarding the practices of hand hygiene is shown in Table 3. One hundred percent of the respondents had good practice of hand hygiene as they follow $\geq 50\%$ in line with the recommended hand washing practice by WHO. From a total of 252 respondents, majority of them always washed their hand before contacts with patients (65.9%), after contacts with patients (84.9%), before and after contact with patients (75.0%), after contact with body secretions (84.1%) and before performing any clean and aseptic procedures (70.2%). 79.4% (n=200) always apply soap during handwashing, while 63.1% (n=159) always moisten their hands under running water before applying soap. However, not many of them always used alcohol-based hand rub for hand hygiene (48.4%). Despite that, majority of them always dry their hands after hand washing (54.8%) and 73.0% (n=184) always wash hands before leaving the hospital.

Pearson's correlation test was used to determine the correlation between knowledge domain of hand hygiene and practice of hand hygiene in clinical settings. Among all of Year 3 to Year 5 UiTM undergraduate students, the knowledge level regarding hand hygiene was found to have a significant negative association with practice of hand hygiene. Level of knowledge were found to have weak correlation to practice of hand

hygiene in clinical settings ($r = -0.354$, $p < 0.001$). Correlation between knowledge and practice is shown in Table 4.

Table 2: Hand hygiene knowledge of undergraduate UiTM dental students

Variables	n	(%)
1. Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility?		
Health-care workers' hands when not clean	176	69.8
Air circulating in the hospital	14	5.6
Patients' exposure to colonized surfaces (i.e., beds, chairs, tables, floors)	47	18.7
Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients	15	6.0
2. What is the most frequent source of germs responsible for health care-associated infections?		
The hospital's water system	0	0
The hospital's air	16	6.3
Germs already present on or within the patient	79	31.3
The hospital environment (surfaces)	157	62.3
3. Which of the following hand hygiene actions prevents transmission of germs to the patient?		
Before touching a patient		
No	0	0
Yes	252	100
Immediately after a risk of body fluid exposure		
No	21	8.3
Yes	231	91.7
After exposure to the immediate surroundings of a patient		
No	24	9.5
Yes	228	90.5
Immediately before a clean/aseptic procedure		
No	7	2.8
Yes	245	97.2
4. Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?		
After touching a patient		
No	3	1.2
Yes	249	98.8
Immediately after a risk of body fluid exposure		
No	7	2.8

Yes	245	97.2
Immediately before a clean/aseptic procedure		
No	19	7.5
Yes	233	92.5
After exposure to the immediate surroundings of a patient		
No	9	3.6
Yes	243	96.4
5. Which of the following hand hygiene actions prevents transmission of germs to the patient?		
Handrubbing is more rapid for hand cleansing than handwashing		
No	40	15.9
Yes	212	84.1
Handrubbing causes skin dryness more than handwashing		
No	36	14.3
Yes	216	85.7
Handrubbing is more effective against germs than handwashing		
No	178	70.6
Yes	74	29.4
Handwashing and handrubbing are recommended to be performed in sequence		
No	45	17.9
Yes	207	82.1
6. What is the minimal time needed for alcohol-based handrub to kill most germs on your hands?		
20 seconds	181	71.8
3 seconds	0	0
1 minutes	38	15.1
10 seconds	33	13.1
7. Which type of hand hygiene method is required in the following situations?		
Before palpation of the abdomen		
Rubbing	196	78.7
Washing	41	16.5
None	12	4.8
Before giving an injection		
Rubbing	125	49.6
Washing	113	44.8
None	14	5.6

After emptying a bedpan		
Rubbing	47	18.7
Washing	200	79.3
None	5	2.0
After removing examination gloves		
Rubbing	38	15.1
Washing	213	84.5
None	1	0.4
After making a patient's bed		
Rubbing	77	30.6
Washing	162	64.2
None	13	5.2
After visible exposure to blood		
Rubbing	16	6.3
Washing	235	93.3
None	1	0.4
8. Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?		
Wearing jewellery		
No	9	3.6
Yes	243	96.4
Damaged skin		
No	15	6.0
Yes	237	94.0
Artificial fingernails		
No	9	3.6
Yes	243	96.4
Regular use of a hand cream		
No	177	70.2
Yes	75	29.8

