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Self-perception of oral health awareness among dental students in Himachal Pradesh, India: A cross-sectional study

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Abstract

Background: The aim was to study the self-perception of oral health awareness considering the various determinants among dental students of dental colleges in Himachal Pradesh, India.

Method: Data collection procedure included information obtained from the dental students recorded on a structured proforma self-administered which included Hiroshima University Dental Behavioral Inventory (HU-DBI). Higher scores indicate better oral health attitude and behavior.

Results: There were 84.9% female, 14.3% male and 0.7% other among total 670 participants. The total response rate was 74.4%. The mean total HU-DBI score is 6.38(1.54). Total score was significant for age between 20 and 23 years in post-hoc analysis of one way ANOVA.

Conclusion: The scores were higher in 1st and 3rd professional year dental students and inculcating right attitude and behavior during this period could come long way in their routine dental practices. Increased curricular coverage including summative assessment and simple problem based learning activities on preventive dentistry are recommended.

Keywords: Self Perception, Hiroshima University Dental Behavioral Inventory (HU-DBI), oral health, dental students

1. Introduction

Perception in cognitive psychology is making meaning out of senses which produces mental representation and processes in the brain^[1]. These processes are encoded and retrieved in the future as when required as part of learning. So, they form the basis of human self-perception which in turn influences human attitude and behavior^[1, 2]. Self-perception influences the higher cognitive processes of judgement, reasoning and decision making. Bern self-perception theory also consider the past mental representation and processes as the basis for the future attitude and behaviour^[3]. This interaction is essential in the process of learning, influenced by learned pattern of behaviour and values of the society^[4, 5].

Professional dental education in dental colleges produces idealized representation of oral health among dental students. As they pass through their rigorous four-year professional training in dental college, they tend to be role model of oral health in the society. This role play becomes more important when the burden of the oral disease is high in developing countries. The extent to which this desired objective and target of preventive oral health is achieved by the dental student is greatly influenced by their self-perception of oral health attitude and behaviour. The dental students admitted to the dental college belong to various background of society governed by different cultural norms and customs. Studies reports that the clarity of enhancing the understanding of oral health behavior and attitude among dental students is lacking in the given curriculum of dental education mostly focused on the clinically oriented dental syllabus.^[5,6] Further this transformation into role model of oral health prevention happens in the later third and final professional year regarded as the clinical years of dental education. There are also considerable differences in the oral health attitude and behavior of clinical and preclinical dental student as reported by studies^[6, 7]. The first and second professional years in dental education are considered to be the preclinical years where

the complete orientation towards preventive oral health is minimal. Literature suggests modifying dental school curriculum, understanding self-care practices and their perceived impact, poor attitude affecting the delivery of oral health care to their patients and demand of awareness programs in the early stage of dental training [7, 8, 9, 10]. The Hiroshima University-Dental Behaviour Inventory (HU-DBI) questionnaire developed by Kawamura in Japan, has been cross culturally compared among various countries with different socioeconomic status, attitude and behaviour towards oral and dental health [11]. The ability of HU-DBI to measure given psychometric construct has been established for various determinants of self-reported oral and dental health.

Developing countries have huge burden of oral diseases and curative dentistry will certainly be more taxing to their resources, so more emphasis should be given to preventive services or improving the attitude and behavior among dental students. With this background the need arises considering other determinants of dental students belonging to the various diversified regions of Himachal Pradesh and other parts of India. So, we aim with primary objective in studying the self-perception of oral health awareness among dental students of dental colleges in Himachal Pradesh, India.

2. Materials and Method

The sources of data for this descriptive qualitative study were dental students studying in government and private dental colleges of Himachal Pradesh (India). There were 5 dental colleges, one government and 4 private colleges during study period. Inclusion criteria included dental students willing to participate and studying in 1st, 2nd, 3rd, 4th professional years of various government and private dental colleges in Himachal Pradesh. The students doing their internship and postgraduate students of the dental colleges were excluded. Further students not willing to participate and provided in complete information in the study were also excluded. Pilot study was conducted to pretest the questionnaire by conducting it with five students from each year in order to assure that the students understood the questions and were able to answer them without help. The permission was obtained from the competent higher authority. Written informed consent was obtained from all participants for the present study which was voluntary and anonymous.

