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Full Length Research Paper

Evaluation of anxiety level changes during the first three months of orthodontic treatment in Pakistani population

Hana Pervez*, Imtiaz Ahmed and Gul-e-Erum, Naresh Kumar

Department of Orthodontic, Dr. Ishrat-ul-ebad Khan Institute of Oral Health Sciences (DIIKIOHS), Karachi, Pakistan.

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There are two types of anxiety disorders: state and trait anxiety. Anxiety among dental patients is common and potentially problematic, both for the patient and for the dental team in managing such patients. The aim of this study was to evaluate changes in dental anxiety among patients and parents, their state and trait anxiety were assessed by using anxiety scales. Anxiety levels of 120 patients and parent of each patient were assessed using questionnaire based scales for state-trait and dental anxiety. Questionnaires were filled by patients and parents at two different intervals, that is, T1 (start of orthodontic treatment) and T2 (3 months after orthodontic treatment). T1 and T2 scores were compared using paired sample t-test and the correlation between dental anxiety scale (DAS) and State-trait anxiety inventory (STAI) was performed using Pearson's correlation test. The results of this study show that anxiety levels of patients greatly reduced with time, however their parent's anxiety level remains unchanged. Level of anxiety of both state and dental patients decreases as these patients become more familiar with the dental environment and orthodontist.

Key words: Orthodontic treatment, state anxiety STAT-S, trait anxiety STAT-T, dental anxiety scale DAS.

INTRODUCTION

Anxiety disorders are of two main types: state and trait anxiety. State anxiety (STAI-S) is a fluctuating emotional condition that changes overtime and shows how one feels right now at the moment, whereas trait anxiety (STAI-T) is a personality trait which remains relatively stable overtime (Caumo et al., 2000). State anxiety is used to assess present level of anxiety, while trait anxiety is used to determine long-term anxiety level.

Dental anxiety and fear are common, and can cause problems, both for the patient and for the dental team in managing such patients. Dental anxiety does not only

make the patients to avoid dental care, but it also results in sleep disturbance, ponders on negative feelings and thoughts and develops low self-esteem (Cohen et al., 2000). Those patients who have painful past dental experience are found to be more apprehensive as compared to those who have pain free experience.

Dental anxiety is a strong negative feeling that is related to dental procedures. According to Sanikop et al. (2011), dental anxiety is defined as a "state of apprehension that something dreadful is going to happen in relation to dental treatment or certain aspects of dental

*Corresponding author. E-mail: hinapervez951@gmail.com.

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treatment. It is a multidimensional complex phenomenon which is influenced by personality characteristics, fear of pain, past traumatic dental experience in childhood and dentally anxious family members or peers. From an orthodontics standpoint, the initial placement of orthodontic appliances can cause discomfort. It was reported in literature that pain associated with the use of orthodontic appliances appeared to be the primary complaint of patients, more in adults than in adolescents, and that this discomfort was a major determining factor for cessation of orthodontic treatment. Anxiety was considered to be at its peak the day following orthodontic appliance placement and slowly reduces from that point onwards (Keith et al., 2013).

However, despite the advent of contemporary dental equipment's and technologies, that are designed to lower pain related to dental procedures, research shows that they are not effective in reducing the fear of pain (Vassend, 1993). According to the study done in the Maxillofacial Department of Khyber College of Dentistry, Peshawar, the frequency of anxiety from local anesthesia injection is high among patients (Mehboob et al., 2011). The results regarding gender differences in studies are conflicting. Hakeberg et al. (1992) reported higher levels of dental anxiety among females, but Sari et al. (2005) did not find any such difference between genders.

State-trait anxiety inventory (STAI) is an n assessment scale based on a 4-point scale. The STAI records two types of anxiety: anxiety-state and trait. Higher scores show greater levels of anxiety.

The Corah's dental anxiety scale (DAS) contains 4 multiple choice options that deals with the patient's subjective reactions to the dental situations. Subjects with higher scores show greater level of anxiety.

In this study, three psychological outcome measures (state anxiety, trait anxiety, and dental anxiety) experienced by patients and one of their parents before and after three months of orthodontic treatment were investigated. The aim of this study was to assess whether patient and parent level of anxiety decrease after patients and their parents became familiar with their orthodontist, and became used to orthodontic treatment procedures.

MATERIALS AND METHODS

This questionnaire-based longitudinal study consisted of 60 patients with class I, II and III malocclusion and 60 parents of each patient. The parents could be male or female. They were all students by profession. All of the patients were treated by the same clinician using fixed orthodontic treatment approach (extraction and non-extraction). Informed consent forms were signed by all the participants and it was ensured that their responses will be kept confidential.

Inclusion criteria

The inclusion criteria includes patients between the age range of 15

and 25 years, patients with skeletal and dental class I, II and III malocclusions, patients undergoing fixed orthodontic treatment extraction and non-extraction.

Exclusion criteria

The exclusion criteria includes patients with previous orthodontic treatment, patients with craniofacial syndromes, patients with mandibular asymmetries and extensive prosthetic appliances, and patients who are mentally disabled

Data collection

Data was collected from patients coming to Orthodontics Department at Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, DUHS for orthodontic treatment. Patient and parent anxiety levels were assessed using questionnaires that were filled by the patients and one of their parents. The first set of questionnaires was given at the start of the initial appointment (T1). The second set of questionnaires was given at the end of the third month of orthodontic treatment (T2). The two sets of questionnaires were similar and comprised two different tests of the STAI and Corah's DAS (Corah, 1969).

The STAI comprises separate self-report scales measuring two distinct anxiety concepts. These scales measure state anxiety (how one feels at a particular moment e.g. dental visit) and trait anxiety (how one usually or generally feels) (Corah, 1969).

The state anxiety score is based on 20 items for which respondents rate anxiety on a scale from one (not at all) to four (very much so). The trait anxiety score (STAI-T) is based on 20 questions designed to measure anxiety on a scale from one (almost never) to four (almost always). The total score is in the range of 20 to 80. The case with the highest total shows increased level of anxiety.

Corah's (DAS, 1969) is a brief questionnaire consisting of four questions asking how respondents would feel "if they had to go to the dentist tomorrow," "waiting at the dentist office," "waiting while he gets the drill ready," and "in the dentist's chair to have teeth cleaned". Respondents rate each item on a five-point scale that ranges from not anxious to extremely anxious, in ascending order. Each question carries a possible maximum score of five, and the total scores range between 4 and 20. Anxiety rating: 4 - 8 = low anxiety, 9 - 12 = moderate anxiety, 13 - 14 = high anxiety, and 15 - 20 = severe anxiety (or phobia).

