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# Journal of Dentistry and Oral Hygiene

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Case Report

## Solitary palatal mass: A case report

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**Pleomorphic adenoma of the palate arising de novo is a rare entity. A case of pleomorphic adenoma of the soft palate in a 28-year-old male is presented. The article discusses the etiopathogenesis, clinical presentation, differential diagnosis, and its management. Minor salivary gland tumors may be present with a diverse range of presentations posing a challenge to even the most competent clinicians and pathologists.**

**Key words:** Pleomorphic adenoma, minor salivary gland, soft palate.

### INTRODUCTION

Minor salivary glands, with estimated number between 600 and 1000, exist as small, discrete aggregates of secretory tissue present in the submucosal areas distributed throughout the oral cavity. The greatest number of these glands is in the lips, tongue, buccal mucosa, and palate. Each gland has a single duct which secretes, directly into the oral cavity, and its composition may be serious or mucous or mixed (Nanci, 2012).

Palatal pathologies can pose diagnostic difficulties to the clinicians. A swelling or a growth in the palate can result from a range of pathologies, such as periapical lesion, periodontal diseases, reactive process, minor salivary gland pathologies, or a neoplastic process (Huston and Brown, 1993; Kusama et al., 1993). In the differential diagnosis of palatal lesions, dental etiology must be given paramount importance because of its wide range of presentations. Salivary gland tumors too deserve consideration due to the presence of numerous minor salivary glands in the palate. Tumors arising from the minor salivary glands are relatively uncommon clinical entities, accounting for 10 to 25% of all salivary gland

tumor (Mubeen et al., 2011). Pleomorphic adenomas, the commonest of the salivary gland tumors make up around 65% of all salivary gland tumors and are the most common type of tumors of the minor salivary glands (Mubeen et al., 2011).

This study reports a case of pleomorphic adenoma of the soft palate in a 28-year-old male patient.

### CASE REPORT

A 28-year-old male reported to the dental out patient department with a complaint of swelling in the palate since 1 year (Figure 1). The patient is apparently healthy with no associated habits. History revealed that the patient had noticed the swelling a year ago. It was small in size and progressively increased during this period with no associated functional disturbances. Clinically, a single, large, diffused swelling is seen on the left side of the hard and soft palate roughly measuring 3 cm in diameter extending anteriorly to an imaginary line drawn

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**Figure 1.** Patient profile photograph.

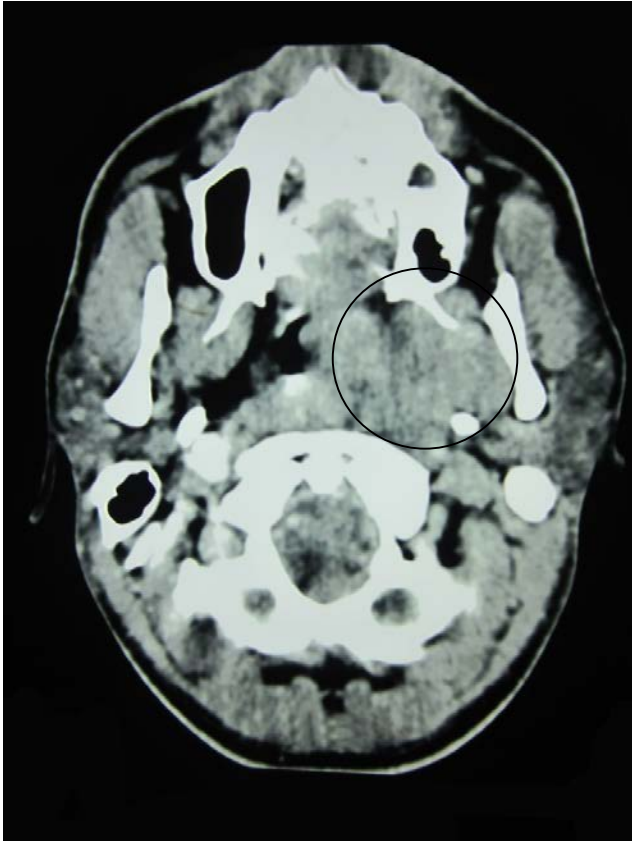


**Figure 2.** A diffuse swelling on the left side of the hard and soft palate involving the faucial pillars and uvula.

between the second maxillary molars to beyond the adenoids posteriorly. Medially, it crosses the midline by a centimeter to the vestibule and faucial pillars laterally (Figure 2). The surface of the swelling appears smooth and diffusing into the surrounding normal mucosa. On palpation, the surface is smooth, soft to firm in consistency, nontender, and compressible in nature.

Based on the history and clinical presentation, a benign palatal neoplasm was considered. Following this, the patient was subjected to conventional radiographs which were non-contributory. Computed tomogram of the region revealed a lobulated, mildly and heterogeneously enhancing lesion approximately measuring  $4.9 \times 3.6 \times 3.9$  cm was seen involving the left prestyloid parapharyn-





**Figure 3.** The CT axial section reveals, a well lobulated, heterogeneously enhancing lesion involving the pre styloid parapharyngeal space and pharyngeal space resulting in the deviation and compression of the oropharyngeal airway to the right.

geal space and pharyngeal mucosal space extending medially and causing significant deviation and compression of the oropharyngeal airway to the right. Superiorly, the lesion is seen extending into the left-side of the nasopharynx with obliteration of the eustachian orifice and the rosenmuller fossa. The anterior extent is seen abutting the left side of the posterior soft palate (Figure 3). These features give an impression of a possible neoplastic pathology of the minor salivary gland. Following investigations, with an informed consent, an excisional biopsy was performed, and the lesion was removed totally (Figure 4). The histopathology revealed glandular epithelium with connective tissue components surrounded by fibrous capsule. These epithelial components were found arranged in the form of nests, sheets, and chords. A few ductlike structures filled with eosinophilic coagulum were present. The connective tissue showed dense, irregularly arranged collagen fibers with plasmacytoid cells in a loose myxomatous area with the presence of a few keratinpearls. Increased vascularity

within the section was also appreciated (Figures 5 and 6). The histopathological features suggested *pleomorphic adenoma* of the soft palate.