Data collection procedure included information obtained from the dental students recorded on a structured proforma, self-administered through the Google forms through Uniform Resource Locator (URL) from the period of November and December 2021. The information included was demographic details and Hiroshima University-Dental Behavioral Inventory (HU-DBI). A prevalidated questionnaire adapted from Hiroshima University-Dental Behavioral Inventory (HU-DBI), developed by Kawamura had 20 questions with

good test-retest reliability (0.73) was used. The evaluation of the oral health attitude and behavior of students is provided by calculating the total scores of 12 items [6, 11]. Higher scores indicate better oral health attitude and behavior. Calculation of each correct answer was given one point while each incorrect answer was given zero. So “agree” responses for items 4, 9, 11, 12, 16, and 19 were given one point each. “Disagree” responses for items 2, 6, 8, 10, 14 and 15 were given one point each. Hence the total score of 12 or more indicates good oral health awareness. The socioeconomic status was calculated using B G Prasad classification based on All India Consumer Price Index for Industrial Worker (AICPI-IW) for March 2022 = 126 [12]. Multiplication factor = current index value (126)/ base index value in 2016 (100) = 1.26. The new income value can now be calculated using the following equation: New income value = Multiplication Factor × Old Income Value × 4.63 × 4.93 × 2.88. Where 4.63, 4.93, and 2.88 are the linking factors given by the Labor Bureau [13]. Revised classification for 2022 (Rs./month) were 8283 (Rs./month) and above as upper class, 4142-8282 (Rs./month) as upper middle class, 2485-4141(Rs./month) as middle class and <1242(Rs./month) as lower class.

2.1 Statistical analysis: This was performed using Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, version 22 for windows). Summarized data sets of nominal or ordinal scale were described in frequency or percentage by descriptive statistics. Various inferential statistics like chi square, Mann Whitney U, Kruskal-Wallis, one way ANOVA with bonferroni, Univariate analysis of variance for power was used. Further with p-value of < .05 were performed to test the hypothesis.

3. Results

There were 84.9% female, 14.3% male and 0.7% other among total 670 participants. The total response rate was 74.4%. The mean total HU-DBI score is 6.38(1.54). Table 3.1 shows that the total HU-DBI was significant for age, school last attended and BDS professional group. The total agree and disagree scores individually was significant for age, gender, among various dental professional years and groups but for school last attended it was only significant for total disagree score. Table 3.2 shows that the proportions of correct response for the total agree score was highest for question number 12 (89.1%) that I often check my teeth in a mirror after brushing. Question number 2, that I do not worry if my gums bleed during brushing, had the highest correct response among the total disagree scores. Table 3.3 shows that question number 1, 2, 3, 4, 7, 8, 10, 15, 17 was statistically significant among various dental professional years students for the agreed question. Table 3.4 shows that total score was significant for age between 20 and 23 years in post-hoc analysis of one way ANOVA.

Table 1: Descriptive statistics of Agree, Disagree and Total HU-DBI score among baseline sample characteristics.