Statistical analyses were done using the Statistical Package for the Social Sciences (SPSS for windows version 15). A sample size of 120 (patients and parents combined) was selected to provide more than 90% power. A P-value less than 0.05 was considered statistically significant. The mean anxiety levels and standard deviations were calculated for T1 and T2 after that paired sample t test was applied to compare scores of T1 and T2. In order to find out the relationship between DAS and STAI scores among patients and their parents, Pearson's correlation coefficient (bivariate two tailed) was calculated for T1 and T2.

RESULTS

In Table 1, mean patient and parent anxiety values and standard deviation (SD) are given for T1 and T2. DAS scores decreased significantly among patients from 6.87 (± 1.95) at T1 to 5.77 (± 1.57) at T2 ($p < 0.001$). Similarly, state and trait anxiety values of patients also decreased

Table 1. Descriptive statistics of dental anxiety and state anxiety scores with paired sample t test.

Index (possible range)	Patient (N= 120)			Parent (N=120)		
	T1	T2	P value	T1	T2	P value
	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
Dental anxiety (4-20)	6.87 (±1.95)	5.77 (±1.57)	0.000	6.87 (±1.95)	6.73 (±1.82)	0.113
State anxiety (20-80)	41.40 (±5.90)	40.46 (±6.07)	0.000	40.46 (±6.07)	39.98 (±5.82)	0.20
Trait anxiety (20-80)	38.53 (±4.975)	38.48 (±4.98)	0.083	38.48 (±4.98)	38.49 (±4.94)	0.657

Table 2. Correlation matrix showing Pearson’s correlation coefficient between DAS and STAI prior to the start of orthodontic treatment (T1).

Correlation	Patient DAS	Patient STAI-S	Patient STAI-T	Parent DAS	Parent STAI-S	Parent STAI-T
Patient DAS	1					
Patient STAI-S	0.141	1				
Patient STAI-T	-0.73	0.092	1			
Parent DAS	1.00 [†]	0.141	-0.075	1		
Parent STAI-S	0.124	0.983 [†]	0.983 [†]	0.124	1	
Parent STAI-T	-0.075	0.088	0.088	-0.075	0.097	1

[†]Correlation is significant p<0.05. STAI-S: Stat anxiety; STAI-T: trait anxiety; DAS: Corah’s dental anxiety scale.

Table 3. Correlation matrix showing Pearson’s correlation coefficient between DAS and STAI 3 months after the start of orthodontic treatment (T2).

Correlation	Patient DAS	Patient STAI-S	Patient STAI-T	Parent DAS	Parent STAI-S	Parent STAI-T
Patient DAS	1	-	-	-	-	-
Patient STAI-S	0.093	1	-	-	-	-
Patient STAI-T	-0.048	0.097	1	-	-	-
Parent DAS	0.776 [†]	0.125	0.007	1	-	-
Parent STAI_S	0.116	0.956 [†]	0.074	0.107	1	-
Parent STAI-T	-0.050	0.093	0.999 [†]	0.008	0.072	1

[†]Correlation is significant p<0.05. STAI-S: Stat anxiety; STAI-T: trait anxiety; DAS: Corah’s dental anxiety scale.

from T1 to T2, STAI-S 41 (± 5.90) at T1 to 40.46 (± 6.07) at T2 (p<0.001) and STAI-T values at T1 38.53 (± 4.975) and at T2 38.48 (± 4.98) does not show significant reduction as P value is (>0.005). Among parents, the mean DAS and STAI-S values (± SD) decreased from 6.87 (± 1.95) at T1 to 6.73 (± 1.82) at T2 and from 40.46 (± 6.07) at T1 to 39.98 (± 5.82) at T2, respectively. The mean STAI-T value, increased from 38.48 (± 4.98) at T1 to 38.49 (± 4.94) at T2. However, none of these differences were statistically significant (p>0.05). Parent’s anxiety values did not show significant reduction in their scores.

The Pearson’s correlation coefficient between DAS, STAI-S and STAI-T among patients and parents are shown in Table 2 for T1 and Table 3 for T2. Patient DAS

score at T1 shows correlation with parent DAS which is 1.00, p<0.05 score and there was also significant correlation found between patient STAI-T and STAI-S with parent STAI-S which is 0.983, p<0.05.

At T2, patient DAS score shows correlation with parent DAS which is 0.776, p<0.05. Patient STAI-S shows correlation with parents STAI-S (0.956, p<0.05) and patient STAI-T shows correlation with parents STAI-T (0.999, p< 0.05).

DISCUSSION

The purpose of this research was to assess changes in the level of dental anxiety in orthodontic patients using a

questionnaire. The age of patients was between 15 and 25 years in which 40 were girls and 20 were boys. Our assumption was that the patients who were anxious at the start of orthodontic treatment became less apprehensive with passage of time. Reduction in anxiety levels were attributed to the familiarity with the orthodontist and orthodontic procedures (Dailey et al., 2001).

The assessment scales used in this study were state anxiety score, trait anxiety score and dental anxiety score. Not only the patients but one of their parents was also included in this study because according to studies high anxiety levels in parents of children awaiting orthodontic treatment which could affect the outcome of their child's treatment (Krishnan, 2007).

The results show that anxiety levels of patients greatly reduced with time; however, their parent's anxiety level remains somewhat unchanged. It seems reasonable to expect that the more time that passed since patients start treatment, the more familiar and comfortable they become, and therefore, lower their level of dental anxiety about orthodontic treatment. Patients receive information at every appointment and they become familiar with the procedures more than their parents. This explains why patient's anxiety levels lowers with time. This is in agreement to the findings of Sergl et al. (1998) who reported that well informed patients tend to show less anxiety.

On the other hand, parents' anxiety levels remain unchanged due to facts that in most of the appointments parents normally stay out of the dental office and they receive less information about the procedures being done in patients' mouth.

