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Knowledge and Attitude Regarding Infection Control among Undergraduate Dental Students at a Tertiary Care Hospital

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ABSTRACT

Introduction: In academic institutes, dental students are not only involved in academic activities, but also in the management of patient care. This calls for inculcation of adequate knowledge and positive attitude among them so that a good clinical practice is implemented in the dental setting.

Objective: To assess knowledge and attitude regarding infection control among undergraduate dental students of B.P. Koirala Institute of Health Sciences (BPKIHS), Dharan, Sunsari, Nepal.

Methods: An online analytical cross-sectional study was conducted at BPKIHS from 2021 February to 2021 April among undergraduate students from third year, fourth year, and internship by using a self-administered questionnaire via Google Forms. Census method was used. Descriptive and inferential statistics were used to analyse the data.

Results: A total of 136 undergraduate dental students participated out of which 107 (78.70%) were found to have adequate knowledge while 101 (74.30%) participants showed 'positive' attitude. Mean age of the participants with adequate knowledge was significantly higher than participants with inadequate knowledge (P=0.047). The difference in knowledge among participants was statistically significant (P=0.001) in academic years. Adequate knowledge was shown by 47 (90.4%) interns followed by 36 (83.7%) fourth year and 24 (58.7%) third year students. The difference in attitude was also statistically significant (P=0.011) across the academic years. Positive attitude was shown by 39 (90.4%) fourth year students followed by 28 (68.3%) third year students and 34 (65.4 %) interns.

Conclusions: The present study reports adequate knowledge and positive attitude regarding infection control among undergraduate dental students in BPKIHS.

Keywords: Attitude; infection control; knowledge; undergraduate dental students.

INTRODUCTION

Majority of routinely performed dental procedures have potential to create contaminated aerosols and splatter which puts the dental health care providers (DHPs) at risk of cross infection.[1] In academic institutes, dental students are directly involved in the management of patients as part of their curricular practical training. Therefore, it is the responsibility of every dental institute to provide appropriate measures to ensure safer working conditions.[2]

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Several studies have been conducted across different countries to assess knowledge, attitude, and practice related to infection control among undergraduate dental students with varying results [3-4] and Nepal is no exception to this.[2,5,6]

In the college of dental surgery, B.P. Koirala Institute of Health Sciences (BPKIHS) lectures on infection control are started as early as first year and they are exposed to problem-based learning (PBL) on this topic during their third year. However, assessment of their knowledge and attitude regarding infection control has not yet been recorded. Therefore, the present study aimed to assess the level of academic knowledge acquired in relation to infection control and subsequently, their attitude towards its guidelines in their clinical practice. As a result, focused supervision could be implemented during clinical training to motivate adherence to the guidelines.

METHODS

An online analytical cross-sectional study was conducted among the undergraduate dental students at college of dental surgery, BPKIHS, Dharan, Sunsari, Nepal from 2021 February to 2021 April. Ethical approval was obtained from the Institutional Review Committee, BPKIHS (Ref. No. 438/077/078-IRC; Code no.: IRC/2042/020) before conducting the study. A link was sent through emails and Facebook Messenger to the participants including a brief introduction on the background, objective of the study, voluntary nature of participation, declarations of confidentiality, and anonymity followed by questions on demographic characteristics, knowledge, and attitude regarding infection control in dental setting.

In this study, census method was used for selecting the participants where all the undergraduate dental students of third, fourth year and internship who agreed to participate were included. Participants had to answer a yes–no question in the google form to confirm their willingness to participate voluntarily.

Sample size adequacy was estimated by considering 95% level of significance and 20% relative error. So, by using one proportion formula sample size was calculated as: $n= z^2pq/d^2$ where, z=1.96 at 95% level of significance, p=proportion of the responding participants in reference to the study done by Alharbi et al.[7]=67.2%; q=100-p=100-67.2=32.8; and d=relative error=20% of 67.2%= 13.44. Hence, $n=(1.96)^2X67.2X32.8/(13.44)^2= 46.87≈47$. After, adding 10% to calculated sample size for reduction of various biases, actual sample size was determined to be 52. However, all the students studying in third year, fourth year, and internship were included in the study. Hence, total target population size was 160 students.

