academicJournals

Vol. 7(9), pp. 144-152, September 2015
DOI: 10.5897/JDOH2015.0171
Article Number: 41BF29654890
ISSN: 2141-2472

http://www.academicjournals.org/JDOH

Journal of Dentistry and Oral Hygiene

*Full Length Research Paper*

# Assessment of knowledge, awareness and attitude towards hepatitis B and human immunodeficiency virus among dental students: A cross-sectional study at Karachi, Pakistan

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Received 15 July, 2015; Accepted 17 August, 2015

**In this study, the attitude, knowledge and awareness of the dental students of Karachi were evaluated on human immunodeficiency virus (HIV) and hepatitis B virus (HBV). Cross-sectional and non-experimental study was carried out on 377 dental students. Data were analyzed using PASW v.18 and Minitab 11 statistical software. Mean ± standard error of mean (SEM) was used to represent participant's scores. Spearmen correlation coefficient (*R*) was used to test the association of variables. Regression analysis and scatter plot was also used to represent the score wise association of variables. 71% was the total return rate of questionnaire in which 18.2% were male and 81.2% were female dental students. The mean age was 20.93 ± 0.1. Cronbach's alpha (α) value was 88%. The attitude score was 22.66 ± 0.22, knowledge was 23.12 ± 0.25 and awareness was 16.12 ± 0.14. Total aggregated score was 61.89 ± 0.54 and Spearman *R* coefficient of all these variables showed strong positive direct association (P < 0.0001). Regression analysis and scatter plots also verify the aforementioned impacts. Findings conclude that, majority of the respondents have positive attitude with good knowledge and awareness towards the aforementioned infections which definitely contribute to its prevention as well as transmission.**

**Key words:** Attitude, awareness, hepatitis B, human immunodeficiency virus, knowledge.

## INTRODUCTION

Despite the use of standard precautions, dental professionals are easily exposed to numerous blood borne infections (Myers et al., 2012). In the oral healthcare setting, transmission of infectious microorganisms is still considered a serious risk due to the inevitable involvement of bodily fluids (Beltrami et al.,

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2000), which is mainly due to the frequent utilization of sharp penetrative instruments in a limited operating area (Bindal et al., 2014). Human immunodeficiency virus (HIV) and hepatitis B virus (HBV), the etiological agents of acquired immune deficiency syndrome (AIDS) and hepatitis B, respectively, are perhaps the most dangerous pathogens (Lavanchy, 2004; Shaikh et al., 2011). HBV infection is a major global health issue worldwide, because 2 billion people are infected with this hazard (Lavanchy, 2004) and more importantly it is referred to as the “silent infection” for dental care professionals (Ammon et al., 2000). Studies reported that transmission of HBV in the oral healthcare setting is alarmingly high, as in dental practitioners, the risk of becoming a chronic HBV carrier is 10 times more as compared with the average individual (Bindal et al., 2014; Myers et al., 2012; Ali et al., 2011). Similarly, HBV is 50 to 100 times more infectious than HIV, because the vectors of HBV infection in dental practice are blood, saliva and nasopharyngeal secretions (Colvin and Mitchell, 2010), whereas, blood remains the primary encountered vector in dental practice (Myers et al., 2012).

HIV first emerged within mankind in the era of 1980s, and to date this epidemic continues to grow (Fauci, 1999). Global estimates indicate that since 2001, more than 35% increase was reported among the people of Middle East and North Africa that were newly infected with AIDS (Bakhoum et al., 2014). For the last two decades (1990 to 2011), there has been a prominent increment reported in the HIV cases, that is, the frequency of detected cases has markedly increased from 1,040 cases in the duration of 2001 to 2005 to 1,663 cases afterwards (Bakhoum et al., 2014). World Health Organization (WHO) has rated Pakistan as one of the leading countries in the world having high rates of chronic infections (Ali et al., 2011). Pakistan is highly endemic with HBV infection, as there are currently an estimated 9 million carriers (roughly 5% of the population) (Ali et al., 2011). Approximately 100,000 new people are infected with HBV annually, many of whom die due to its severities (Colvin and Mitchell, 2010; Mahoney, 1999).