The results showed a significant correlation between dental anxiety and state-trait anxiety among patients and parents. Patients' state and trait anxiety before treatment was correlated with parents' state and dental anxiety. Additionally, parent's dental anxiety was also correlated with patient dental anxiety at the start of the treatment. The correlation between patients' DAS and parents' DAS remained significant even after three months of orthodontic treatment. Also, correlation among patients' state and trait anxiety and parents' state and trait anxiety also remained significant after three months of orthodontic treatment. This finding is according to Hakeberg et al. (1992) definition of anxiety as a contagious emotion. According to Gordis et al. (2001), anxiety levels of children are greatly influenced by the attitude and behavior of family members.

The limitations of this study are the use of wide range of patients. For instance, patients of ages 25 will show anxiety which cannot be compared with the stress level of 14 years old patient. Secondly, treatment method was not evaluated, for example, effects of extraction versus non extraction method on reducing level of dental anxiety.

Last but not the least, patients included in this study

were not selected on the basis of their class of malocclusion.

The type of treatment also affects the level of stress among patients. Restorative procedures are less likely to cause anxiety than periodontal or endodontic treatment (Stabholz and Peretz, 1999). Studies show that anxiety levels among patients who are undergoing periodontal and endodontic procedures are high as compared to restorative and prophylactic procedures (Dailey et al., 2001). Recent literature stated that some orthodontic related procedures like separator placement, placement and activation of arch wires, delivery of orthopedic forces and deboning produce pain in patients (Hakeberg et al., 1992). It has also been suggested that patients treated with fixed appliances had more painful experience than removable or functional appliances (Hakeberg et al., 1992).

Approximately 70 to 95% of orthodontic patients are reported to experience pain during orthodontic treatment. Patients with past painful experiences during orthodontic treatment were found to be less cooperative and less motivated throughout their treatment. Although for most patients, pain is not a major problem (e.g. they tolerate it and continue their treatment). However, up to 8% of orthodontic patients discontinued their orthodontic treatment because of initial painful experiences (Yıldırım and Karacay, 2012).

By identifying the cause of fear among patients, orthodontist will be able to understand patients in a better way and therefore can improve the quality of patient care. Since pain is considered to be the main contributing factor for anxiety, efforts employed to reduce pain will be beneficial both for the clinician and patient. Dentist should also have good communication with the patients and create a friendly environment which will result in reduced anxiety among patients (Sergl et al., 1998).

Conclusion

Level of anxiety both state and dental decreases as the patients become more familiar with the dental environment and orthodontist. The anxiety levels of patients are greatly influenced by the parents' anxiety levels.

REFERENCES

- Caumo W, Broenstrup JC, Fialho L, Petry SM, Brathwait O, Bandeira D, Loguercio A, Ferreira MB (2000). Risk factors for post-operative anxiety in children. *Acta Anaesthesiol. Scand.* 44:782-789.
- Cohen SM, Fiske J, Newton JT (2000). The impact of dental anxiety on daily living. *Br. Dent. J.* 189:385-390.
- Corah NL (1969). Development of a dental anxiety scale. *J. Dent. Res.* 48(4):596.
- Keith DJ, Rinchuse DJ, Kennedy M, Zullo T (2013). Effect of text message follow-up on patient's self-reported level of pain and anxiety. *Angle Orthod.* 83(4):605-610.

- Dailey YM, Humphris GM, Lennon MA (2001). The use of dental anxiety questionnaires: a survey of a group of UK dental practitioners. *Br. Dent. J.* 190:450-453.
- Yıldırım E, Karacay S (2012). Evaluation of anxiety level changes during the first three months of orthodontic treatment. *Korean J. Orthod.* 42(4):201-206.
- Gordis EB, Margolin G, John RS (2001). Parents' hostility in dyadic marital and triadic family settings and children's behavior problems. *J. Consult. Clin. Psychol.* 69(4):727-734.
- Hakeberg M, Berggren U, Carlsson SG (1992). Prevalence of dental anxiety in an adult population in a major urban area in Sweden. *Community Dent. Oral Epidemiol.* 20(2):97-101.
- Krishnan V (2007). Orthodontic pain: from causes to management-a review. *Eur. J. Orthod.* 29(2):170-179.
- Mehboob B, Khan Ehtesham, Khan M (2011). Dental anxiety Scale in Exodonxia Patient. *J. Khyber Coll. Dent.* 1(2):58-64.
- Sari Z, Uysal T, Karaman AI, Sargin N, Ure O (2005). Does orthodontic treatment affect patients' and parents' anxiety levels? *Eur. J. Orthod.* 27:155-159.
- Serfl HG, Klages U, Zentner A (1998). Pain and discomfort during orthodontic treatment: causative factors and effects on compliance. *Am. J. Orthod. Dentofacial Orthop.* 114(6):684-691.
- Sanikop S, Agrawal P, Patil S (2011). Relationship between dental anxiety and pain perception during scaling. *J. Oral Sci.* 53(3):341-348.
- Stabholz A, Peretz B (1999). Dental anxiety among patients prior to different dental treatments. *Int. Dent. J.* 49:90-94.
- Vassend O (1993). Anxiety, pain and discomfort associated with dental treatment. *Behav. Res. Ther.* 31(7):659-666.

Full Length Research Paper

Knowledge and attitude of Saudi mothers towards health of primary teeth

Mona A. Kamil^{1*}, Nahid M. El-Ameen², Sara H. Madkhaly³, Tahani H. Alshamarry³,
Ruaa U. Hakami³ and Elham M. Nassir³

¹Department of Preventive Dental Sciences, Faculty of Dentistry, Jazan University, KSA.

²Department of Medical Science, Faculty of Dentistry, Jazan University, KSA.

³Graduate Program, Faculty of Dentistry, Jazan University, KSA.

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The aim of this study was to assess Saudi mothers' knowledge and attitude towards primary teeth health and dental caries and the impact of level of education on their knowledge and attitude. Four hundred, self-reported questionnaires were distributed to mothers of children aged 1 to 6 years. They contained questions expressing knowledge and attitudes towards the health of primary teeth and the effect of educational level on knowledge and attitude of oral health. Data were processed and analysed by means of the Statistical Package for Social Sciences (SPSS) using Chi-square test. The significance was taken for P-value ≤ 0.05 . Mothers had good knowledge about dietary practices and oral hygiene practices. While more than half of them do not know when to start child mouth cleaning, first visit to dentist and transmissibility of caries. Half of the respondents do not know the contribution of frequent sweet consumption to dental caries. Our study showed a strong correlation between level of education and oral health knowledge (P-value = 0.00) whereas effect of knowledge on mothers' attitude was insignificant (P-value ≤ 0.6). Mothers showed some degree of knowledge about certain aspects of primary teeth health and caries, while poor knowledge is shown in other aspects. We recommended broadening prevention concept.