The data collection tool was a self-administered questionnaire which consisted of 26 closed ended questions. It was constructed using items designed to reflect Centres of Disease Prevention and Control (CDC) guidelines towards infection control in dental health care setting along with further appropriate questions relevant to routine clinical practice of dental students or professionals in the dental setting. The prepared questionnaire was presented at the concerned departments for content validity and accordingly suggestions were incorporated. The finalised questionnaire was thereupon subjected to pilot study among 10% of sample size to assess its reliability, for which it was converted into a web-based format (Google Forms) and shared via emails and social networking platform (Facebook messenger). The data from participants (N=16) of the pilot study were excluded from the final analysis.

The results did not show acceptable internal consistency of the tool. Therefore, it was re-constructed which now comprised of 21 questions after item deletion and reframing, out of which 13 questions were based upon knowledge and 8 on attitude related to infection control in dental setting. A revised and finalised version was then re-piloted among the same study sample which, upon reliability analysis, showed that Cronbach's coefficient alpha for knowledge and attitude was 0.724 and 0.714, respectively.

For the knowledge questions, incorrect or uncertain responses (I do not know, and I do not remember) were given score 0 while, score 1 was assigned for correct answer. For attitude questions, responses were graded on a 5-point Likert scale, an agreement scale ranging from strongly agree, agree, uncertain, disagree, and strongly disagree which were scored as 4,3,2,1 and 0 respectively. The expected maximum total knowledge score for knowledge and attitude were 13 and 32 respectively. The scores for all the questions were summed up and the mean score was calculated, which then was expressed as percentage and further interpreted according to modified Bloom's cut off point.[8] Level of knowledge was considered "adequate" if the score was above 80%, and attitude to be "positive" if above 90%.

The data collected via online questionnaire were stored in MS excel 2007 and then converted into SPSS Statistics for Windows, version 11.5 (SPSS Inc., Chicago, III., USA) for statistical analysis. Descriptive statistics were presented in frequency, percent, mean and standard deviation (SD) along with graphical and tabular form, whereas inferential statistics, independent t-test and Chi-square test was applied to find out the significant difference between selected variables with attitude and knowledge regarding infection control. P value<0.05 was considered statistically significant.

RESULTS

The expected sample size was 144 after eliminating 10% of the study sample (N=16) included in the pilot test. So, out of 144 existing students only 136 (94.4%) responded to the questionnaire. Among them, 89 (65.0%) were females and 47 (35.0%) were males. The mean age of the participants was 23.96±1.03 years. The academic year distribution of third, fourth, and intern were 41 (30.2%), 43 (31.6%), and 52 (38.2%) students respectively in the study.

The distribution of responses on knowledge and attitude questionnaires has been tabulated (Table 1 and Table 2). Of the total participants, 107 (78.70%) were found to have 'adequate' knowledge while 101 (74.30%) participants were found to have 'positive' attitude.

Table 1: Responses of participants on knowledge questionnaire.