Earlier, WHO stated that all dentists must provide treatment to HIV infected individual; hence, a dental practitioner’s positive and willing attitude is usually attributed to possessing sufficient knowledge (Khosravanifard et al., 2014). Dentists who are well-informed regarding the accurate precautionary measures which need to be implemented whilst treating affected individuals, are more likely to provide treatment with confidence and willingness (Ryalat et al., 2011). Hence, dental students must be trained to have a strong command of the issues revolving around HIV and HBV such as understanding of the disease process, recognition of oral manifestations and awareness of the modes of transmission. Therefore, the purpose of this study was to measure the extent of knowledge of HIV and HBV amid dental students and house officers, gauge the height of awareness amongst them and assess their attitude towards the carriers.

## METHODOLOGY

Study design of this survey research was cross-sectional and exclusively non-experimental. The data were collected through a questionnaire based interview from dental students of first year to the fourth year and house officers, at three tertiary care teaching dental hospitals of Karachi, that is, Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences (DIKIOHS), Dow Dental College (DDC) and Dow International Dental College (DIDC). Participant‘s enrollment were entirely independent with respect to their age, gender, marital status, qualification levels and race. Study duration was February, 2014 to January, 2015.

### Ethics consideration

Before the start of this research, approval from the concerned authorities of Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences, Karachi, Pakistan was taken. Prior to the collection of data, all participants of this study were given a brief introduction about the prospect of this research as well as the relevant information on the nature of the study. Additionally, informed verbal consent was also obtained from participants before handing over the survey instrument. Assurance of confidentiality of all their shared information as well as their personal identity was also provided.

### Sample size

Sample size was calculated through online Raosoft sample size calculator. The minimum sample size for this study was equivalent to 377 participants computed by adjusting the margin of error (d) at 5%, confidence of interval on 95%, considering the recommended population size (20000) with at least 50% response distribution.

### Study instrument

In order to evaluate the attitude, knowledge and awareness on HIV and HBV, pretested questions on these variables were taken from the recently published study by Bindal et al. (2014) and modified further. This self-administered questionnaire consists of a total of sixteen (16) variables/questions along with socio-demographic characteristics (age, gender, qualification years) were administered. The questionnaire was divided into three parts, in which, part 1 was on attitude, part 2 was on knowledge and part 3 was on awareness assessment. The first and second part contains six questions each, however, the third part contain only four variables. Responses to all questions were equally scored on 5 points Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) with statement mentioned in all three parts. Initially, pilot testing was done on 10 dental students, after the successful output it was decided to precede the present research work in order to achieve the pre-defined minimum sample size.

### Scoring

Pattern used for scoring the aforementioned three parts was as follows: parts 1 and 2 have total highest score of 30, while part 3 has total highest score of 20. The characterization of scores of parts

1 and 2 were similar (attitude and knowledge variables), with 3 sub-categories with respect to the obtained scores of participants. In this regard, total score of 0 to 10 reflects minimum, total score of 11 to 20 shows average, while 21 to 30 shows the highest level of attitude and knowledge towards HIV and HBV. The scaling of awareness score also has 3 sub-categories with respect to the obtained scores of participants. The sub characterization was the total score from 0 to 6 reflects minimum, total score from 7 to 13 reflects the average, whereas score from 14 to 20 shows the highest awareness level towards HIV and HBV.

The total aggregated score was finally obtained after consolidating all three parts score, which is equal to a maximum total of 80 units. The final score of 80 was also sub-categorized into 3 sections, in which, a total score of 0 to 26 shows minimum, total score from 27 to 53 shows average, and total score from 54 to 80 shows the highest level of awareness, attitude and knowledge towards the present objective.

#### Participants' enrolment

A total of 377 dental students were selected and approached. Only 267 students through interview completed the questionnaire. Seventy six students had regretted their availability, while 34 students did not report their response completely/properly on the provided instrument. Overall, 110 respondents were excluded as study participants. Therefore, an approximate of 71% was the total rate of return of the present study questionnaire.

#### Data analysis

Data were entered in Microsoft 2010 Excel Workbook and statistical analyses were performed using Predictive Analytical Software (PASW version18.0) and Minitab 11 statistical software for Windows version 7 professional. Through PASW v.18, percent frequencies of students were computed for categorical variables like age, gender, and class groups. Depending on the distribution of responses with obtained scores, data for each variable are presented as mean with standard error of mean (SEM), minimum to maximum, median and interquartile range (IQR) of responses, respectively. Data were correlated with Spearman's method (two tailed) depending on distribution of variables in order to test the correlation between individual scores of attitude, knowledge and awareness with total obtained scores. Cronbach's Alpha was calculated for detecting the consistency among the 16 different responses of the study instrument. Minitab software was used for regression analysis of the total score as the dependent variable and factors (attitude, knowledge and awareness) scores as independent variables. Scatter plot also highlights the area of maximum responses in all the three categories when compared with total aggregated score. Results were considered significant when P value < 0.05.