Key words: Early childhood caries (ECC), oral health knowledge, oral health attitude.

INTRODUCTION

Caries prevalence among Saudi Arabian children and adolescent in Jazan Region, Kingdom of Saudi Arabia is high (Al-Malik and Rehbin, 2006). Oral health knowledge is an essential pre-requisite for health related behaviour (Ashley, 1996). Children under the age of 5 years spend most of their time with mothers, so their oral hygiene and dietary habits are influenced by their care takers and

level of education (Jain et al., 2014). In addition to the level of education, behavioural, cultural and social factors influence caries risk (Acs et al., 1992). These include sleeping with a bottle and frequent consumption of sugar-containing snacks or drinks (Hallett and O'Rourke, 2006). Dental caries with its consequences including pain, and diminished quality of life is a common health problem

*Corresponding author. E-mail: munakamil@yahoo.com, Tel: 00966507831154.

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among children (Casamassimo et al., 2009). Since caries is a transmissible infectious disease, salivary contact is responsible for its transmission (Berkowitz, 2006). The organisms responsible for caries are mutans streptococci (MS) (Sakai et al., 2008). Children of mothers with high levels of mutans streptococci, are at greater risk and elimination of saliva-sharing activities (e.g. sharing utensils) reduces transmission of caries (Berkowitz, 2006). Although, early childhood caries (ECC) is preventable, most parents often think it is not (Acs et al., 1992). Consequences of ECC include a higher risk of new carious lesions in both the primary and permanent dentitions (Al-Shalan et al., 1997). Severe early childhood caries (S-ECC) interferes both with the quality of life of the child and the family. It affects child's school performance, and social behaviour. Treatment of S-ECC is expensive, invasive and very stressful (Filstrup et al., 2003). Young children with high caries activity may develop caries even during tooth eruption so it is essential to reach the preschool child and its caregivers as early as possible (Plutzer and Spencer, 2008). Oral hygiene measures should be implemented to infants no later than the time of eruption of the 1st primary tooth and tooth brushing should be performed by parents twice daily (American Academy on Pediatric Dentistry [AAPD], 2011).

The first dental visit is important and should be before completion of 12 months of age. The age at which a child visits the dentist for the first time, reflects the quality of the preventive dental care and the future of his oral health (Widmer, 2003). Many studies showed a low awareness level in the population, as the commonest reason for seeking dental care is pain and dental caries (Meera et al., 2008). Basic knowledge of caries risk factors, importance of the deciduous teeth and oral health maintenance are important to employ effective disease preventive strategies (Finlayson et al., 2007). There is little information on the awareness and attitude of Saudi mothers towards the health of the primary teeth.

The aims of this study were to assess the Saudi mothers' knowledge and attitude towards the primary teeth health and dental caries and the impact of level of education on primary teeth health and dental caries in Jazan Region, Kingdom of Saudi Arabia.

MATERIALS AND METHODS

A questionnaire based cross-sectional study was conducted in Kingdom of Saudi Arabia, Jazan area during the period of June to August, 2012. Trained interviewers (dental students) distributed 400 questionnaires to mothers of children aged 1 to 6 years from different cities and villages in Jazan area (the participating students' residential areas). 91% (365) of distributed questionnaires were collected. Some questionnaires were with few missing data (18%). The questionnaire was reviewed by expert staff members for refining and criticism then approved by the ethical committee. A simple, short and direct questionnaire written in Arabic language (participants' mother tongue) was designed to provide an overall view of the subject's socio-demographic characteristics, oral

hygiene practices, dietary practices and degree of awareness of the importance of primary teeth. The questions were constructed with closed alternative answer in order to be simple and easily understood by the subjects regardless of their educational status. The mothers were asked to respond to the knowledge questions by agree, disagree or not sure for most questions. The questionnaire reflected subjects' knowledge and attitudes towards oral health and ECC. Oral health educational pamphlets were distributed to the respondents after collection of questionnaires. We used Cronbach's alpha statistics to measure internal consistency for assessing reliability. The value of Cronbach's alpha was 0.79 which indicates acceptable reliability.

Ethical considerations

The study proposal was submitted to the College of Dentistry Jazan University, Research and Publication Office for ethical clearance and written informed consent was obtained from the participants prior to study commencement. In this concern, it has been stated to the participants that there is no direct benefit of their participation in the study, however knowledge gained from the study may lead to the prevention and treatment of primary teeth (general population benefits) and that no information about the participants, or information provided by them during the research will be disclosed to others without their written permission.

Construction of scales for analysis

A total of 8 questions were gotten for oral health knowledge and 3 questions for oral health attitude. Concerning responses for oral health knowledge questions, positive statement (agree) scores 1 whereas both don't agree and don't know score 0. The sum of the 8 responses represents oral health knowledge score for each respondent. For further analysis, the sum scores were sub-grouped into 3 groups: poor, adequate and good knowledge (0 to 3, 4 to 5 and 6 to 8, respectively). Concerning mothers' attitudes towards oral health, we had three questions (Table 3) with 3 different choices of answers. A positive statements scores 3, an average statement scores 2 and a negative statement scores 1. The sum of the three attitude questions served as the final oral health attitude score for each respondent. For further analyses, the sum scores were sub-grouped into 3 groups: poor, average and good attitude (<4, 4 to 6 and 7 to 9, respectively).

Statistical analysis

All data were analysed using the Statistical Package for the Social Sciences (SPSS version 19) program. For frequency, Chi-square test was used to find out if mothers' educational level affects their oral health knowledge and attitude. The significance was taken for P-value ≤ 0.05 .

RESULTS

61.6% of respondents had university level of education, 25.6% had secondary school level, while only 12.8% had primary school level of education or illiterate. Mothers had a good knowledge about diet, dietary practices and oral hygiene practices. Nevertheless, more than half of them had poor knowledge about child mouth cleaning starting, child first visit to dentist and transmissibility of caries. Around half of them did not know that frequency of sweet consumption predispose to dental caries

Table 1. Oral health knowledge questions, number and percentage distribution of the study participants.