Variables (n)	Total Agree Score		Total Disagree Score		Total HU-DBI Score	
	Mean (SD)	p value	Mean (SD)	p value	Mean (SD)	p value
Gender						
Females (569)	2.62(0.96)	0.001	3.76(1.35)	.001	6.37(1.59)	0.54
Males (96)	2.86(0.98)		3.58(1.48)		6.44(1.31)	
Others (5)	0(0)		6(0)		6(0)	
Age						
17years (2)	4(1.41)	<.001**	0.50(0.70)	<0.001**	4.5(0.70)	0.10*
18 years (15)	2.93(0.96)		3.47(1.59)		6.40(1.88)	
19 years (57)	2.91(0.87)		3.00(1.22)		5.91(1.52)	
20 years (120)	2.33(1.14)		3.67(1.47)		6.00(1.85)	
21years (178)	2.78(0.85)		3.75(1.24)		6.53(1.39)	
22 years (170)	2.46(0.93)		3.98(1.35)		6.44(1.44)	
23 years (99)	2.68(1.02)		4.03(1.38)		6.70(1.43)	
24 years (29)	2.97(1.21)		3.66(1.39)		6.62(1.54)	
Dental college type						
Government Dental College (238)	2.64(1.06)	0.582	3.79(1.39)	0.578	6.42(1.50)	0.281
Private Dental College (432)	2.63(0.96)		3.73(1.37)	0.578	6.35(1.57)	
Socio-economic status						
I (upper class) (556)	2.65(0.99)	0.33	3.76(1.38)	0.28		0.819
II (upper middle class) (92)	2.51(1.08)		3.77(1.36)		6.40(1.56)	
III (middle class) (13)	2.92(0.862)		3.23(1.36)		6.28(1.54)	
IV (lower middle class) (8)	2.50(0.75)		3.63(1.06)		6.15(1.46)	
V (lower class) (1)	2.00(0)		3.00(0)		6.12(0.83)	
State Domicile						
Himachal Pradesh (487)	2.67(0.96)	0.26	3.76(1.39)	0.61	6.42(1.48)	0.281
Other state in India (183)	2.53(1.08)		3.74(1.34)		6.26(1.70)	
District (zone)						
Kinnaur/ Lahaul Spiti/Chamba/Kullu Manali (Upper Zone) (53)	2.68(0.93)	0.67	3.75(1.34)	0.733	6.43(1.47)	0.611
Kangra/Mandi/Shimla/Sirmaur (Middle Zone) (246)	2.65(1.03)		3.82(1.38)		6.46(1.55)	
Hamirpur/Una/Bilaspur/Solan (Lower Zone) (187)	2.69(0.88)		3.68(1.42)		6.39(1.40)	
Other District of India (184)	2.53(1.08)		3.73(1.33)		6.26(1.70)	
School last attended						
Government School (110)	2.62(1.11)	0.99	3.35(1.62)	0.013*	5.97(1.98)	.039*
Private School (560)	2.63(0.97)		3.83(1.31)		6.46(1.43)	
Dental Professional Year						
1 st Year (108)	2.77(0.93)	0.006*	3.45(1.32)	<0.001**	6.22(1.60)	0.128
2 nd Year (148)	2.70(0.91)		3.45(1.45)		6.14(1.80)	
3 rd Year (130)	2.38(1.02)		4.21(1.38)		6.58(1.40)	
4 th Year (284)	2.66(1.04)		3.81(1.29)		6.47(1.43)	
Total (670)	2.63(1.00)		3.75(1.38)		6.38(1.54)	
Dental Professional Groups						
Preclinical Group (256)	2.73(0.92)	0.015*	3.45(1.40)	<0.001**	6.17(1.72)	0.023*
Clinical Group (414)	2.57(1.05)		3.94(1.33)		6.50(1.42)	

*p value <.05, **p value =<.001, SD= Standard Deviation, n=total

Table 2: Frequency distribution of various questions considered for the HU-DBI total score.