## RESULTS

### Respondent's profile

Of the total 267 students, 47 (18.2%) were male and 220 (81.2%) were female. Of the entire sample size, 13, 35.3, 16.4, 19.3 and 15.2% were in 1st, 2nd, 3rd, and 4th year and as house officers of dental education, respectively. The age range of students was from 17 to 28 years, in which 82.39% belongs to 17 to 22 years age group and 17.61% have 23 to 28 years of age (Figure 1). The mean age was 20.93 ± 0.105.

### Assessment of attitude, knowledge and awareness towards hepatitis B and HIV patients

In attitude variable section, responses were analyzed with respect to the obtained scores in all the six variables. In the first variable, the obtained score was 4.36 ± 0.048. In the second variable, the obtained value was 4.49 ± 0.046. In the third variable, the obtained value was 2.77 ± 0.073. The fourth variable has the mean value of 3.24 ± 0.06. In the fifth variable, the obtained value was 4.06 ± 0.049. Last variable has obtained value of 3.75 ± 0.06 (Table 1).

In knowledge variable section, responses were analyzed with respect to the individually obtained scores. In the first variable, the obtained score was 4.10 ± 0.051. In the second variable, the obtained mean score was 4.40 ± 0.046. In the third knowledge variable, the obtained mean score was 3.78 ± 0.067. In fourth variable, the obtained mean score was 4.40 ± 0.043. In fifth variable, the obtained mean score was 3.06 ± 0.074. In the last variable, the obtained mean score was 3.41 ± 0.069 (Table 1).

Student's responses were analyzed with respect to the individually obtained scores in all the four awareness variables. In the first variable, the obtained score was 4.75 ± 0.031. In the second variable, the obtained mean score was 4.40 ± 0.039. In the third variable, the obtained mean score was 3.3 ± 0.061. In last variable, the mean obtained score was 3.68 ± 0.072 (Table 1).

### Analysis of attitude, knowledge, awareness and total aggregated score

Male students (N = 47) have mean attitude score of 24.85 ± 0.55 with score range of 18 to 30 units, median score was 24 and IQR of 22 to 29 units. Similarly, in female students (N = 220), mean attitude score of 22.19 ± 0.23 with score range of 8 to 29 units, median score was 22 and IQR of 21 to 24 units. The overall score of students (N = 267) was 22.67 ± 0.22 with score range from 8 to 30 units, median score was 23 units and IQR was 21 to 25 units (Table 2).

Male students (N=47) have mean knowledge score of 25.13 ± 0.52 with score ranging from 19 to 30 units, median score was 25 and IQR of 22 to 28 units. Similarly, in female, students (N = 220) have mean attitude score of 22.69 ± 0.27 with score ranging from 9 to 30 units, median score was 23 and IQR of 20 to 25 units. The overall score of students (N = 267) was 23.12 ± 0.25 with score ranging from 9 to 30 units, median score was 23 units and IQR was 21 to 26 units (Table 2).

Male students (N=47) have mean awareness score of

**Table 1.** Detailed analysis of obtained scores for the item labeled for the assessment of attitude, knowledge and awareness patterns towards HIV/hepatitis from dental student (N=267) in Karachi, Pakistan.