Table 3: Practice of hand hygiene of undergraduate UiTM dental students

Variable	Response	Frequency	(%)
Wash hands before contact with patients	Always	166	65.9
	Usually	69	27.4
	Often	12	4.8
	Sometimes	5	2.0
Wash hands after contact with patients	Always	214	84.8
	Usually	32	12.7
	Often	6	2.4
Wash hands before and after contact with patients	Always	189	75.0
	Usually	55	21.8
	Often	6	2.4
	Sometimes	2	0.8
Wash hands after contact with body secretions	Always	21	84.1
	Usually	35	13.9
	Often	5	2.0
Wash hands before performing any clean and aseptic procedures	Always	177	70.2
	Usually	63	25.0
	Often	9	3.6
	Sometimes	3	1.2
Apply soap during handwashing	Always	200	79.4
	Usually	48	19.0
	Often	4	1.6
Moisten hands under running water before applying soap	Always	159	63.1
	Usually	65	25.8
	Often	22	8.7
	Sometimes	6	2.4
Use alcohol-based hand rub for hand hygiene	Always	122	48.4
	Usually	76	30.2
	Often	40	15.9
	Sometimes	14	5.6
Dry hands after washing	Always	138	54.8
	Usually	85	33.7
	Often	19	7.5
	Sometimes	8	3.2
	Never	2	0.8
Wash hands before leaving the hospital	Always	184	73.0
	Usually	54	21.4
	Often	10	4.0
	Sometimes	4	1.6

Table 4: Correlation between knowledge and practice of hand hygiene

Descriptive Statistics

	Mean	Std. Deviation	N
Knowledge Score	20.02	2.242	252
Practice Score	36.10	3.692	252

Correlations

		Knowledge Score	Practice Score
Knowledge Score	Pearson Correlation	1	-0.354
	P value		<0.001
	N	252	252
Practice Score	Pearson Correlation	-0.354	1
	P value	<0.001	
	N	252	252

DISCUSSION

Response rate is influenced by the method of administration, sampling process, type of questionnaire and characteristics of the sample. This study has achieved 100% respondents from the sample size targeted. It was conducted to assess the level of knowledge and practices of hand hygiene in the clinical setting of undergraduate UiTM dental students.

In this study, undergraduate dental students were reported to have a high level of knowledge regarding hand hygiene. The reason for this can be attributed to the teaching and learning activity from the Introduction to Clinical Practice module, which was taught before the participants started their clinical training. They were taught regarding self-protective measures, hand washing techniques before and after starting any treatment, including how to don and doff Personal Protective Equipment (PPE). Majority of respondents (74.6%) had good knowledge of hand hygiene while 25.4% had moderate knowledge of hand hygiene. This result is in parallel to a study done in northwest Nigeria, which recorded about three-quarters (72.4%) of the respondents exhibited good knowledge of hand hygiene (Garba & Uche, 2019). The essential factor which led to this result is that healthcare workers having frequent contact with patients and their body fluids including performing clinical procedures had contribute to their good knowledge on hand hygiene (Garba & Uche, 2019). On the contrary, a study conducted in Navi Mumbai has revealed only 7.59% respondents (n=15) had good knowledge while 69.19% (n=137) was moderate in knowledge regarding hand hygiene among medical, dental and nursing students (Thakker & Jadhav, 2015). Their study concluded that formal training in hand hygiene needs to be inculcated at the undergraduate level due to poor knowledge recorded among undergraduate students (Thakker & Jadhav, 2015).

Despite that, we can state that minority of respondents in this study were not very familiar with recommended time which 15.1% (n=38) of them answered 1 minute while 13.1% (n=33) believed that it took 10 seconds for alcohol-based hand rub to be effective against germs as per WHO hand hygiene guideline.

Majority of the respondents in this study were aware of the World Health Organization’s five moments of hand washing. Similar results can also be seen in a study done at Qassim College of Medicine which

recorded 40 out of 51 (78.4%) respondents were able to identify all the five indications of hand hygiene and this percentage was recorded as hand hygiene awareness level (Salati & Al Kadi, 2014). This contradicts a study led by Shobowale et al. (2016) among healthcare workers that showed only 10 respondents were found to be compliant to hand hygiene practice before touching the patient while 165 were non-compliant, minority of the respondents (n=48) performed hand hygiene after touching the patient against the 128 respondents that did not. However, study by Shobowale et al. (2016) was an observational study done in Babcock University Teaching Hospital where hand hygiene compliance was monitored using the hand hygiene observation tool developed by the World Health Organization.

A different study conducted by Vaishnavi S. Thakker and Pradeep R. Jadhav (2015) among undergraduate medical, dental and nursing students had the similar findings as ours, in which majority of respondents were unaware that patients were the frequent source of germs responsible for health care-associated infections. For this study, only 79 out of 252 respondents (31.3%) believed germs already present on or within the patient while 157 respondents (62.3%) answered the hospital environment surfaces which happened to be an incorrect response. In addition, a study in Anuradhapura Teaching Hospital involving ICU staffs reported 70% agreed that the most frequent source of germs responsible for health care associated infections came from the hospital environment whereas only 25% knew that germs present on the patient was the main source of infection (Kudavidnange et al, 2015). These might be often mistaken, as in one study conducted in a Tertiary Care Teaching Institute in India showed less than half of respondents which were medical, dental and nursing students answered correctly with 23.81%, 36.49% and 25% respectively (Thakker & Jadhav, 2015).