Items/questions of HU-DBI	Proportion of Correct responses n (%)	Proportion of Incorrect responses n (%)
Q4. I am concerned about sticky deposits on my teeth (Agree)	239(35.7)	431(64.3)
Q10. It is necessary to teach the correct brushing procedure (Agree)	309(46.1)	361(53.9)
Q11. I think I can clean my teeth well without using toothpaste (Agree)	43(6.4)	627(93.6)
Q12. I often check my teeth in a mirror after brushing (Agree)	597(89.1)	73(10.9)
Q16. Use of tooth brush with hard bristles will damage the gums (Agree)	43(6.4)	627(93.6)
Q19. Brushing the teeth more than once is ideal (Agree)	285(42.5)	385(57.5)
Q2. I do not worry if my gums bleed during brushing (Disagree)	583(87.0)	87(13)
Q6. I think that I cannot help having false teeth when I am old (Disagree)	487(72.7)	183(27.3)
Q8. I am worried that my teeth are getting worse despite my daily brushing (Disagree)	490(73.1)	180(26.9)
Q9. Spending much time on brushing will damage the tooth structure (Disagree)	144(17)	556(83)
Q14. It is impossible to prevent gum disease with tooth brushing alone (Disagree)	311(46.4)	359(53.6)
Q15. It is not necessary to visit a dentist until I get a toothache (Disagree)	281(41.9)	389(58.1)

Table 3: Cross tab among various BDS Professional years for the “Agreed” Items.

Items/questions of HU-DBI	Total n (%)	Prof Year 1	Prof Year 2	Prof Year 3	Prof Year 4	
1. I do not worry much about visiting the dentist	322(48.1)	59(18.3)	78(24.2)	79(24.5)	106(32.9)	0.001**
2. I do not worry if my gums bleed during brushing D	87(13)	30(34.5)	21(24.5)	9(10.3)	27(31)	0.001**
3. I worry about the colour of the teeth	468(69.9)	81(17.3)	123(26.3)	73(15.6)	191(40.8)	0.001**
4. I am concerned about sticky deposits on my teeth A	239(35.7)	53(22.2)	61(25.5)	41(17.2)	84(35.1)	0.001**
5. Using of child-sized tooth brush is improper	39(5.8)	5(12.8)	15(38.5)	7(17.9)	12(30.8)	0.083
6. I think that I cannot help having false teeth when I am old D	183(27.3)	37(20.2)	45(24.6)	30(16.4)	71(38.8)	0.153
7. I am bothered by the colour of my gums	246(36.7)	24(9.8)	64(26)	48(19.5)	110(44.7)	0.005*
8. I am worried that my teeth are getting worse despite my daily brushing D	180(26.9)	19(10.6)	64(35.6)	21(11.7)	76(42.2)	0.001**
9. Spending much time on brushing will damage the tooth structure D	556(83)	91(16.4)	129(23.2)	99(17.8)	237(42.6)	0.098
10. It is necessary to teach the correct brushing procedure A	309(46.1)	54(17.5)	86(27.8)	42(13.6)	127(41.1)	0.001**
11. I think I can clean my teeth well without using toothpaste A	43(6.4)	7(16.3)	6(14)	7(16.3)	23(53.5)	0.400
12. I often check my teeth in a mirror after brushing A	597(89.1)	98(16.4)	126(21.1)	111(18.6)	262(43.9)	0.059
13. I am bothered having bad breath	440(65.7)	69(15.7)	99(22.5)	75(17)	197(44.8)	0.130
14. It is impossible to prevent gum disease with tooth brushing alone D	359(53.7)	60(16.7)	71(19.8)	68(18.9)	160(44.6)	0.393
15. It is not necessary to visit a dentist until I get a toothache D	389(58.1)	75(19.3)	91(23.4)	63(16.2)	160(41.1)	0.008*
16. Use of tooth brush with hard bristles will damage the gums	43(6.4)	5(11.6)	14(32.6)	5(11.6)	19(44.2)	0.229
17. Brushing of teeth with strong strokes is not ideal	115(17.2)	17(14.8)	40(34.8)	11(9.6)	47(40.9)	0.001**
18. I feel sometimes I take too much time to brush my teeth A	184(27.5)	27(14.7)	47(25.5)	27(14.7)	75(40.8)	0.123
19. Brushing the teeth more than once is ideal	285(42.5)	45(15.8)	63(22.1)	46(16.1)	131(46.1)	0.236
20. I have used a dye to see how clean my teeth are A	338(50.4)	58(17.2)	60(17.8)	70(20.7)	150(44.1)	0.057

*p value <.05, **p value =<.001, n=total

Table 4: Post-hoc test of one way ANOVA Agree, Disagree and Total HU-DBI score among baseline sample characteristics.