| | | | | | | |
|---|---|---|---|---|---|---|
| Attitude variable | Q1: supporting HIV/AIDS patients improves community health | Q2: HIV/HBV patients should be treated at a separate ward | Q3: Dentists should have the opportunity to refuse to treat patients with HIV or hepatitis | Q4: If you are aware about the HIV/HBV infection status of the patient, will you be comfortable treating such a patient in your practice? | Q5: Do you think treating HIV/Hepatitis B+ patients with close clinical supervision would give you more confidence in treating such patients in future | Q6: Would you volunteer to provide services to AIDS/Hepatitis B specialist centre |
| Mean ± SEM | 4.36 ± 0.048 | 4.49 ± 0.046 | 2.77 ± 0.073 | 3.24 ± 0.06 | 4.06 ± 0.049 | 3.75 ± 0.06 |
| Knowledge Variable | Q7: A healthy looking person can be infected with AIDS/HBV virus | Q8: Hepatitis B is transmitted via the infected person's blood or open sores | Q9: Hepatitis B is transmitted via saliva | Q10: HIV can be passed on to a baby from HIV+ mother | Q11: HBV is more infectious than HIV | Q12: Infection control methods for hepatitis B provide adequate protection against transmission of HIV |
| Mean ± SEM | 4.10 ± 0.051 | 4.40 ± 0.046 | 3.78 ± 0.067 | 4.40 ± 0.043 | 3.06 ± 0.074 | 3.41 ± 0.069 |
| Awareness variable | Q13: Patients who are HIV or HBV+ should have a legal obligation to inform their dentists about their disease | Q14: Do you think there is a certain amount of undiagnosed HIV/HBV+ patients that attend the dental clinics? | Q15: Do you think in the polyclinic you are well-prepared for treating patients with infectious diseases | Q16: All patients coming to the dental operatory should be considered potentially infectious | - | - |
| Mean ± SEM | 4.75 ± 0.031 | 4.40 ± 0.039 | 3.3 ± 0.061 | 3.68 ± 0.072 | - | - |

16.94 ± 0.38 with score range from 12 to 20 units, median of 17 and IQR of 15 to 20. Female students (N = 220) have 15.94 ± 0.15 mean score with score range from 8 to 20 units, median of 16 and IQR of 15 to 18. Total students (N = 267) showed mean score of 16.12 ± 0.14 with score range from 8 to 20 units, median of 16 and IQR of 15 to 18 units (Table 2).

The total aggregated score summary of male students, that is, 66.91 ± 1.3 (range = 49 to 80, median = 65 and IQR = 60 to 77) when compared with female students, that is, 60.81 ± 0.57 (range = 26 to 78, median = 62 and IQR = 57 to 66) showed overall similarity. The total aggregated score of students also supports the gender differentiated scores as mean score was 61.89 ± 0.54 (range = 26 to 80, median = 62 and IQR = 57 to 67) (Table 2).

Pattern of responses of students was also observed in the scatter plots, in which total scores were gradually compared with attitude score (Figure 2), knowledge score (Figure 3) and awareness score (Figure 4), respectively, which showed consistency in responses. This scenario was also secondarily validated by the computation of Cronbach's alpha of all responses (Table 3).

## Correlation of total aggregated score with attitude, knowledge, and awareness score

Correlation of attitude score with total aggregated score showed significant (strong) positive correlation (Spearman R coefficients are 0.892, 0.894 and 0.901, respectively). Correlation of knowledge score with total aggregated score also showed significant (strong) positive correlation (Spearman R coefficients are 0.91 for male, 0.93 for both female and overall participants). Similarly, relation of awareness score with total aggregated score of male, female and total participants also showed significant (strong) positive correlation (Spearman R coefficients are 0.892, 0.824 and 0.84, respectively). This entire impact of dental students showed that respondents possess strong attitude, knowledge and awareness towards HIV and hepatitis B (Table 3).

## Regression analysis of total aggregated score with attitude, knowledge, and awareness score

The coefficient of regression was computed by setting the total aggregated score as dependent

**Table 2.** Detailed comparative analysis of obtained scores of attitude, knowledge, awareness and total score obtained by the respondents from dental students in Karachi, Pakistan.

| Variable | Attitude score | Knowledge score | Awareness score | Total score |
|---|---|---|---|---|
| **Male (N)** | **47** | **47** | **47** | **47** |
| Mean ± SEM | 24.85 ± 0.55 | 25.13 ± 0.52 | 16.94 ± 0.38 | 66.91 ± 1.30 |
| Minimum to maximum | 18 – 30 | 19 – 30 | 12 – 20 | 49 – 80 |
| Median | 24 | 25 | 17 | 65 |
| Interquartile range | 22 – 29 | 22 – 28 | 15 – 20 | 60 – 77 |
| **Female (N)** | **220** | **220** | **220** | **220** |
| Mean ± SEM | 22.19 ± 0.23 | 22.69 ± 0.27 | 15.94 ± 0.15 | 60.81 ± 0.57 |
| Minimum to maximum | 8 – 29 | 9 – 30 | 8 – 20 | 26 -78 |
| Median | 22 | 23 | 16 | 62 |
| Interquartile range | 21 – 24 | 20 – 25 | 15 – 18 | 57 – 66 |
| **Total respondents (N)** | **267** | **267** | **267** | **267** |
| Mean ± SEM | 22.66 ± 0.22 | 23.12 ± 0.25 | 16.12 ± 0.14 | 61.89 ± 0.54 |
| Minimum to maximum | 8 – 30 | 9 – 30 | 8 – 20 | 26 – 80 |
| Median | 23 | 23 | 16 | 62 |
| Interquartile range | 21 – 25 | 21 – 26 | 15 – 18 | 57 – 67 |