Respondents in this study were reported to have good knowledge on factors that contribute to harmful germs colonization on hand as more than 90% agreed wearing jewellery (96.4%) should be avoided in clinical settings. This result is consistent with a study conducted among medical students in Subharti Medical College, which recorded 98.68% of respondents agreed that jewellery is a potential source of colonization and transmission of potential pathogens (Chauha et al, 2019).

Practice of hand hygiene in this study depicted that all respondents had good practice. The results of this study demonstrate that dental students were aware that handwashing plays a significant role in preventing the incidence of Hospital Acquired Infections. In a study in Nigeria, it was revealed self-reported good hand hygiene practice was found among 134 of 236 (56.8%) of the health care workers (Afolaranmi & Code, 2018) which roughly half of them had good practice of hand hygiene. In general, all of the respondents had shown a good practice of hand hygiene as they followed $\geq 50\%$ in line with the recommended hand washing practice. However, this result contradicts a study in Northeast Ethiopia among healthcare professionals that revealed more than half of the respondents (56%) were categorized under poor practice (Jemal, 2018). The reasons they claimed were scarce of hand washing supplies such as antiseptic agents, work overload as well as shortage of time, water and soap.

Research done by Suoud Jemal among healthcare professionals recorded surprising results which revealed the participants had poor practice of hand washing despite that most of them were knowledgeable and this was attributed to shortage of time, work overload and scarcity of handwashing supplies (Jemal, 2018). In another study done among the South Asian Medical students demonstrated that knowledge has weak positive association with practice (Jayarajah et al, 2019), which contradicts this study that revealed to have weak negative correlation. Nonetheless, having adequate knowledge about hand hygiene coupled with continuous training and seminars could have a positive impact on the practice of hand hygiene. Positive correlation might be recorded with a result such as the better knowledge regarding hand hygiene, the better the practice of hand hygiene. For instance, a study conducted among nurses in Shiraz Nemazee Hospital stated a weak positive correlation was noted between knowledge and self-reported practice score ($r = 0.31$; $P < .001$) (Nematian et al, 2017). However, this study revealed a weak negative correlation due to inconsistency in both knowledge and practice of hand hygiene level. For example, a few samples were found to have a low knowledge score but high practice score.

Although there was significant linear correlation between knowledge and practice ($p \leq 0.01$) observed in this study, weak correlation was found between level of knowledge and practice. Overall, results of the survey show reasonably good responses towards knowledge and practices of hand hygiene. A study carried among South Asian Medical students shows those with higher scores on knowledge and attitudes will also score higher in practice, with greater association to attitudes rather than knowledge (Jayarajah et al, 2019). However, the correlation presented was between low and moderate, which means that the amount of variance explained was quite low. Thus, improving knowledge may not necessarily change their practices. Nonetheless, this is a very interesting research question to be addressed for future studies, in order to understand the reason why students who possess high knowledge on hygiene measures, do not implement it in daily practice.

Despite the large sample size and excellent response rate, there are several limitations which needs to be considered in this study. Firstly, the fact that the responses were based on students' self-assessment rather than being under supervision may not fully reflect respondents' real knowledge and practice of hand hygiene in clinical practice. In addition, this number of questions do not represent the real knowledge level and practice of the respondents. Moreover, there is a possibility that students did not realise the negative questions asked as they might not read them carefully. Hence, this can lead to inaccurate answers by the respondents. Lastly, as the study was conducted only among the dental students in UiTM Sungai Buloh, the result could be biased and did not represent the dental students from all universities in Malaysia.

CONCLUSION

Level of hand hygiene knowledge slightly influences the practice of hand hygiene in the form of negative correlation. Although respondents had good knowledge, there might be other external factors which influence the practice, such as shortage of time and high patient workload. This can be seen in a study by Trick et al, which addressed determinants including knowledge, facilities, and attitude as the valuable components in hand hygiene improvement strategies (Huis et al, 2012). Further qualitative study should be conducted to elucidate other confounding factors influencing the practice of hand hygiene among undergraduate dental students. The overall findings of this study indicate that further improvement should be addressed to fill the gaps in knowledge level of hand hygiene and the practices of hand hygiene. Proper training of handwashing technique needs to be emphasized and supervised more among our undergraduate dental students as their good level of knowledge only slightly influences the practice of hand hygiene in clinical settings. For instance, evaluation and assessment on the knowledge as well as the practice of hand hygiene should be done annually to ensure that students' knowledge is up to date, along with continuous good practice in clinical settings.

ETHICS

This study was approved by the UiTM Research Ethics Committee, Universiti Teknologi MARA (Ref no: REC/05/2020 (UG/MR/153)). This research was conducted in full accordance with the World Medical Association Declaration of Helsinki.

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We declare that this study has no funding and no conflict of interest in relation to the published result.

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