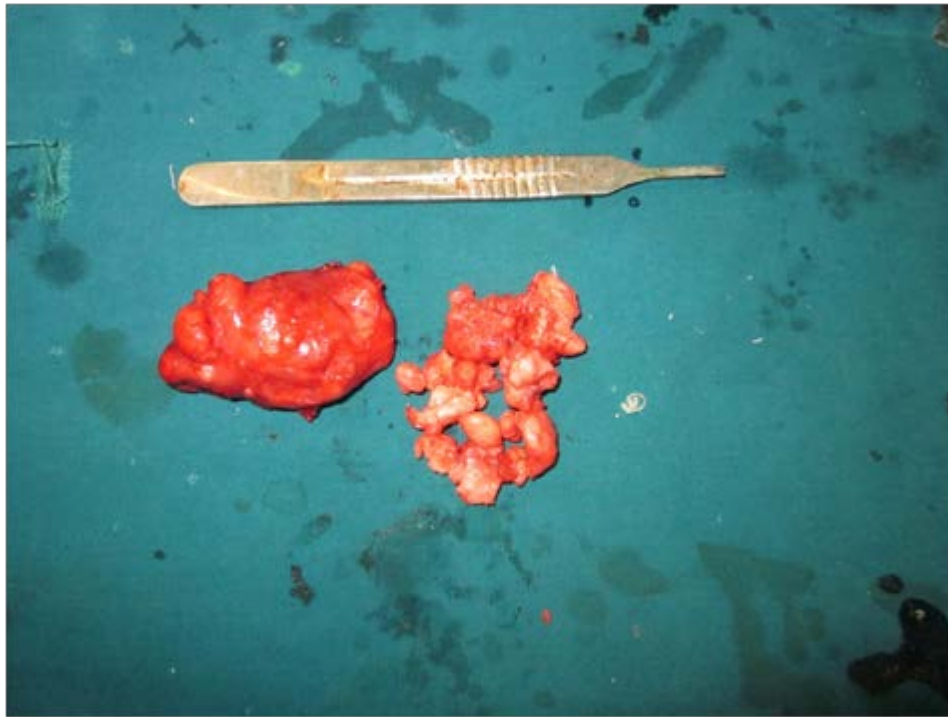
The patient was under clinical review and regular follow up for one year duration with no clinical evidence of recurrence and functional impairment (Figure 7).

## DISCUSSION

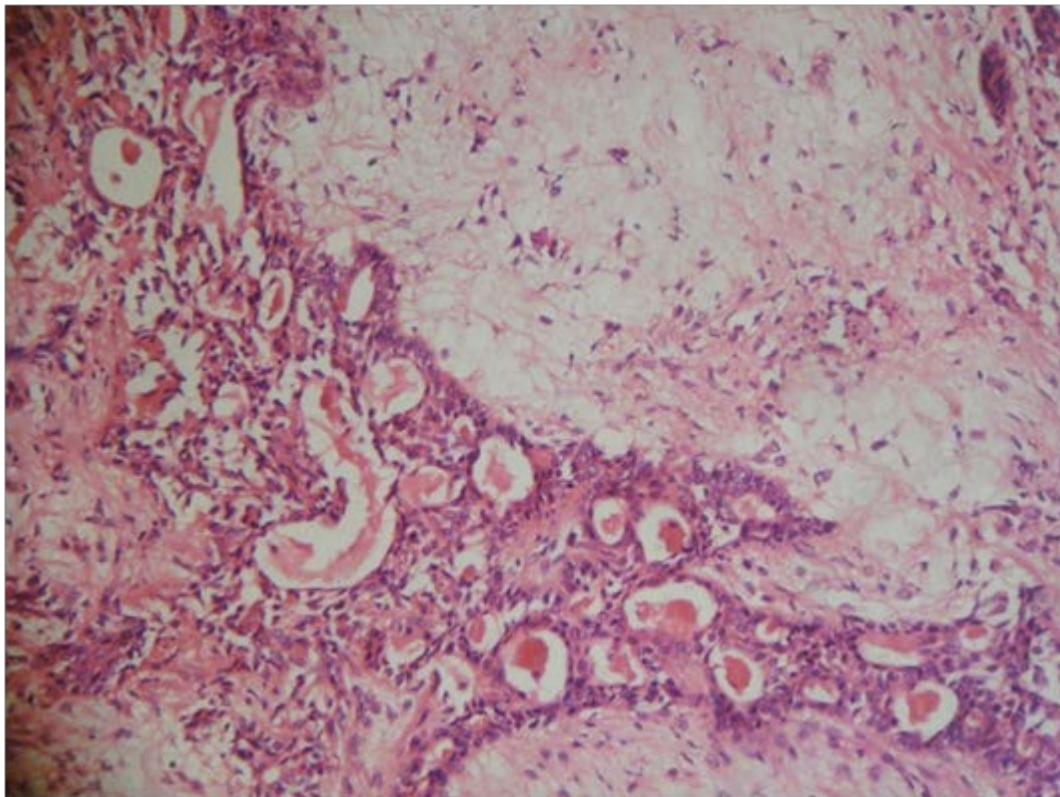
Minor salivary gland tumors constitute 2 to 4% of all head and neck malignancies and 10% of the tumors within the oral cavity (Sanchez et al., 2005). Minor salivary glands contribute about 22% of all salivary gland tumors (Cohen, 1986; Spiro, 1986; Waldron et al., 1988). Pleomorphic adenoma is the most common minor salivary gland tumor (Sumer and Celenk, 2008). The current theory of histogenesis centers around the myoepithelial cell and a reserve cell in the intercalated duct. Ultrastructural studies have confirmed the presence of both ductal and myoepithelial cells in the pathologic process. Workers have postulated that the myoepithelial cell is responsible for the morphologic diversity of the tumor, including the production of the fibrous, mucinous, chondroid and osseous areas (Shafer et al., 2005). The hard palate is the most common site followed by the lip, pharynx, and retromolar area (Cohen, 1986; Spiro, 1986; Waldron et al., 1988). Intraoral pleomorphic adenoma is usually presented as an asymptomatic slow-growing mass, in the fourth and fifth decades (Feinmesser and Gay, 1983). Moshy et al. in their study postulated higher predilection among older patients (Moshy et al., 2010). However, Waldron et al. favored a younger age group (Waldron et al., 1988).