Question	I don't agree (%)	I don't know (%)	I agree (%)
Sweets and soft drinks contribute to dental caries	7 (1.9)	7 (1.9)	351 (96.2)
Eating sweets between meals contributes to dental caries	125 (34.4)	48 (13.2)	190 (52.3)
The contribution of sharing spoons, tooth brushes, etc., in caries transmission	95 (26.2)	111 (30.7)	156 (43.1)
Night time bottle feeding with sugar contributes to dental caries	14 (3.9)	49 (13.5)	300 (82.6)
The general health of mothers during pregnancy affects deciduous teeth health of their children	38 (10.5)	99 (2.7)	224 (62.0)
Primary teeth caries can affect permanent teeth	61 (17)	77 (21.4)	221 (61.6)
Primary teeth caries is preventable	43 (11.8)	44 (12.1)	276 (76)
Child mouth cleaning start after birth	93 (26)	90 (25.1)	175 (43.9)

Table 2. Level of knowledge and frequency distributions of the participants.

Level of knowledge	Frequency	%	Valid percent
Poor	58	15.9	15.9
Valid Adequate	132	36.2	36.2
Good	175	47.9	47.9

regardless of its amount. There was a significant correlation between respondents' level of education and oral health knowledge (P-value = 0.00), whereas the impact of the level of education on oral health attitude of the participants was insignificant (P-value \leq 0.6).

The frequency and percentage of the participants' answers to questions of knowledge are shown in Table 1. Level of oral health knowledge of the participants is shown in Table 2. The frequency and percentage of mothers' answers for the dental health attitude questions are shown in Table 3.

Level of dental health attitude of the participants is as shown in Table 4. Oral health knowledge and attitude level among the participants is as shown in Figure 1. Impact of education on mothers' health knowledge is shown in Figure 2.

DISCUSSION

Many studies suggest that mother's education influences dental health of their children. Shamta et al. (2009) found a strong interdependence on the mother's level of knowledge with that of their educational level which influenced the child's oral health. This was found to be true in the present study as well. The higher the educational attainment of mothers, the better the dental health practices. An overwhelming majority of mothers (96.2%) believed that sweets and soft drinks can lead to caries, although this reflect excellent knowledge of sweet risk factor in dental caries, but at the same time, only 52.3% of the respondents relate this risk factor to the frequent sweets intake more than the quantity taken. Rafi et al. (2012) got the same finding. The majority of

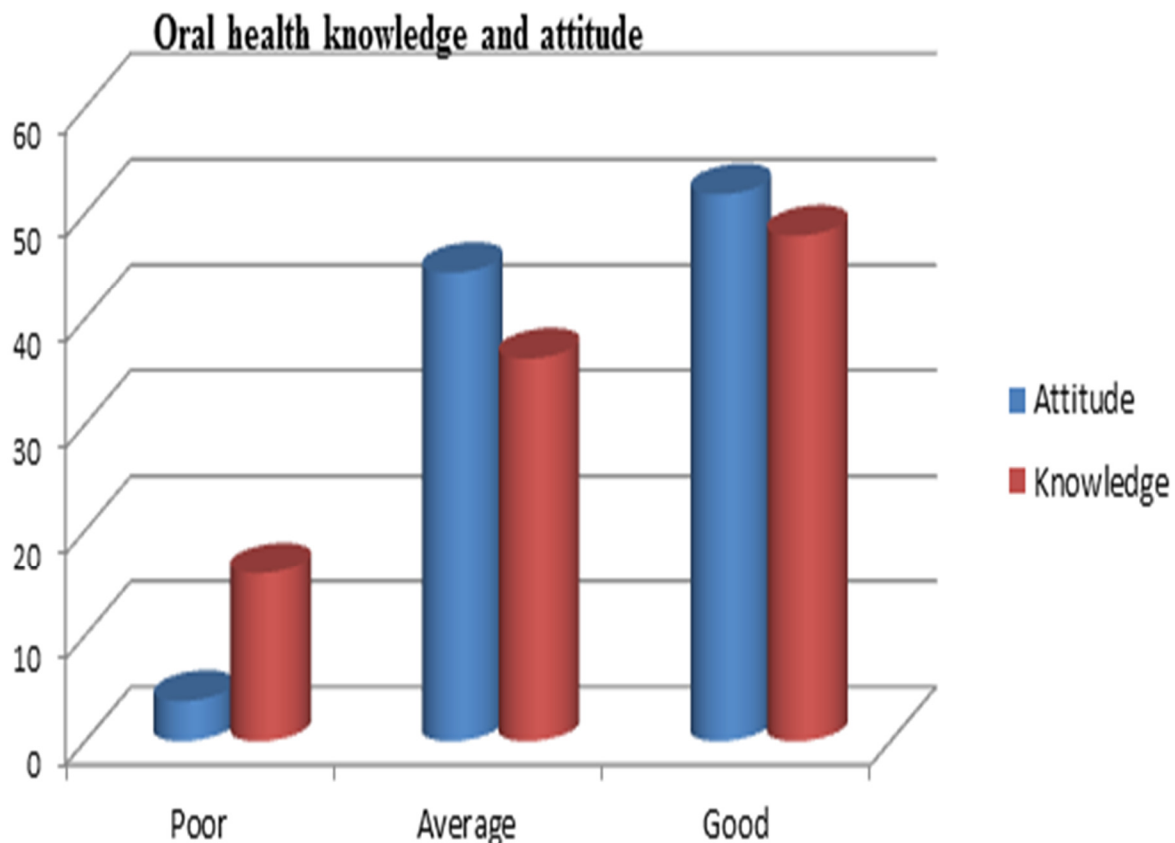
mothers (56.9%) had inadequate knowledge about the fact that sharing of utensils and kissing can transmit *Streptococci mutans* which causes caries. This finding is consistent with the finding of Sakai et al. (2008); although the transmissibility of dental caries is relatively well established in the literature. Night time bottle feeding with sugar; 82.6% of our respondents agreed that night time bottle feeding with sugar contributes to caries. Children that were put to sleep with a bottle had S-ECC compared to those not put to sleep with a bottle (Hallett and O'Rourke, 2006). In the present study, we inquired about the knowledge of the sweetened night time bottle feeding, but did not ask about the actual habit itself, especially in a country of high caries prevalence and this is a limitation of this study. Knowledge alone is not the absolute basis of oral health practices as other

Table 3. Number and percentage distribution of mother according to attitude items.