**Table 3.** Correlation between total score obtained from the respondents with attitude, knowledge and awareness score and reliability of all scored items in term of Cronbach's alpha. Mean showing significant correlation at the 0.01 level (2-tailed) from dental students in Karachi, Pakistan.

| Variable | Male (N = 47) | | Female (N = 220) | | Overall respondents (N = 267) | | Cronbach's alpha (Q1 – Q16) |
|---|---|---|---|---|---|---|---|
| | Spearman R versus total scores | *P* value | Spearman R versus total scores | *P* value | Spearman R versus total scores | *P* value | |
| Attitude score | 0.892 | 0.0001 | 0.894 | 0.0001 | 0.901 | 0.0001 | |
| Knowledge score | 0.91 | 0.0001 | 0.929 | 0.0001 | 0.929 | 0.0001 | 88% or 0.88 |
| Awareness score | 0.892 | 0.0001 | 0.824 | 0.0001 | 0.84 | 0.0001 | |

variable and individual scores of attitude, knowledge and awareness as independent variables. To separate the role of attitude variable from all the other variables, the coefficient to relate attitude variable indicated that for every additional unit score in attitude variable can expect total aggregated score to increase by an average of 2.23 units of score. In case of knowledge variable, the coefficient to relate knowledge variable indicated that for every additional unit score in knowledge variable can expect total aggregated score to increase by an average of 2.05 units of score. Similarly, for awareness variable, coefficient to relate awareness variable indicated that for every

**Table 4.** Coefficient results for regression analysis with total aggregated scores as the dependent variables and differentiated scores of respondents, that is, attitude, knowledge and awareness towards HIV/Hepatitis as independent variables.

| Predictor | Coefficient | Standard deviation of coefficient | T | P |
|---|---|---|---|---|
| Constant | 11.308 | 1.517 | 7.45 | 0.000 |
| Attitude† | 2.23234 | 0.06613 | 33.76 | 0.000 |
| Constant | 14.412 | 1.181 | 12.21 | 0.000 |
| Knowledge* | 2.05394 | 0.05033 | 40.81 | 0.000 |
| Constant | 9.320 | 2.103 | 4.43 | 0.000 |
| Awareness$^{\varphi}$ | 3.2621 | 0.1292 | 25.24 | 0.000 |

The obtained regression results equates as, total score = 11.3 + 2.23 attitude score†; total score = 14.4 + 2.05 knowledge score*; total score = 9.32 + 3.26 awareness score$^{\varphi}$

additional unit score in awareness variable can expect total aggregated score to increase by an average of 3.26 units of score (Table 4).

## DISCUSSION

Globally, hepatitis B and HIV infections are the main health issues, contributing a huge burden on the healthcare setup, and are a major source of human misery (Ali et al., 2011; Bakhoum et al., 2014). In countries like Pakistan, more and more people become infected with the deadly HBV and HIV; in this count, the number of such patients affiliated directly or indirectly in the dental healthcare set up will also grow rapidly (Bindal et al., 2014). Karachi, the economic capital and metropolitan city, contributing the largest part of Pakistani population, unfortunately, faces a prominent challenge to compete with illiteracy, and lack of authentic knowledge even in the graduated population.

In the field of dentistry, patients infected with HIV and HBV may routinely visit for receiving services, therefore it is imperative for dental students, which will be the nation's future, to be equipped with complete knowledge of HIV and HBV, as well as routes of transmission, virology, universal precautions, and cross infection methods. Knowledge, awareness and attitude play important role in improving the health status of the society as sufficient amount of knowledge will strongly influence their level of confidence when handling such patients and have an impact on their attitude (Sadeghi and Hakimi, 2009). People suffering from HBV and especially HIV are often stigmatized and it is a burgeoning issue that many dentists are unwilling to treat (Ryalat et al., 2011). Reasons for their reluctance may include fear of contagion, ignorance of the risk of transmission and preventative methods. It is important for dental students to develop a positive attitude concerning carriers of HIV or HBV in order to end discriminatory practices.