Most studies have shown that minor salivary gland tumors are more common in females than the male counterparts (Loyola et al., 1995), with a male:female ratio of 1:1.8 to 1:2.4 (Kusama et al., 1993; Rivera-Bastidas et al., 1996). The palate has the highest concentration of minor salivary glands in the upper aero digestive tract and the most favoured site for both benign and malignant minor salivary gland tumors. Pleomorphic adenoma of the hard palate is typically a firm or rubbery submucosal mass without any secondary changes (Sanchez et al., 2005). The differential diagnosis should include palatal mass, odontogenic and non-odontogenic cysts and tumors, and salivary gland neoplasms. Palatal abscess, the most frequent swelling of the hard palate deserves first consideration. This could occur as a result of infected/non-vital tooth in close vicinity or a localized periodontal defect. However, in our case, the absence of these findings demerits its consideration. Considering odontogenic and nonodontogenic cysts should be based on a thorough clinical exploration of the swelling and demonstration of its cystic nature. The presence of soft

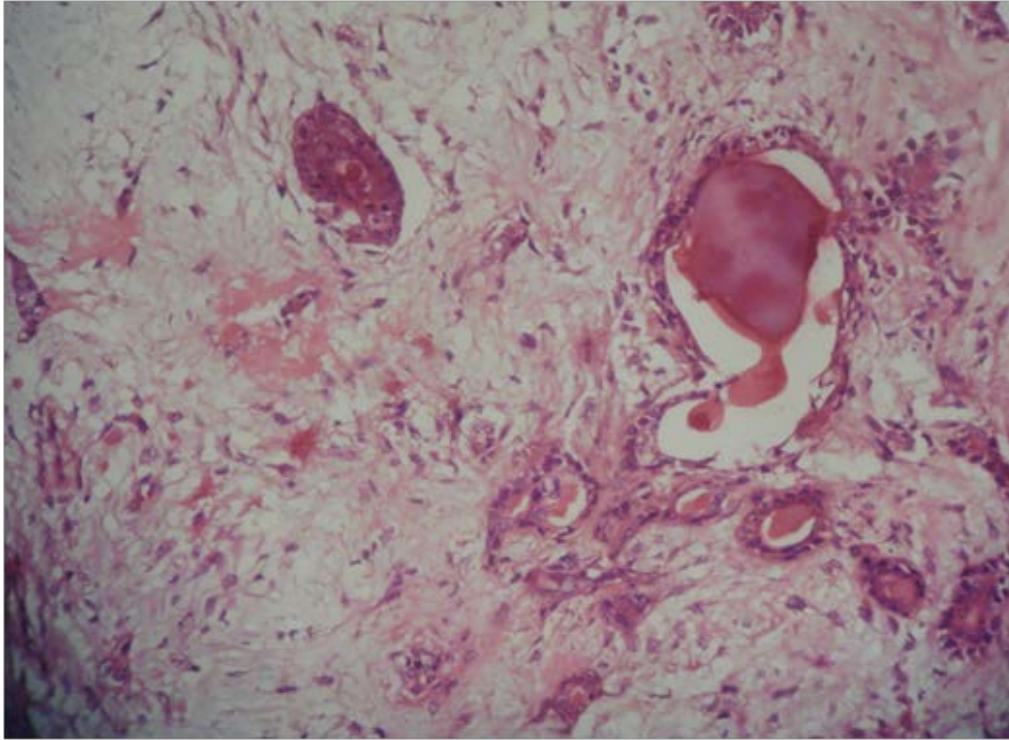




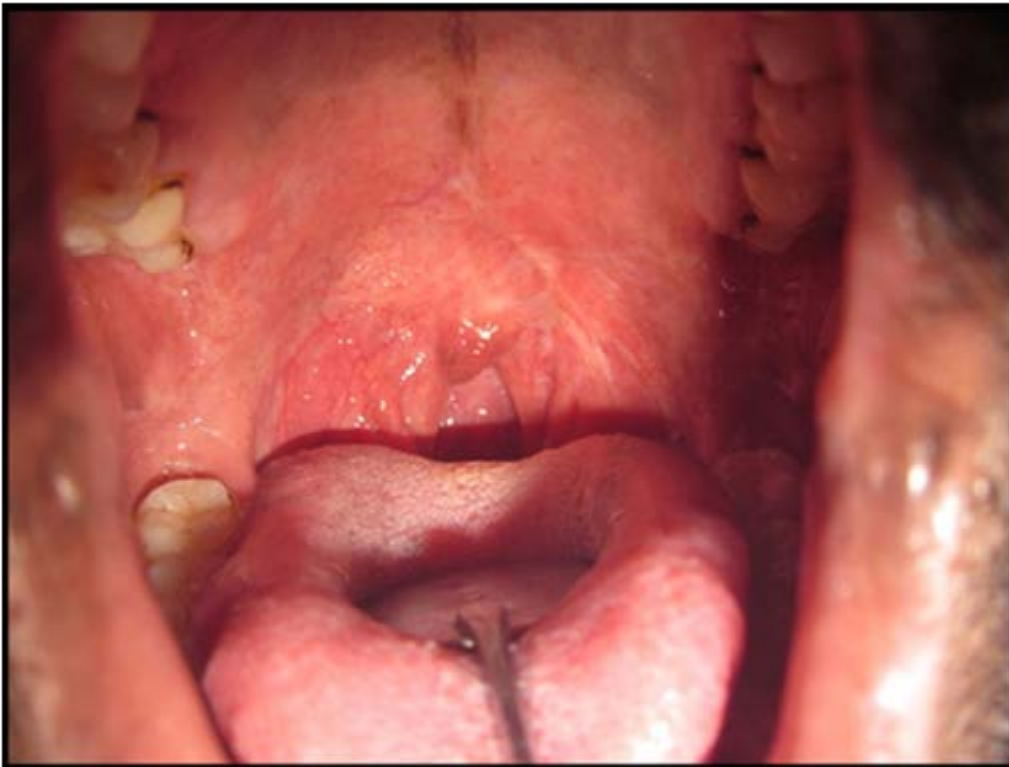
**Figure 4.** Surgically excised lesion with underlying periosteum.



**Figure 5.** Photomicrograph (20×) shows the epithelial components are arranged in the form of nests, sheets and chords with dense irregularly arranged collagen fibres and plasmacytoid cells.



**Figure 6.** Photomicrograph (40x) shows few duct like structures filled with eosinophilic coagulum and increased vascularity.



**Figure 7.** Follow up Intra oral photograph (1 year).

tissue components and minor salivary glands warrants us to consider soft tissue and salivary gland tumors. Lipoma, neurofibroma, neurilemmoma, pleomorphic adenoma, mucoepidermoid carcinoma and adenoid cystic carcinoma need consideration.

Pleomorphic adenoma is the most common salivary gland tumor, which presents as a smooth, submucosal mass or nodule, and its neoplastic growth rate is usually indolent. Mucoepidermoid carcinoma is the most common malignant salivary gland neoplasm. The minor salivary glands constitute the second most common site, the palate which is the most preferred site for this mixed tumor (Neville et al., 2009). It is usually presented as an asymptomatic, slow-growing swelling, fluctuant to firm in consistency. Adenoid cystic carcinoma, the most commonly encountered pathology in the palate may present as a painful or an asymptomatic swelling with secondary changes such as dysphagia and hoarseness of voice suggestive of malignant changes (Mubeen et al., 2011). The treatment of choice for pleomorphic adenoma involving the minor salivary glands in the palatal region will require a wide excision with the removal of bone if it is involved. A simple enucleation is thought to cause high local recurrence due to the rupture of the capsule or spillage of tumor cells into the surrounding area (Mubeen et al., 2011).