Questions	Responses, n (%)		
	Yes	I don't know	No
1. Infection control programme is conducted as a part of academic course in the institute you are studying.	136 (100)	-	-
2. For routine dental examinations and nonsurgical procedures, use of soap and water is necessary when hands are visibly soiled, otherwise, an alcohol-based hand rub may be used.	111 (81.6)	9 (6.6)	16 (11.8)
3. An operator should change mask between patients.	105 (77.2)	13 (9.6)	17 (13.2)
4. Surface barriers (aluminium foil) used to protect clinical contact surfaces like light handles, switches on dental chair etc. should be changed between patients.	114 (83.8)	14 (10.3)	8 (5.9)
5. Critical items, such as surgical instruments and periodontal scalers, should always be heat sterilised.	122 (89.7)	9 (6.6)	5 (3.7)
6. The quality of water used in dental unit in nonsurgical procedures is recommended to meet the Environmental Protection Agency (EPA) regulatory standard for safe drinking water.	112 (82.4)	18 (13.2)	6 (4.4)
7. Cleaning of used instruments should always precede disinfection and sterilisation.	121 (89)	12 (8.8)	3 (2.2)
8. Either one-handed scoop technique or a mechanical device designed for holding the needle cap should be used when recapping needles.	136 (100)	-	-
9. Impression should be disinfected as soon as possible after removing from the patient's mouth.	135 (99.3)	1 (0.7)	-
10. Have you received Hepatitis B Virus (HBV) immunisation vaccine?	121 (89)	10 (7.4)	1 (3.7)
11. Single dose (single use) medication vials, ampules and bags are used only for one patient.	135 (99.3)	1 (0.7)	-
12. If an unvaccinated dentist encounters needle prick injury while treating HBsAg (Hepatitis B surface Antigen) positive patient, following regimen as post exposure prophylaxis is recommended as soon as possible after exposure- "1 dose of HBIG and 1 dose of Hepatitis B Vaccine"	106 (77.9)	19 (14)	11 (8.1)
13. Personal protective equipment should be removed before leaving the work area.	123 (90.4)	10 (7.4)	3 (2.2)

Table 2: Responses of participants on attitude questionnaire.

Questions	Responses, n (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. It is mandatory for all dental practitioners to receive Hepatitis B Virus (HBV) immunisation vaccine.	131 (96.3)	5 (3.7)	-	-	-
2. It is necessary to enquire and record the medical history of the patient before starting any intraoral procedures.	128 (94.1)	8 (5.9)	-	-	-
3. It is necessary to wash hands before wearing gloves.	83 (61)	43 (31.6)	10 (7.4)	-	-
4. Wearing two pairs of gloves is effective in preventing disease transmission during oral surgical procedures.	73 (53.7)	62 (45.6)	-	1 (0.7)	-
5. Face masks should be offered to coughing patients and other symptomatic person when they enter the dental setting.	82 (60.3)	50 (36.8)	3 (2.2)	1 (0.7)	-
6. The patients should be instructed to perform pre-procedural mouth rinse before commencement of intraoral treatment procedure	112 (82.4)	20 (14.7)	6. 4 (2.9)	-	-
7. Do you believe that the responsibilities for disinfection and sterilisation of dental instruments and other equipments should be assigned to a trained staff?	88 (64.7)	43 (31.6)	5 (3.7)	-	-
8. It is necessary to discard used needles and sharp objects into the designated sharps container.	111 (81.6)	25 (18.4)	-	-	-

Table 3: Association of knowledge with age, gender, and academic year of the study participants.

		Adequate knowledge	Inadequate knowledge	Total	P value
Age in years	Mean±SD	24.05±1.05	23.62±0.86	23.96±1.03	0.047 *
Gender, n (%)	Male	37 (78.7)	10 (21.3)	47 (100)	0.992+
	Female	70 (78.7)	19 (21.3)	89 (100)	
Academic year, n (%)	Third year	24 (58.5)	17 (41.5)	41 (100)	0.001+
	Fourth year	36 (83.7)	7 (16.3)	43 (100)	
	Interns	47 (90.4)	5 (9.6)	52 (100)	

*Independent t-test, +Chi-square test

Table 4: Association of attitude with age, gender and academic year of the study participants.