	Total Agree Score		Total Disagree		Total HU-DBI Score	
	Mean Difference (I-J)	p value	Mean Difference (I-J)	p value	Mean Difference (I-J)	p value
Gender						
Females(I)						
Males(J)	-2.49	.061	0.176	0.732	-0.73	1.00
Others(J)	2.65	.001**	-2.24	0.001**	0.37	1.00
Age						
20years(I)						
17 years(J)	-1.66	0.49	3.167	0.02*	1.50	1.00
18 years(J)	-0.60	0.73	0.20	1.00	-0.40	1.00
19 years(J)	-0.57	0.008*	0.66	0.062	0.08	1.00
21 years (J)	-0.44	0.004*	-0.08	1.00	-0.53	0.09
22 years(J)	-0.13	1.00	-0.31	1.00	-0.44	0.44
23 years(J)	-0.34	0.28	-0.36	1.00	-0.70	0.02*
24 years(J)	-0.63	0.05	0.01	1.00	-0.62	1.00
Dental Professional Year						
1 st Year (I)						
2 nd Year (J)	0.073	1.00	0.00	1.00	0.08	1.00
3 rd Year (J)	0.39	0.016*	-0.75	0.001**	-0.36	0.43
4 th Year (J)	0.10	1.00	-0.36	0.11	-0.25	0.884

*p value <.05, **p value =<.001

4. Discussion

Preventive dentistry has proved its importance in all these years, as early intervention leads to early prevention of oral diseases. Various preventive measures intervene the lag period of oral diseases, making it the most acceptable intervention in dentistry. Still, the practice of preventive dentistry has not reached to its full potential, due to more focus on curative approach in dental practice. Right attitude of dental student leads to best practices in oral health. Dental students are the future dental health professionals, so it becomes quite essential for the dental students to possess the right attitude and awareness about the oral health. Dental students orient themselves through the preclinical and clinical dentistry in their dental professional year. Study assessed the self-perception of oral health awareness among dental student in our region using cross culturally accepted HU-DBI questionnaire.

The HU-DBI score of dental student was low (6.38) which was reported higher than Komabayashi *et al.* [13], Al-Shiekh *et al.* [15], Halboub *et al.* [8]. It was similar in other geographic regions as reported by Dagli *et al.* [6], Al-Wahadni *et al.* [16], Polychronopoulou *et al.* [17], Dumitrescu *et al.* [18], Sinem *et al.*

[19], Alam Moheet *et al.* [7], Badovinac *et al.* [20], Pacauskiene *et al.* [10]. The studies by Kawamura *et al.* [21], Komabayashi *et al.* [14], Olszowski *et al.* [22], Vangipuram *et al.* [23], Raid *et al.* [24] reported higher than our study. This variation in the mean scores of different geographical region can be explained by the cultural variability in education system of these regions. Study also reports that there is also gradual orientation towards the clinical preventive dentistry from preclinical to clinical dental professional year as preclinical dental students had a lower HU-DBI score than their clinical dental students. This has also been reported by Dumitrescu *et al.* [18], Sinem *et al.* [19], Perker *et al.* [25], Badovinac *et al.* [20], Alam Moheet *et al.* [7], Sato *et al.* [26], Pacauskiene *et al.* [10] and Raid *et al.* [24]. However, studies by Dagli *et al.* [6], Ahamed S *et al.* [27], Al-Sheikh *et al.* [15], Halboub *et al.* [8] and Mekhemar *et al.* [28] reported no such difference.

The study reports that HU-DBI total score was significant for age and dental professional groups (preclinical and clinical groups). Further analysis showed the significance level at age 20 and 23 years which indicates the difference due to transitional phase. The mean scores increases with age which is due to increase in understanding about preventive dentistry.