### Conflicts of interest

The authors declare that they have no conflicts of interest.

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*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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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  $\pm$  standard error of mean (SEM) was used to represent participant's scores. Spearman 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  $20.93 \pm 0.1$ . Cronbach's alpha ( $\alpha$ ) value was 88%. The attitude score was  $22.66 \pm 0.22$ , knowledge was  $23.12 \pm 0.25$  and awareness was  $16.12 \pm 0.14$ . Total aggregated score was  $61.89 \pm 0.54$  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 version 18.0) 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  $20.93 \pm 0.105$ .

### 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  $4.36 \pm 0.048$ . In the second variable, the obtained value was  $4.49 \pm 0.046$ . In the third variable, the obtained value was  $2.77 \pm 0.073$ . The fourth variable has the mean value of  $3.24 \pm 0.06$ . In the fifth variable, the obtained value was  $4.06 \pm 0.049$ . Last variable has obtained value of  $3.75 \pm 0.06$  (Table 1).

In knowledge variable section, responses were analyzed with respect to the individually obtained scores. In the first variable, the obtained score was  $4.10 \pm 0.051$ . In the second variable, the obtained mean score was  $4.40 \pm 0.046$ . In the third knowledge variable, the obtained mean score was  $3.78 \pm 0.067$ . In fourth variable, the obtained mean score was  $4.40 \pm 0.043$ . In fifth variable, the obtained mean score was  $3.06 \pm 0.074$ . In the last variable, the obtained mean score was  $3.41 \pm 0.069$  (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  $4.75 \pm 0.031$ . In the second variable, the obtained mean score was  $4.40 \pm 0.039$ . In the third variable, the obtained mean score was  $3.3 \pm 0.061$ . In last variable, the mean obtained score was  $3.68 \pm 0.072$  (Table 1).

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

Male students ( $N = 47$ ) have mean attitude score of  $24.85 \pm 0.55$  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  $22.19 \pm 0.23$  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  $22.67 \pm 0.22$  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  $25.13 \pm 0.52$  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  $22.69 \pm 0.27$  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  $23.12 \pm 0.25$  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.

<b>Attitude variable</b>	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
<b>Mean ± SEM</b>	4.36 ± 0.048	4.49 ± 0.046	2.77 ± 0.073	3.24 ± 0.06	4.06 ± 0.049	3.75 ± 0.06
<b>Knowledge Variable</b>	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
<b>Mean ± SEM</b>	4.10 ± 0.051	4.40 ± 0.046	3.78 ± 0.067	4.40 ± 0.043	3.06 ± 0.074	3.41 ± 0.069
<b>Awareness variable</b>	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	-	-
<b>Mean ± SEM</b>	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
<b>Male (N)</b>	<b>47</b>	<b>47</b>	<b>47</b>	<b>47</b>
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
<b>Female (N)</b>	<b>220</b>	<b>220</b>	<b>220</b>	<b>220</b>
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
<b>Total respondents (N)</b>	<b>267</b>	<b>267</b>	<b>267</b>	<b>267</b>
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	88% or 0.88
Knowledge score	0.91	0.0001	0.929	0.0001	0.929	0.0001	
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 <sup>†</sup>	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 <sup>°</sup>	3.2621	0.1292	25.24	0.000

The obtained regression results equates as, total score = 11.3 + 2.23 attitude score<sup>†</sup>; total score = 14.4 + 2.05 knowledge score\*; total score = 9.32 + 3.26 awareness score<sup>°</sup>

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; Bakhroum 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  $22.66 \pm 0.22$ , 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  $23.12 \pm 0.25$ , 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  $16.21 \pm 0.14$ , 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,  $61.89 \pm 0.54$  (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).

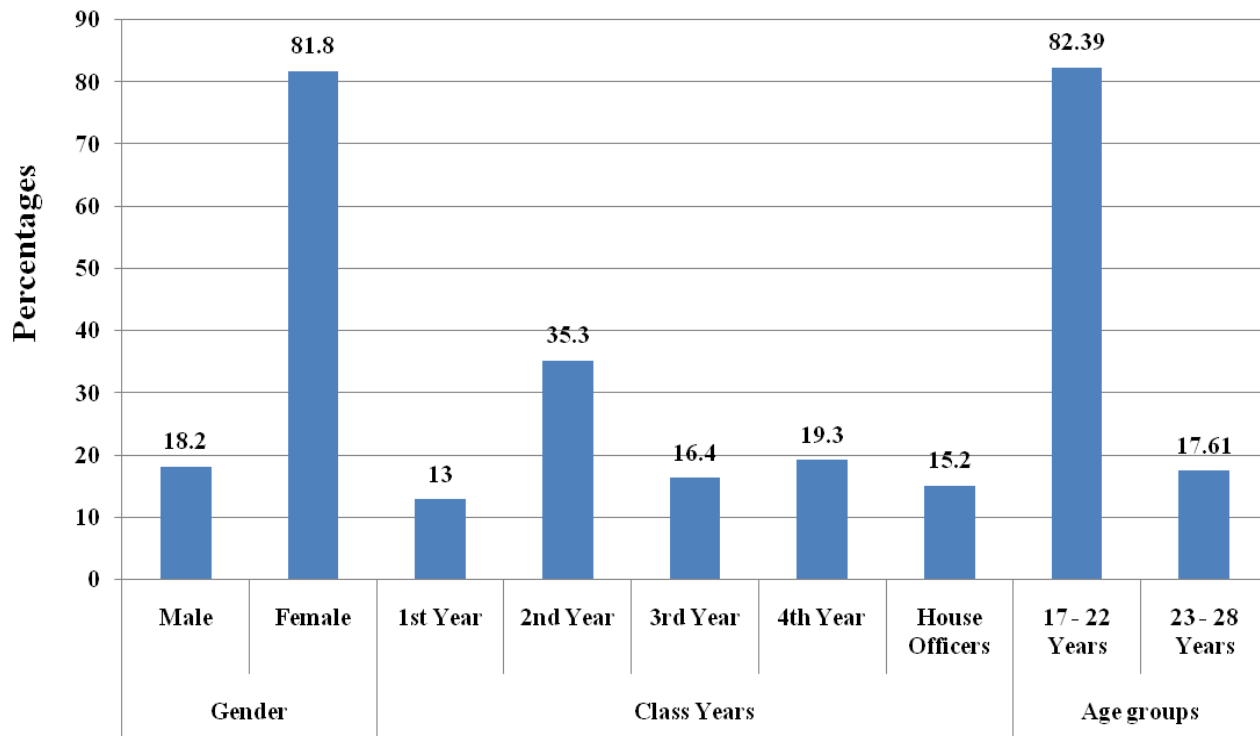


Figure 1. Respondents' classification with respect to gender, class years and the aged groups (N=267).