The mean attitude score was 22.66 ± 0.22, which showed the highest level of attitude (in both male and female students) (Table 2). Despite the availability of clinical precautions, the risk of transmission of HBV/HIV infection from patient to dentist is still there. Our findings are concerned, dental students showed a good sense of moral responsibility (attitude) in accepting such patients (Cohen et al., 2005).

Proper knowledge about the transmission patterns of HIV/HBV is significantly important and still healthcare providers lack knowledge about the etiology and modes of transmission of such infections (Sadeghi and Hakimi, 2009). The mean score of knowledge on the aforementioned subject was 23.12 ± 0.25, and same was observed in both male and female students, which represents the highest level of knowledge. It was reported earlier that when it comes to susceptibility to such infection, dental students are a particularly vulnerable group owing to their limited experience and skills (Kuthy et al., 2005). Additionally, dental students may not be able to identify the often asymptomatic carriers of HIV or HBV, or fail to correctly administer appropriate post-exposure prophylactic measures (Shaghaghian et al., 2014). However, the present findings support that the dental students of Karachi have sound knowledge towards HIV/HBV.

Dental students' awareness scores were 16.21 ± 0.14, which showed the highest awareness of dental students. Awareness on any scientific subject remains an essential concept which represents the level of training or guidance people possess in order to perform their duty, by considering the principles of good professional practices (Oboro et al., 2010). In this regard, the computed score from respondents showed a positive impact of awareness towards HIV/HBV infection.

Significant positive correlation was also observed when aggregated total score, that is, 61.89 ± 0.54 (highest level) was compared with attitude, knowledge and awareness scores which describes the scenario of having proper attitudes, knowledge and awareness that in general reduces and prevented the spread of such viruses up to a great extent. Regression equations with responses levels also verify the aforementioned impacts (Table 4).