Question	Answer	N (%)
Child 1st visit to dentist	Pain treatment	191 (53.4)
	Never visit dentist	123 (34.4)
	Routine visit after 1st year	44 (12.3)
Mothers' brushing frequency	Don't brushing	30 (8.4)
	Once daily	84 (23.5)
	Twice daily	244 (68.8)
U55 When mother start brushing	Recently	64 (17.7)
	After primary	108 (29.9)
	Before primary	-

Table 4. Frequency and percentage distribution of participants according to attitude items.

Attitude of subjects towards oral health		Frequency	Percentage	Valid Percentage
Valid	Poor	14	3.8	3.8
	Average	162	44.4	44.4
	Good	189	51.8	51.8
	Total	365	100.0	100.0

**Figure 1.** Oral health knowledge and attitude of the participants.

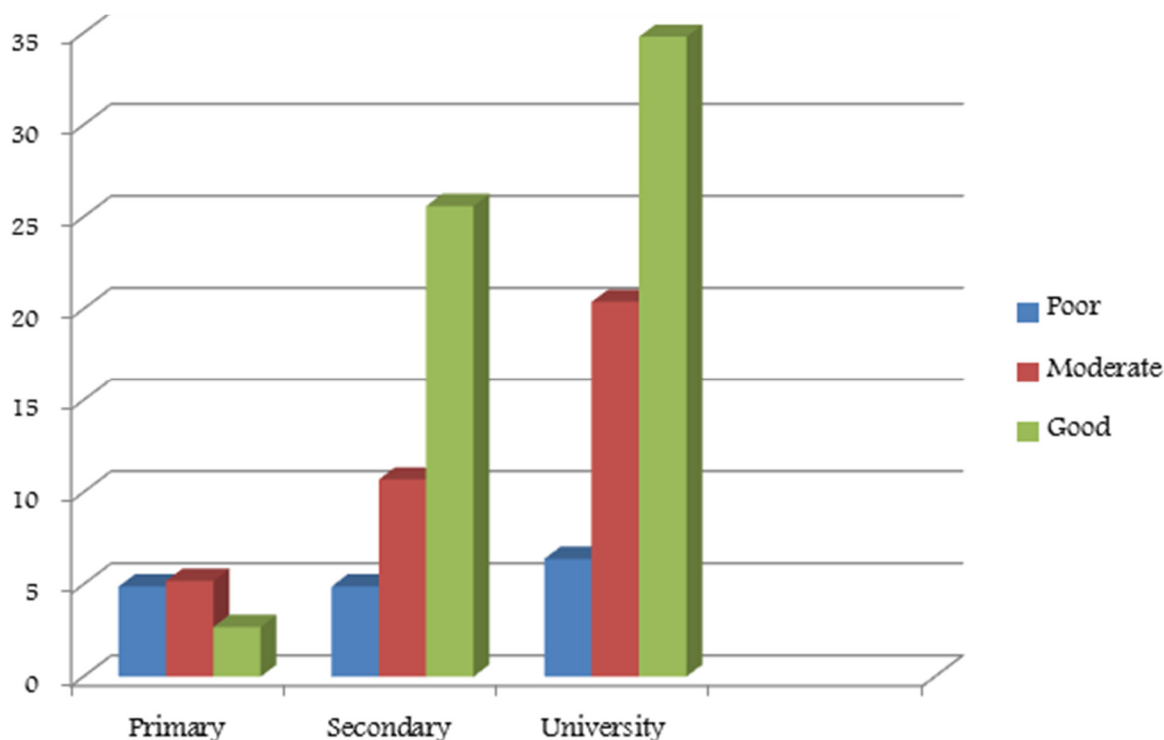


Figure 2. Impact of education on mothers' health knowledge.

factors like dietary traditions exist. Gussy et al. (2008) found that parents had good knowledge of diet related risk factors, but half the children were given bottle at bedtime. 62.0% of respondent of the present study agreed that the health of the pregnant mother affect her baby primary teeth health; this finding reflects good knowledge of the subjects. 61.6% agreed that primary teeth caries affect general health and child's permanent teeth which is almost the same finding with that of Rafi et al. (2012). Dental caries is a preventable disease, and it can be stopped and even potentially reversed during its early stages (Kawashita et al., 2011). The majority of the subjects of the present study (76%), agreed that primary teeth caries is preventable. In the present study, tooth brushing habits of mothers were assessed because they strongly affect brushing habits of their children (Castilho et al., 2013). This study showed good oral hygiene knowledge and practices which may result from high level of education of the majority of respondents (61.6% of our respondents had higher university education).

CONCLUSION AND RECOMMENDATIONS

Mothers' level of education improves the awareness of oral health related issues. They were familiar with factors causing dental caries, while transmissibility of caries and effect of frequent fermentable carbohydrates were not evident. The awareness of the importance of the first

dental visit is very low. Majority of the mothers had good oral hygiene practices for themselves, but most of them ignore the proper age for starting new-born's mouth cleaning. Broadening prevention concepts with special focus on transmissibility of caries, frequent intake of sweets, infants' mouth cleaning commencement and first visit to dentists is recommended.

Conflict of Interest

The authors have not declared any conflict of interest.

REFERENCES

- American Academy on Pediatric Dentistry (AAPD) (2011). Policy on early childhood caries (ECC): classifications, consequences, and preventive strategies. *Pediatr. Dent.* 36(6):14-15.
- Acs G, Lodolini G, Kaminsky S, Cisneros GJ (1992). Effect of nursing caries on body weight in a pediatric population. *Pediatr. Dent.* 14(5):302-305.
- Al-Malik MI, Rehbini YA (2006). Prevalence of dental caries, severity, and pattern in age 6 to 7-year-old children in a selected community in Saudi Arabia. *J. Contemp. Dent. Pract.* 7(2):46-54.
- Al-Shalan TA, Erickson PR, Hardie NA (1997). Primary incisor decay before age 4 as a risk factor for future dental caries. *Pediatr. Dent.* 19(1):37-41.
- Ashley FP (1996). Role of dental health education in preventive dentistry, In: *Prevention of dental disease* (Murray JJ). 3rd edition. Oxford: Oxford University Press, pp. 406-414.
- Berkowitz RJ (2006). Mutans streptococci: Acquisition and transmission. *Pediatr. Dent.* 28(2):106-109.