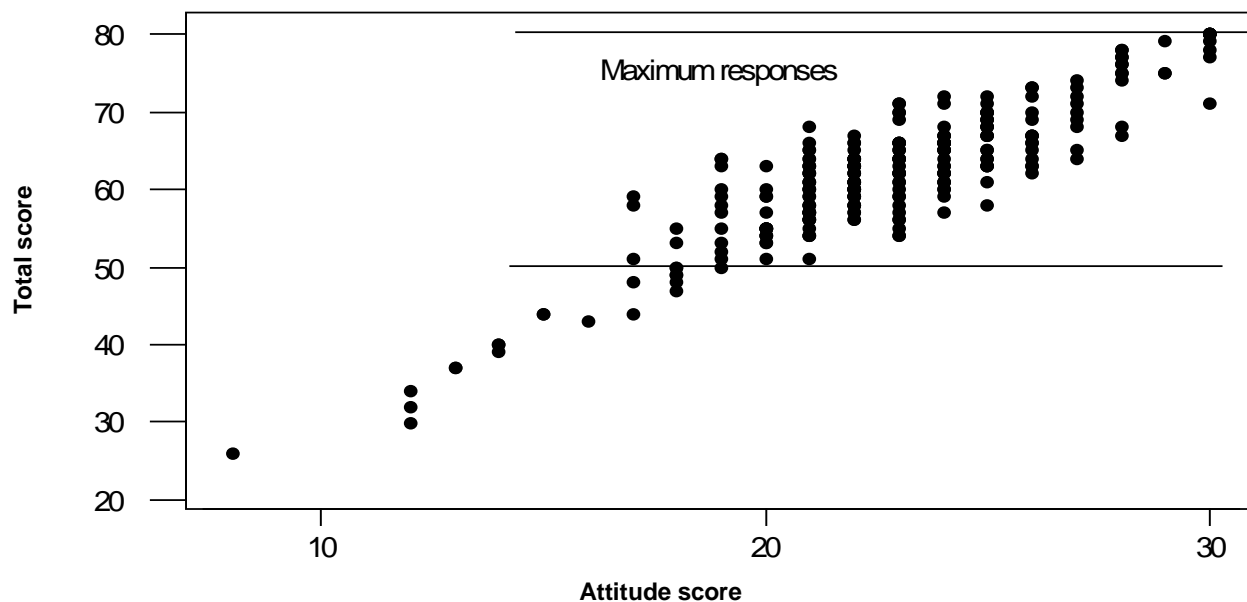
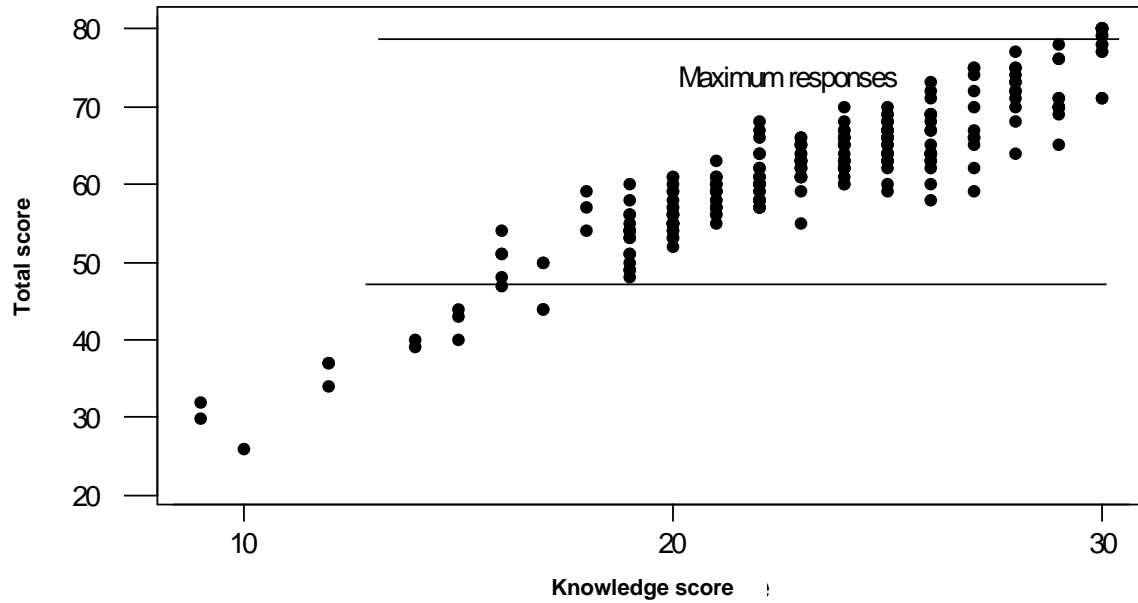


Figure 2. Scatter plot showing total scores of respondents according to the attitude score, including the limit area where maximum responses observed in attitude towards HIV.

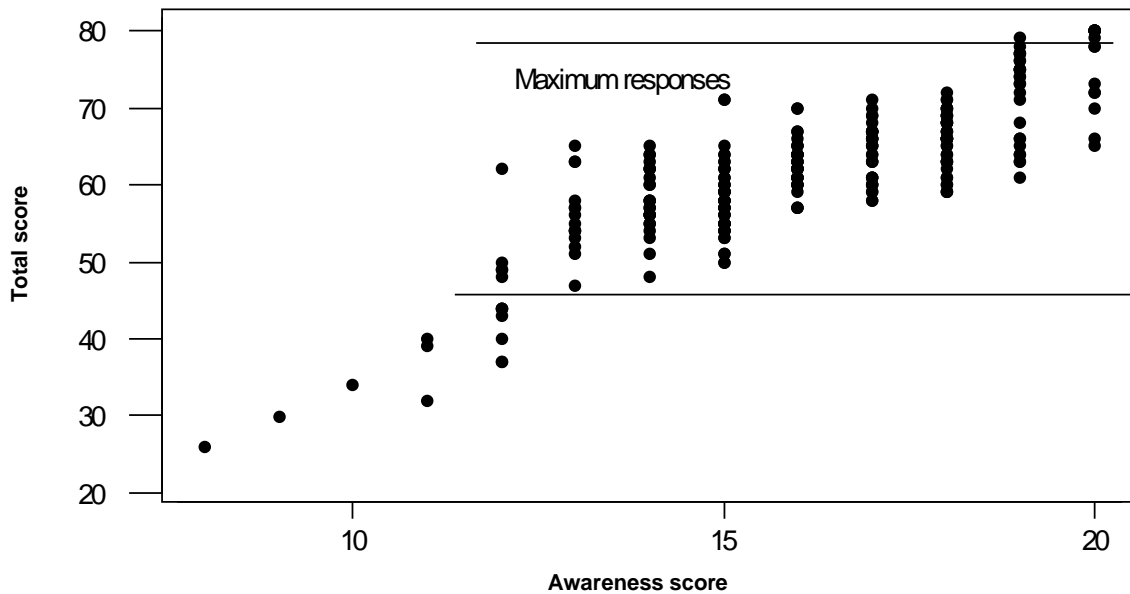
**Conclusion**

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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*Full Length Research Paper*