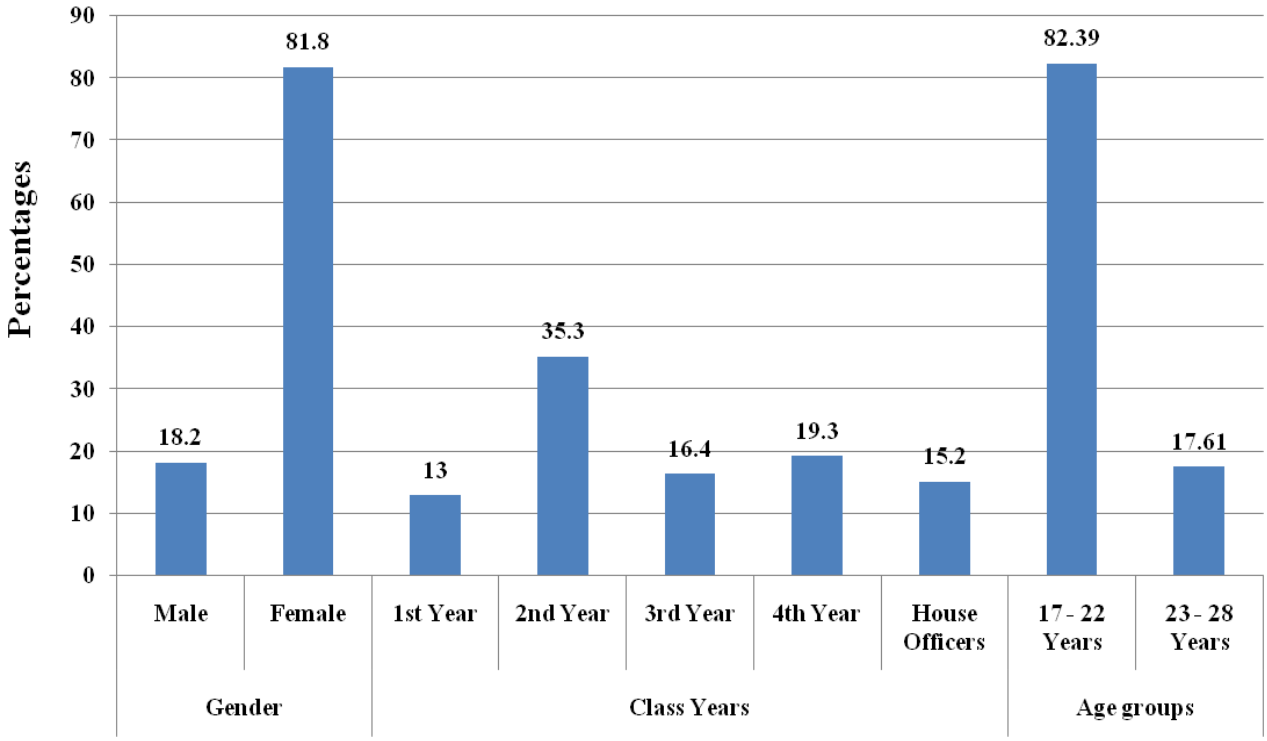


**Figure 1.** Respondents' classification with respect to gender, class years and the aged groups (N=267).

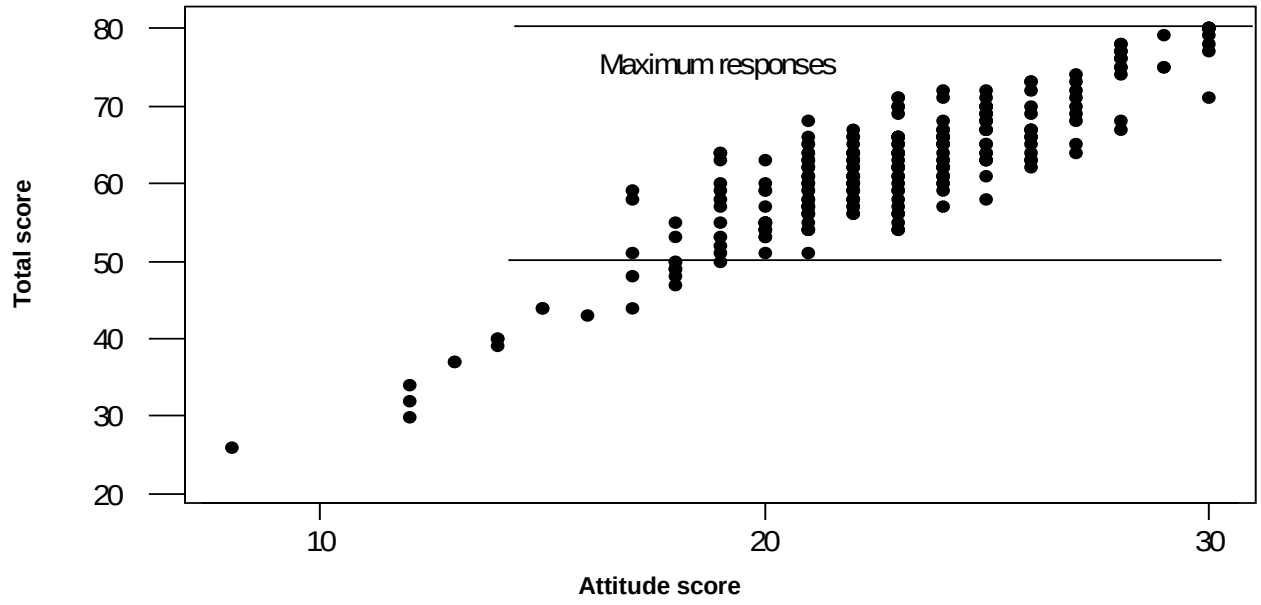


**Figure 2.** Scatter plot showing total scores of respondents according to the attitude score, including the limit area where maximum responses observed in attitude towards HIV.

## Conclusion

The present findings concluded that the magnitude of attitude, knowledge and awareness of dental students of Karachi towards HBV and HIV infections are up to satisfactory levels, especially the understanding about