- Casamassimo PS, Thikkurissy S, Edelstein BL, Maiorini E (2009). Beyond the dmft: the human and economic cost of early childhood caries. *J. Am. Dent. Assoc.* 140(6):650-657.
- Castilho AR, Mialhe FL, Barbosa Tde S, Puppim-Rontani RM (2013). Influence of family environment on children's oral health: a systematic review. *J. Pediatr. (Rio J)* 89(2):116-123
- Filstrup S, Briskie D, da Fonseca M, Lawrence L, Wandera A, Inglehart MR (2003). Early childhood caries and quality of life: child and parent perspectives. *Pediatr. Dent.* 25(5):431-439.
- Finlayson TL, Siefert K, Ismail AI, Sohn W (2007). Maternal self-efficacy and 1-5 year old children's brushing habits. *Community Dent. Oral Epidemiol.* 35(4):272-281.
- Gussy MG, Waters EB, Riggs EM, Lo SK, Kilpatrick NM (2008). Parental Knowledge, Beliefs and Behaviours for Oral Health of Toddlers Residing in Rural Victoria. *Aust. Dent. J.* 53(1):52-60.
- Hallett KB, PK O'Rourke PK (2006). Caries experience in preschool children referred for specialist dental care in hospital. *Aust. Dent. J.* 51(2):124-129.
- Jain R, Oswal KC, Chitguppi R (2014). Knowledge, attitude and practices of mothers toward their children's oral health: A questionnaire survey among subpopulation in Mumbai (India). *J. Dent. Res. Sci. Dev.* 1(2):40-45.
- Kawashita Y, Kitamura M, Saito T (2011). Early Childhood Caries. *Int. J. Dent.* 2011:725320.
- Meera R, Muthu MS, Phanibabu M, Rathnaprabhu V (2008). First dental visit of a child. *J. Indian Soc. Pedod. Prev. Dent.* 26 Suppl 2:S68-71.
- Plutzer K, Spencer AJ (2008). Efficacy of an oral health promotion intervention in the prevention of early childhood caries. *Community Dent. Oral Epidemiol.* 36(4):335-346.
- Rafi AT, Zakirulla M, Syed MY, Nasim VS, Al Qahtani AR, Al-Turki AA (2012). Cross-sectional study of awareness and knowledge of causative factors for early childhood caries among Saudi parents: A step towards prevention. *Int. J. Health Sci. Res.* 2(3):1-7.
- Sakai VT, Oliveira TM, Silva TC, Moretti AB, Geller-Palti D, Biella VA, Machado MA (2008). Knowledge and attitude of parents or caretakers regarding transmissibility of caries disease. *J. Appl. Oral Sci.* 16(2):150-154.
- Shamta S, Ayyaz AK, Saima C (2009). Maternal Factors and Child's Dental Health. *J. Oral Health Comm. Dent.* 3(3):45-48.
- Widmer R (2003). The first dental visit: an Australian perspective. *Int. J. Paediatr. Dent.* 13(4):270.

Full Length Research Paper

Dental professionals' attitude towards biostatistics

Ashwin C. Shetty^{1*}, Noura M. Al Rasheed² and Sara A. Alwardi²

¹Department of Restorative Dentistry, Riyadh Colleges of Dentistry and Pharmacy, P. O. Box 84891, Riyadh 11681, Kingdom of Saudi Arabia.

²Postgraduate, Riyadh Colleges of Dentistry and Pharmacy, P. O. Box 84891, Riyadh 11681, Kingdom of Saudi Arabia.

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The aim of this study was to evaluate the attitude of dental professionals towards biostatistics. A cross-sectional questionnaire survey was conducted among all the faculty members and postgraduate students of dentistry at Riyadh Colleges of Dentistry and Pharmacy, Kingdom of Saudi Arabia. Descriptive analysis was undertaken and differences between groups were examined using Chi-square test. A response rate of 53.7% (n = 102) was achieved. Biostatistics was believed to be a difficult subject by 57.8% (n=59) of the respondents. Only 28.4% (n=29) respondents were confident that they can conduct their own statistical analyses with confidence. Majority of the respondents reported a positive attitude to the questions concerning perceptions of biostatistics and its relationship to research and evidence based dentistry. Dental professionals showed a low perceived knowledge of biostatistical concepts despite a clear recognition of the importance of these issues. There is a need of changing the training pattern of biostatistics for dental professionals. An integrated approach to teaching biostatistics with clinical relevance would make them confident enough to apply biostatistics in their clinical practice.

Key words: Dental, professionals, attitude, biostatistics, perception.

INTRODUCTION

Biostatistics is an integral part of medical/dental research and an important element of evidence based practice in dentistry. The analysis of data from any research project seeks to answer the research question which was set at the beginning of the study (Williams et al., 2004). Dental professionals are expected to read dental journals and participate in postgraduate training in order to keep updated of new developments. It is therefore important that they are able to assess reports of original research. Clinicians and academicians review articles frequently on patient care, research, and education. Most of the articles

are accompanied by statistics to either validate or question the findings/conclusions of the investigations. An attitude towards statistics is a measure of positive and negative feelings toward the subject in terms of relevance and value, difficulty and self-efficacy, and general impression toward the subject (Evans, 2007).

A recent study in India reported a lack of command over the subject of biostatistics among dental professionals, although they were aware of its importance in dentistry (Batra et al., 2014). Studies on postgraduate dental students showed a high level of attitude towards

*Corresponding author. E-mail: drashwin@riyadh.edu.sa, Tel: (+966) 1 2931177.

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biostatistics (Kumar et al., 2014; Wadhwa et al., 2015). A study on medical professionals reported low perceived knowledge of biostatistics despite a clear recognition of the importance of these issues (West and Ficalora, 2007). Irish and Chinese postgraduate medical students reported positive attitudes about their interest towards statistics, but they tended to view statistics as difficult (Hannigan et al., 2014; Zhang et al., 2012). Medical residents lacked the knowledge in biostatistics needed to interpret results in published clinical research (Windish et al., 2007).