## Prevalence and factors leading to early childhood caries among children (71 months of age or younger) in Karachi, Pakistan

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The aim of this study was to determine the prevalence of early childhood caries (ECC) and factors leading to it among 71 months of age children or younger in Karachi, Pakistan. ECC is a preventable chronic disease affecting infants and children worldwide. The early detection of ECC can reduce pain and life threatening conditions and help growth and development of infant and children. A cross-sectional study was conducted in Karachi, Pakistan. About 650 mothers of children (71 months of age or younger) were randomly selected and interviewed using a pretested semi-structured questionnaire. The dental examination was performed by the dentist, who was calibrated against a standard examiner using World Health Organization (WHO) criteria. The data was entered and analysed using statistical package for social sciences (SPSS) version 16 software. ECC was found in 23.5% of children with mean decayed missing and filled teeth (dmft) of 0.67. The factors identified were age of the child, mother educational and occupational status, sweetened drink consumption at night and not utilizing routine dental health care services. This study concluded that high proportion of ECC was found among children (71 months of age children or younger) and factors identified were all preventable and needs attention to promote dental health education and routine dental visits.

**Key words:** Early childhood caries (ECC), mothers, risk factors, children 6 to 71 months of age.

### INTRODUCTION

Early childhood caries (ECC) is a major public health challenge worldwide. ECC is defined as caries on primary incisors, at least one (the number of maxillary incisors ranges from 1 to 4 teeth) in the pre-school aged children (Milnes, 1996; Jose and King, 2003; Ismail and Sohn,

1999). Initially, primary upper incisors are affected with white spots on gingival margin and later in advance stage, crowns are destroyed. It is important for parents and caretakers to recognize first clinical sign of ECC soon after the eruption of primary upper incisors (Santos

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and Soviero, 2002). The prevalence of ECC varies across the region. In developed world, it was found in the range of 1 to 12% (Burt and Eklund, 1999). The highest prevalence of caries is reported from Africa and South East Asia (Milnes, 1996). In England, Sweden and Finland, the prevalence is reported from 1 to 32% (Davies et al., 2001). In Eastern Europe, it is found high up to 56% (Szatko et al., 2004). In Canada, the prevalence of ECC in general population was found to be less than 5% and in high risk group it is reported to be 50 to 80% (Harrison et al., 1997; Albert et al., 1988; Harrison and White, 1997). The prevalence of ECC in Far East Asia was from 36 to 85% (Tsai et al., 2006; Carino et al., 2003; Jin et al., 2003). 44% prevalence of ECC was reported in India in 8 to 48 months old children (Jose and King, 2003).

The etiology of ECC is multi-factorial, and the exact interplay of risk factors in different communities found was controversial. There are many risk factors which were found significantly associated with ECC. The most important is consumption of sugary snacks, sweetened drinks, and consumption of sweetened feeding bottles at night (Liu et al., 2007). Breastfeeding or bottle feeding at night is a major risk factor for development of dental caries (Van Palenstein et al., 2006). A study conducted in Japan showed that nocturnal breastfeeding and snacking habits are associated with early childhood caries (Nakayama and Mori, 2015). According to American Academy of Pediatric Dentistry (AAPD), prolonged and repetitive breastfeeding and bottle feeding without proper oral hygiene were reported to be a devastating risk factor for ECC. Therefore, parents are encouraged to feed infants through drinking cups from first year of life and stop bottle feeding between 12 and 14 months (American Academy of Pediatrics, 2008, 2009). The other reported risk factors for ECC were poverty, racial minorities, single mother, parent's level of education, mothers' illiteracy, enamel hypoplasia due to prenatal and perinatal malnutrition or undernourishment, poor oral hygiene, fluoride insufficiency and greater preference for sugary foods (Chu, 2006).

The most effective approach for the control of early childhood caries is early detection and prevention. The restorative treatment can be avoided by preventive strategies. It is necessary to provide expectant mothers dental health education and counseling regarding prevention of ECC. The routine dental examination of children should be emphasized during counseling of mothers as late utilization of dental health care facility is the biggest problem faced by dentist for the control and prevention of early childhood caries. It is reported that few parents take their children to the dentist at the age of three years which usually prevents early detection of ECC (Drury et al., 1999). This study was designed to determine prevalence of ECC and factors leading to it among 71 months age group of children or younger in Karachi, Pakistan. There is scarcity of data on this

important problem and this would help in designing preventive dental health education strategies for ECC.

## METHODOLOGY

A cross-sectional study was conducted in Gulberg Town of Karachi, Pakistan from October 2009 to 2010. It has a total population of 453,490 according to the census conducted in 1998. A sample size of 650 was calculated by taking the proportion of ECC to be 19.2% (Tyagi, 2008), confidence interval of 95%, margin of error to be 3%, design effect to be 1.0% and power of test to be 80%. The sampling was performed in two stages; in the first phase, four union councils out of a total of eight were selected randomly through lottery method. In the second phase, list of households in each selected union council was obtained from town administration and random number table was generated and required sample size was achieved by taking equal proportion of participants from each selected union council. The selected households were visited and the child (71 months of age or younger) age was examined for the presence of ECC and the mother interviewed through administering a questionnaire.

The dental examination was performed by the dentist, who was calibrated against a standard examiner. Inter-examiner reliability was 92% agreement giving kappa = 0.85. The intra-examiner reliability was 97% in agreement with kappa = 1.0. Consent was obtained at the time of interview and clinical examination of the child. Clinical examination of the child was performed by dental surgeon under natural light at knee-to-knee position with an autoclavable mouth mirror using disposable gloves and mask and a gauze to dry the tooth. The WHO diagnostic criterion was used for diagnosis of dental caries (World Health Organization [WHO], 2003). ECC was diagnosed according to the WHO criteria; presence of caries on the labial or lingual surfaces of at least two maxillary incisors with the absence of caries in mandibular incisors (Azevedo et al., 2005; Dini et al., 2000). The data was entered and analysed using the Statistical Package for Social Science (SPSS) version 16 software. Descriptive statistics was used to describe socio-demographic characteristics and study variables (risk factors) were computed. The association between dependent variable, that is, early childhood caries with independent variables (risk factors) were determined through multi binary logistic regression analysis using the logistic model and 95% confidence intervals. The P-value of less than 0.05 has been considered significant.