		Positive attitude	Negative attitude	Total	P value
Age in years	Mean±SD	23.94±0.99	24±1.11	23.96±1.03	0.769*
Gender, n (%)	Male	38 (80.9)	9 (19.1)	47 (100)	0.202+
	Female	63 (70.8)	26 (29.2)	89 (100)	
Academic Year, n (%)	Third year	28 (68.3)	13 (31.7)	41 (100)	0.011+
	Fourth year	39 (90.7)	4 (9.3)	43 (100)	
	Interns	34 (65.4)	18 (34.6)	52 (100)	

*Independent t-test, +Chi-square test

Mean age of the participants with good knowledge was significantly higher than participants with inadequate knowledge (P=0.047). The difference in knowledge among participants was statistically significant (P=0.001) across different academic years with 47 (90.4%) of interns showing higher level of knowledge followed by 36 (83.7%) of fourth year and 24 (58.7%) of third year. However, there was no difference in level of knowledge between males and females (Table 3).

The age and gender difference among participants with positive and negative attitude was not statistically significant. The difference in attitude among participants was statistically significant (P value=0.011) across different academic years with 39 (90.7%) participants from fourth-year showing positive attitude followed by 28 (68.3%) third year and 34 (65.4%) interns (Table 4).

DISCUSSION

Assessment of knowledge and attitude regarding infection control is crucial in creating a safer workplace for dental health care providers as well as patients visiting them. This is challenging for academic institutes which is responsible for education and training of undergraduates to knowledgeable and skilled professionals. Such challenge can be accomplished by consistent inculcation of good knowledge and positive attitude in them with consistent supervision. Various studies have been conducted to assess knowledge, attitude, and practice of infection control policies amongst health care workers in Nepal. However, only few have been recorded among undergraduate dental students which entailed the conduction of the present study.

In the present study, first- and second-year students were excluded because those students are not exposed to clinical practice until they reach third year and the final year students were nonexistent due to fourth year examination delay for COVID-19 pandemic. Majority of undergraduate dental students in BPKIHS had adequate knowledge regarding infection control which is almost like the findings of the study conducted by Embrahimpour et al. and Halboub et al. among undergraduate dental students which showed satisfactory level of knowledge.[9,10] However, there are studies which report inadequate knowledge regarding infection control among undergraduate dental students.[2,3] The reason for adequate knowledge in this study is the incorporation of infection control training in the curriculum which is routinely conducted both via theory and practical sessions as early as third year.

Regarding the association of level of knowledge with respect to gender, age, and academic years, there was no significant difference in level of knowledge between males and females though it was higher among the participants with higher mean age and among students of higher academic level. This is in accordance with the results of another study

conducted in Nepal among undergraduate dental students and interns.[2] This significant difference is highly plausible in the sense that with increasing age and increasing level of education, knowledge is ought to upgrade. It is notable that, regarding Hepatitis B Virus (HBV)-vaccination status, 121 (89.0%) were vaccinated against HBV while 10 (7.4%) did not remember their status and four (3.7%) reported to be unvaccinated. This finding agrees with 86.50% vaccinated and 13.50% unvaccinated status of the students of BPKIHS itself which was reported in a cross-sectional study done by Bhattarai et al.[11] This study included medical, dental as well as nursing students and particularly for dental students, the vaccinated status was 80.2%, which was slightly lesser compared to current study result.[11] Another cross-sectional study done in Nepal including medical and dental students reported that 73.5% were vaccinated while 4.5% had no idea about their vaccination status.[12] Such increase in percent of vaccinated students in the present study indicates increased awareness among the students with due course of time in Nepal which is a positive finding. On the contrary, much higher rate of vaccinated status has been reported by other studies in UAE (95.8%), Brazil (90.8%), and Canada (100%).[13-15]

A couple of striking findings were noted despite good knowledge among majority of the students. Few students were unaware regarding the protocol of changing mask between patients. This could be attributed to the limited supply of such requirements in the institute because of which good clinical practice is being compromised. In addition, few students were found to lack the knowledge regarding post-exposure prophylaxis regimen when an unvaccinated dentist encounters a needle prick injury while treating Hepatitis B surface Antigen positive (HBsAg) patient. It is a serious concern though an occasionally encountered incidence during clinical practice, which calls for conduction of additional lectures and demonstrations to improve their knowledge.