The mean total score for males were higher than females in this study but was not statistically significant. Studies by Halboub *et al.* [8], Al-Wahadni *et al.* [16], Vangipuram *et al.* [23] have reported higher score levels among females than males while study by Kumar *et al.* [29] reported no change. The other factor like type of college, socioeconomic status, district zones and state domicile neither had no effect on the total score nor total agree or disagree scores separately. These determinants are independent for the cognitive learning among dental students provided enabling environment to change the attitude among dental student in every professional year is ensured. The factor about school last attended in this study was significant for the total score which is also due to over representation of students from private schools. The previous education influencing the present attitude and awareness among the dental students needs to be investigated in near future. The study by Halboub *et al.* [8] had reported higher score among students in public university than private university. This was not the case in our study due to uniformity of syllabus with same university affiliation as per the Dental Council of India (DCI). The development of right attitude among dental student for oral health is also envisaged in dental curriculum of Dental Council of India (DCI) [30].

The question asked about “check my teeth in a mirror after brushing” had the highest agree responses similar to studies reported from Dagli *et al.* [6], Sinem *et al.* [19] and reported lower in Halboub *et al.* [8] study. Out of the six disagree question considered for HU-DBI score, question about “do not worry if my gums bleed during brushing” had the highest response. In the preventive dentistry motivation, education and demonstration of plaque control to the patient is an important aspect and best emphasized best during the clinical years of dental professional. This is evident through the question 10, 13, 16, 17, 18 that pertain to oral hygiene where the proportion of correct responses was higher among clinical dental students. This study reported that question asked about “it is necessary to teach the correct brushing procedure”, the proportion of agreement was lower and disagreement was higher among clinical students. The proportion of variability is due lack of the lack of translation and delivery of oral hygiene knowledge into their routine clinical practices and inability to understand its due importance in post treatment. The study also reports the variation in the mean scores among the first year and third year without much increase in the final year in the college. This is explained by relative competition among various subjects of dental curriculum and development of preferential liking of subjects among dental students in final year. Academic pressure in final year about the completion of number patients in a session is also another paramount reason that leads to continued neglect to preventive dental practices after any dental treatment. Further studies considering these factors are required.

The question asked about dental students, put off going to the dentist until they had a toothache was reported to be 58%. However, this was reported higher by Vangipuram *et al.* [23] and Komabayashi *et al.* [14]. The Halboub *et al.* [8] in Yemen had reported about inherent tendency as there were some correct responses as agree and some as disagree among 20 questions and rest were considered as dummy variables to get the overall view of the attitude and awareness. So, this study attempts to reports total agree and total disagree scores separately to understand the interaction of these scores on the total score. Dagli *et al.* [6] study in India also reports the lack of discriminatory power of HU-DBI. Raid *et al.* [24] study in Germany categorized the 12 question of agree and disagree

into the domains of knowledge, attitude and practice. A further study considering the different items within defined constructs and testing the scores into new ordinal scale by qualitative research methodology is required in near future.

The strength of this study is that, firstly it is one of its kind in our region using HU-DBI questionnaire as far as our knowledge. Secondly, many studies had reported using HU-DBI total score, without considering the total agree score and total disagree scores separately which could not be neglected in understanding the attitude among the dental students. Thirdly, many other variables last school attended, variation among region were considered to understand the interaction of these variables in the study.

The main limitation of the study is the use of convenience sampling which affects its generalizability though considering the difference of the standard deviation of the preclinical and clinical group the study reached its power to 77.6% at 95% confidence level and partial eta square value of .011 (small effect size). Secondly, over and under reporting could not ignored though the anonymity of the participants were considered.

5. Conclusion

This study reports moderate level of self perception of oral health awareness in dental students among various studies conducted in different region. The scores were higher in 1st and 3rd professional year dental students and inculcating right attitude and behavior during this period could come long way in their routine dental practices. Increased curricular coverage including summative assessment and simple problem based learning activities on preventive dentistry are recommended.

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