## Ethical consideration

Ethical approval for the study was obtained from the Institutional Review Board of Dow University of Health Sciences. Furthermore, a written consent for participation in the study was obtained from the caregivers of children.

## RESULTS

### Descriptive statistics

Out of 650 guardians, 97.5% were mother and 2.5% were father of the child examined. The mean age of the mothers was 29 years (SD  $\pm$  5.4). Among 650 children, 46.5% were boys and 53.5% were girls. The mean age of the child was 45 months (SD  $\pm$  16.8). About 31% guardians were having four or more than four children. Regarding educational status, 40.9% mothers and 25.8%

fathers were found illiterate. About 21.6% women were working on daily wages, while 62% were earning less than 10,000 Pakistani rupees (Table 1). The prevalence of ECC was found to be 23.5% with mean dmft of 0.67. About 46% children had dmft positive in their whole arch (Table 2).

### Univariate analysis

The univariate analysis showed that increase in age of the child showed statistically significant association with ECC. Gender did not show any significant association with ECC. The odds of having early childhood caries in children of illiterate mothers were two times (OR = 2.46, CI = 1.40 to 3.86) more as compared to mothers who had <10 years of education. The odds of having early childhood caries in children of working mothers were more as compared to non-working mothers (OR = 1.70, CI = 1.03 to 2.79). The dietary factors related to ECC showed that odds of having early childhood caries among children who were having sweetened drink at night were 2 times (OR = 2.83, CI = 1.34 to 5.99) more as compared to children who never consumed sweetened drink at night. The odds of having ECC in children of mothers who had stopped breastfeeding after 6 months (OR = 2.45, CI = 1.76 to 3.92) and after 18 months (OR = 3.12, CI = 2.38 to 4.19) were significantly associated with ECC. The other dietary factors which showed significant association in univariate analysis were consumption of fruit juices (OR = 1.83, CI = 1.01 to 3.31), biscuits (OR = 2.21, CI = 1.43 to 3.76), and nursing bottle (OR = 1.56, CI = 1.02 to 2.52). The frequency of brushing did not show significant association with ECC. The routine dental visits showed significant association; children who did not visit dentist regularly were having ECC two times more (OR = 2.87, CI = 1.06 to 7.85) as compared to those who visit dentist regularly (Table 3).

### Multivariate analysis

After adjusting socio-demographic variables, the odds of having early childhood caries in children of illiterate mothers were two times (AOR = 2.19, CI = 1.38 to 3.87) more as compared to mothers who had >10 years of education. The odds of having early childhood caries in children of working mothers were more (AOR = 1.70, CI = 1.03 to 2.79) as compared to housewives. The odds of having early childhood caries among children who consumed sweetened drink at night showed significant association (AOR = 2.83, CI = 1.34 to 5.99) as compared to children who did not consume sweetened drink at night. The children of mothers who breast fed for 18 to 24 months had ECC three times more (AOR = 3.12, CI = 2.38 to 4.19) as compared to those who never breast fed. The mothers who did not visit dentist regularly, their

children had ECC two times more (AOR = 2.87, CI = 1.06 to 7.85) as compared to children who had visited dentist regularly (Table 3).

### DISCUSSION

High prevalence of ECC is reported worldwide. It has become a great public health challenge to control and prevent due to its complex etiology and involvement of multiple risk factors. This study reported prevalence of ECC (23.5%) which is consistent with the findings of research studies conducted in Iran and India (Askarizadeh and Siyonat, 2004; Mahjabeen et al., 2006). The dmft scores did not show any difference in gender and similar results are reported from studies conducted in Mexico and China (Segovia-Villanueva et al., 2006; Du et al., 2007). The children from low socio economic group consumed more sugary foods and did not possess healthy dental practices, for example use of toothbrush, toothpaste and attending routine dental health clinics. The low socio economic status and income is considered to be one of the most important risk factor for ECC. A study conducted in Australia showed that guardian income is strongly associated with children oral health (Wyne and Khan, 1998). Our study did not prove any statistical association of income and ECC, and this is consistent with the findings of a study conducted in Riyadh, Saudi Arabia (Al Ghanim et al., 1998).

Several studies from various part of the world reported that consumption of beverages and sweetened milk is a profound predictor of caries (Al Ghanim et al., 1998; Warren et al., 2008). These findings are consistent with the findings of our study. But contrary to these findings, another study reported that it may not be the sole reason and there are other factors involved such as time of milk consumption and its content; sweetened or non-sweetened (Johansson et al., 2010). An interesting and favourable finding of this study is that most of the children consumed milk or other liquids in glass rather than in bottle at bed time. This reduces the chances of dental caries and helps the parents to brush their child's teeth prior going to bed. It is found helpful in breaking the habit of using a feeding bottle which is usually advocated for children up to 12 months of age (Marshall et al., 2007). Most of the mothers preferred to continue breastfeeding from twelve to twenty four months of child age while only few mothers stopped breastfeeding after six months. A study conducted in Japan showed that nocturnal breastfeeding and snacking habits are associated with ECC (Nakayama and Mori, 2015). Another study conducted in Brazil reported that children who did not breastfeed for more than 24 months of age are at risk of ECC (Dini et al., 2000).

This study showed that caries status is significantly associated with children who did not breastfeed for six months or more than eighteen months of age. This is

**Table 1.** Distribution of socio-demographic variables of the study population.

<b>Variable</b>	<b>Frequency (N = 650)</b>	<b>Percentage</b>
<b>Child age (months)</b>		
6 - 19 months	69	10.6
20 - 33 months	100	15.4
34 - 47 months	125	19.2
48 - 61 months	249	38.3
62 - 75 months	107	16.5
<b>Child gender</b>		
Male	302	46.5
Female	348	53.5
<b>Guardian age (years)</b>		
15 - 30	420	64.6
31 - 45	230	35.4
<b>Guardian gender</b>		
Male	16	2.5
Female	634	97.5
Total house hold income (PKR)*		
≤ 10000	400	62
> 10000	250	38
<b>Education of father</b>		
Illiterate**	168	25.8
< 10 years	152	23.4
> 10 years	330	50.8
<b>Education of mother</b>		
Illiterate**	266	40.9
< 10 years	118	18.2
> 10 years	266	40.9
<b>Occupation of mother</b>		
Housewife	509	78.3
Working mother	87	13.4
In-house working mother	53	8.2
Others	1	0.2
<b>Number of siblings</b>		
None	58	8.9
One	115	17.7
Two	188	28.9
Three	86	13.2
Four or more	203	31.2