In response to attitude questionnaire, majority of participants 101(74.30%) showed 'positive' attitude regarding infection control. This finding again is in congruence with the study done by Alharbi et al.[7] Similarly, there are various other studies which report positive attitude among the dental students.[16,17] But there are studies reporting negative attitude as well.[3,18] Regarding the attitude of different academic year students, it was found that majority of fourth year students showed the most positive attitude. This statistically significant difference may be attributed to the fact that attitude is a subjective domain and hence a result of discrepancy in an individual's beliefs, notions, and behavior. However, there was no difference in attitude noted among different age group and gender.

In the present study, it was appreciable to note that majority of the students showed positive attitude regarding the need of all dental practitioners to get vaccinated against HBV, importance of enquiring and recording the medical history of the patients before starting any intraoral procedures, and the necessity of disposal of used needles and sharp objects into designated sharps container. Such attitude is the reflection of good knowledge reported in the present study which in turn will contribute in strict adherence to infection control guidelines among the naive dental students.

Still, one (0.7%) of the participants disagreed to the statement regarding effectiveness of wearing two pairs of gloves during any intraoral surgical procedures to prevent disease transmission and offering face mask to coughing person as they enter the dental setting. However, wearing of double gloves can be incorporated into practice as it has been considered based upon several studies that, double gloving provide protection from occupational blood contact maintaining optimum manual dexterity as well as tactile sensitivity. In addition, the practice of offering mask to coughing persons in the vicinity of clinical set-up has also been recommended by CDC.[16] Furthermore, few students revealed uncertainty to the CDC guidelines like washing hands before wearing gloves and instructing patients to use pre-procedural mouth rinse before commencement of any treatment procedure. This is a serious issue, which could be implemented in their practice if not supervised strictly. Washing of hands thoroughly before wearing gloves is highly recommended[16] and despite the paucity of existing data which recommend preprocedural mouth rinse to prevent clinical infection among patients or Dental Health Care Personnels, it is advisable to use such rinse prior to aerosol generating procedures (AGPs) because, there are studies that have demonstrated reduction in the level of microorganisms with its use.[19,20] Also, there were students though very few, who showed uncertainty as per CDC recommendation according to which responsibilities for disinfection and sterilisation of dental instruments and other equipment should be assigned to a trained staff.[16] Such attitude if not improvised will subsequently produce incompetent professionals who might jeopardise the health system in toto.

There are few limitations in the current study. Practice which is one of the major domains of education was

not incorporated in the questionnaire because clinical assessment was not feasible as the students were only virtually accessible due to COVID-19 pandemic. Hence, with a view that subjective response would not reflect the true practice of the students, only knowledge and attitude were taken into consideration. Also, the present study did not include dental students from other parts of Nepal, thus making the sample size relatively small.

Despite the limitations, the data obtained from the study will help derive information pertaining to existing lacunae regarding knowledge and attitude towards infection control among the undergraduate students. This will trigger the need for further upgradation of current teaching-learning methods via conduction of continuous education programs, demonstrations regarding proper use of personal protective equipment (PPE), disinfection methods at more frequent intervals. Formal assessments and feedbacks during their clinical postings will also improve their knowledge, attitude and practice. Moreover, the results of this study will add to the existing literature and in turn impel conduction of similar studies amongst other group of staffs/ health care personnel in this institute. The result is expected to contribute to strengthening a cautious treatment strategy in the institute in future.

CONCLUSIONS

The present study reports adequate knowledge and positive attitude regarding infection control among undergraduate dental students in BPKIHS. However, there were minimal number of students showing negative attitude as well, which could be reflected in their practice. This calls for strict supervision during their clinical practice to achieve maximum adherence to infection control protocols. The scrutiny regarding adequacy of institutional supply of personal protective equipment among the students is also equally important. Last but not the least, further studies are encouraged to conduct such assessments among students from different institutes all over the country which would provide an insight regarding status of the dental health service of the country.

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