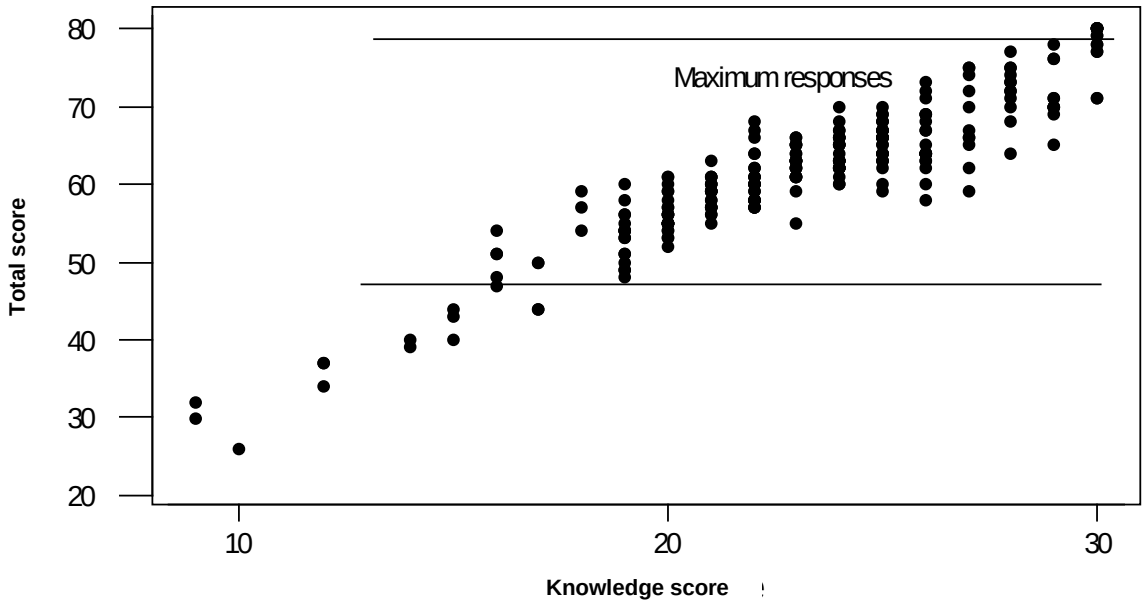


**Figure 3.** Scatter plot showing total scores of respondents according to the knowledge score, including the limit area where maximum responses observed in knowledge towards HIV.

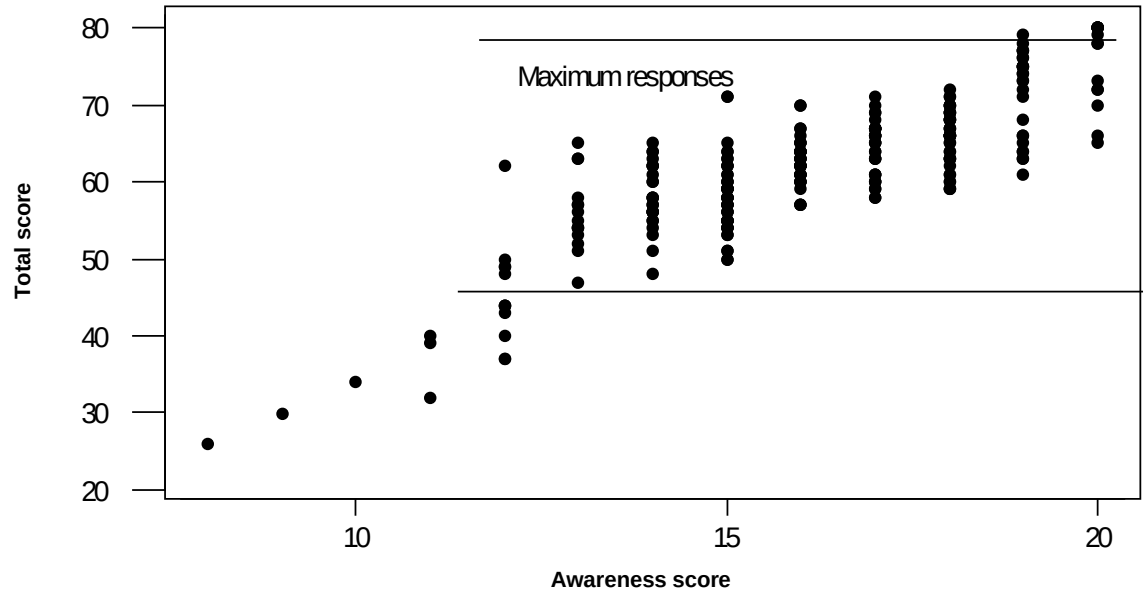


**Figure 4.** Scatter plot showing total scores of respondents according to the awareness score, including the limit area where maximum responses observed in awareness towards HIV.

HIV and HBV as serious public healthcare problems.

## RECOMMENDATION

Nation-wide extension, authentication and validation of such outcomes are still needed, so as to prevent the spread of such threats from the dental sector.

## Competing interests

The authors declare that they have no competing interest.

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