\*PKR: Pakistani rupee; \*\*Illiterate (cannot read and write).

consistent with the findings of a Hispanic study that children who did not breastfeed are found more at risk of oral diseases and other systemic diseases like gastro intestinal (GI) infections, asthma, atopic disease and diabetes mellitus (Rosenblatt and Zarzar, 2004). In our study, consumption of fruit juices and biscuits are found significantly associated with ECC. Majority of the children reported consumption of different types of snacks during the day and choice depends on the availability and affordability of the snacks. Most preferred type of snacks

reported are chips, flavoured milk, juices, chocolates, biscuits, instant noodles and potato fries. These findings are consistent with the findings of studies conducted in US and Australia (Johansson et al., 2010; Hallett and O'Rourke, 2006). Another research conducted on pre-school children reported similar findings regarding consumption of beverages, biscuits and chocolates (Tsai et al., 2006).

Proper brushing technique plays an important role in prevention of ECC. In this study, only few children

**Table 2.** Distribution variables of early childhood caries (ECC) and dmft status.

Variable	Frequency (N = 650)	Percentage
<b>ECC (dmft)</b>		
Positive	153	23.5
Negative	497	76.5
<b>dmft (Number of teeth involved)</b>		
sound	497	76.5
1	15	2.3
2	58	8.9
3	14	2.2
4	66	10.2
<b>dmft (Whole arch)</b>		
Positive	300	46.2
Negative	350	53.8

**Table 3.** Univariate and multivariable logistic regression model for socio-demographic, dietary and oral hygiene variables with early childhood caries (ECC).

Variable	Unadjusted OR (95% CI)	P- value	Adjusted OR (95% CI)	P-value
<b>Child age (months)</b>				
6 - 19	1	-	1	-
20 - 33	5.16 (1.46 - 18.19)	0.01	-	NS
34 - 47	9.96 (2.95 - 33.70)	<0.001	-	NS
48 - 61	7.29 (2.21 - 24.02)	0.001	-	NS
62 - 75	8.57 (2.50 - 29.36)	0.001	2.78 (2.56-3.21)	0.03
<b>Gender of child</b>				
Female	1	-	-	-
Male	1.33 (0.92 - 1.92)	0.12	-	NS
<b>Education of mother</b>				
Illiterate**	1.44 (0.87 - 2.63)	0.64	1.36 (0.65 - 1.43)	0.62
<10 years	1	-	1	-
Illiterate	2.46 (1.40 - 3.86)	0.001	2.23 (1.43 - 3.87)	0.001
>10 years	1	-	1	-
<b>Total house hold income (PKR)*</b>				
<10000	0.71 (0.47 - 1.06)	0.10	-	NS
≥10000	1	-	-	-
<b>Occupation of mother</b>				
Housewife	1	-	1	-
Working mother	1.70 (1.03 - 2.79)	0.03	1.68 (1.01 - 2.65)	0.05
<b>Sweetened drink at night</b>				
Never	1	-	1	-
Once	0.94 (0.58 - 1.52)	0.80	0.86 (0.53 - 1.45)	0.83
Two times	2.83 (1.34 - 5.99)	0.006	2.73 (1.43 - 6.01)	0.04
<b>Use of snacks</b>				
<b>Fruit juices</b>				
No	1	-	-	-
Yes	1.83 (1.01 - 3.31)	0.04	-	NS

<b>Biscuits</b>				
No	1	-	-	-
Yes	2.21 (1.43 - 3.76)	0.02	-	NS
<b>Stop breastfeeding</b>				
Did not breast feed	1		1	-
6 - 17 months	2.45 (1.76 - 3.92)	0.02	2.45 (1.65 - 3.89)	0.05
18 - 24 months	3.12 (2.38 - 4.19)	0.01	2.85 (1.43 - 3.20)	0.01
<b>Nursing bottle</b>				
No	1		-	-
Yes	1.56 (1.02 - 2.52)	0.05	-	NS
<b>Frequency of brushing</b>				
Nil	1		-	-
Once a day	1.26 (0.71 - 2.19)	0.39	-	NS
Twice a day	1.80 (0.85 - 3.81)	0.12	-	NS
Occasionally	1.72 (0.89 - 3.33)	0.10	-	NS
<b>Dental visits</b>				
Yes	1		1	-
No	2.87 (1.06 - 7.85)	0.03	2.751 (1.55 - 4.85)	<0.001

reported brushing teeth once or twice a day. Majority reported that they never brushed their teeth. Only few children reported some alternatives for example miswak or a chewing stick (dandasa) for cleaning teeth. Similar findings are reported by a study conducted in Taiwan (Pacey et al., 2007, 2008). The parent's education and counselling is very important for maintenance of oral hygiene of their children. If early protective and preventive methods are not taken, then it leads to plaque and multiple cavities formation and there is increased risk of other dental problems. Similarly, routine dental health care utilization is an important strategy which is neglected by most of the parents. The results of this study showed that majority of parents did not take their children to dentist for routine check-up. The parents usually take their children to dentist when the child complaint of pain or some other dental problem. The reasons reported are access to dental health care service, unaffordability; and in parents opinion routine visits are not important.

In this study, majority of participants were less educated and belong to low income group. Several studies reported similar findings related to routine dental health care utilization (Iida et al., 2007; Nunn et al., 2009; Adair and Popkin, 2005). A reporting bias might be probable regarding caregivers response to the use of glass for child's beverage or milk consumption as well as recognition of ill effects of leaving nipple in child's mouth and avoidance of such practices. Hence, there is a liable chance that such ratios could have been more than revealed. There are few limitations of this study, for example there is likelihood of recall bias among mothers, especially of older child and his or her breastfeeding

practices at the time when the child was young. Oral hygiene and plaque levels of toddlers were not calibrated for the study purpose. The ECC examination was entirely visual and lacked radiographic proof to second the visual findings because of shortage of capital resources. This might have led to underestimation of true ECC experience in the defined population.

### Conclusion

This study concluded that high proportion of ECC was found among children (71 months of age or younger) and factors identified were child age, mother's level of education, mother's occupation and time of cessation of breastfeeding, and consumables like fruit juices and biscuits are all preventable.

### RECOMMENDATION

This study recommended that oral health awareness programmes should be planned for the guardians especially for mothers and there is need to pay attention for promoting dental health education and routine dental visits so that ECC can be early detected. The program should be focused on preventive interventions to reduce the burden of ECC.

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### Conflicts interest

The authors declare that they have no competing interest.

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