Statistical knowledge can lead to the attitude of dental professionals towards the subject. Positive attitudes contribute to a better use of statistical knowledge and improvement of positive attitudes towards statistics is a critical goal in statistics education (Pimenta et al., 2010). Rationale of this study includes, need to effectively interpret results for patients as clinical decisions become more complex and limited access to statistical experts when required. Understanding current perceptions of dentists regarding biostatistics and its role in both research and clinical practice may be helpful in improving teaching on this subject. Moreover, the perception concerning this subject has not been thoroughly assessed among the dental professionals. The aim of this survey was to evaluate the attitude and to assess fundamentals and training of dental professionals towards biostatistics in Riyadh Colleges of Dentistry and Pharmacy (RCsDP), Kingdom of Saudi Arabia (KSA).

METHODOLOGY

An anonymous cross-sectional questionnaire survey was conducted among all the faculty members and postgraduate students of dentistry in RCsDP. Questions using five-point Likert scales which were adapted from validated existing surveys that addressed medical clinicians' attitudes toward biostatistics (West and Ficalora, 2007) were used. Questions from the validated questionnaire were taken directly with slight modifications being made to match it for the dental professionals. The questionnaire was piloted on a representative sample of faculty and postgraduates who were not part of the study population. Final questionnaire was administered to each of the eligible members through e-mail. The purpose of the study was explained in an accompanying letter. Two weeks time was given to all the participants to complete the questionnaire and in between two reminders was sent. Closed questions were utilised permitting respondents to scale responses from 1 ("strongly agree") to 5 ("strongly disagree") on a five-point Likert scale across eighteen items to assess the attitude about biostatistics.

The questionnaire had sections examining attitude and demographic details of the participants. Questions addressed perceptions regarding biostatistics in general, statistical knowledge and training, the role of biostatistics in clinical research, and links between biostatistics and evidence based dentistry (EBD). Demographic details included gender, years of experience, department, academic position, and career focus. Participants were informed that completion and return of the questionnaire implied consent to participate in the study. The questionnaire took

approximately 10 min to complete. To make the Chi-square test valid, strongly agree and agree response were merged for some questions. Data was analysed using SPSS version 18 for Windows. Associations between responses to certain questions and demographic factors was analysed with the Chi-square test; level of statistical significance was set at $p \leq 0.05$. This study was approved by the ethical committee of RCsDP.

RESULTS

The survey response rate was 53.7% (102/190). Response rates differed by academic position, with a significantly lower response rate among postgraduate students (40.8 versus 74.3% among teaching faculty; $p < 0.05$). 58.8% ($n=60$) were male and 41.2% ($n=42$) were female. Out of the total respondents, 52% ($n=53$) were faculty members and 48% ($n=49$) were postgraduate students. Most of the study participants (67.6%, $n=69$) focused on academic clinical careers and had ≤ 15 years experience (74.5%, $n=76$) (Table 1). Responses to each of the individual survey questions are presented in Table 2.

General perceptions

Biostatistics was believed to be a difficult subject by 57.8% ($n=59$). Respondents with >15 years experience ($p=0.017$) and faculty members were more likely to disagree ($p=0.033$). 49.8% ($n=51$) disagreed that biostatistics is more difficult than other subjects in dentistry; respondents from OMFS and diagnostic science department were more likely to agree than others ($p=0.037$). Most of the respondents (69.6%, $n=71$) believed that it would be helpful for them if the teachers/consultant biostatisticians whom they are consulting for statistical help have some knowledge of dentistry so that they could understand their needs. 86.2% ($n=88$) respondents agreed that knowing biostatistics will benefit their career and 57.9% ($n=59$) agreed that biostatisticians have high status within the dental field.

Perceptions of knowledge and training

52% ($n=53$) of respondents reported that their training in biostatistics was adequate for their needs. 37.2% ($n=38$) felt that their current level of training in biostatistics in dentistry is adequate and postgraduates were more likely to agree than faculty members ($p=0.001$). 50% ($n=51$) thought their previous biostatistics coursework had been taught effectively and females were more likely to agree than males ($p=0.028$). A total of 52% ($n=53$) of respondents agreed that they could identify when correct statistical methods had been applied in a study, 41.5%

Table 1. Demographic data of the respondents.

Demographic	Number (%) of respondents
Gender	
Male	60 (58.8)
Female	42 (41.2)
Years of experience	
≤15 years	76 (74.5)
>15 years	26 (25.5)
Academic position	
Faculty member	53 (52.0)
Postgraduate student	49 (48.0)
Department	
OMFS and diagnostic sciences	17 (16.7)
Preventive dentistry	36 (35.3)
Prosthodontics	17 (16.7)
Restorative dentistry	32 (31.4)
Career focus	
Clinical (academic)	69 (67.6)
Clinical (nonacademic)	19 (18.6)
Research	14 (13.7)

(n=46) of the respondents believed they could design their own research projects with confidence, and only 28.4% (n=29) respondents were confident that they can conduct their own statistical analyses with confidence. Females, respondents with ≤15 years of experience, faculty members, respondents from preventive dentistry and restorative dentistry department, and clinical academic career focused respondents were more confident in conducting their own statistical analysis and design their own research projects in comparison to others. None of the knowledge perception questions were statistically significant by gender, years of experience, academic position, department, or career focus ($p>0.05$) (Table 3).

Perceptions of biostatistics and research

95.1% (n=97) of respondents agreed that biostatistics should be an integral part of research. Majority of the respondents (73.5%, n=75) thought that a biostatistician should be centrally involved in most research. A total of 93.2% (n=94) of respondents agreed that knowledge of biostatistics is necessary for a clinician involved in research. Opinion was less strong regarding the necessity of biostatistical knowledge for clinicians not

involved in research (45.1%, n=46).

Perceptions of biostatistics and evidence based dentistry

Questions concerning perceptions of biostatistics and its relationship to EBD revealed that 93.2% (n=95) of respondents believed that biostatistics is an important part of EBD and 95.1% (n=97) believed that knowledge of biostatistics is necessary when evaluating dental literature. Majority of the respondents (93.1%, n=95) thought that EBD is important for clinical practice.

DISCUSSION

The results of our study showed significantly lower response rate of postgraduate students in comparison with the faculty members. Majority of the respondents focused on academic clinical career. Approximately half the respondents believed that biostatistics is a difficult subject and more difficult than other subjects in dentistry. Majority agreed that knowing biostatistics will benefit their career. Half the respondents reported that their training in biostatistics was adequate for their needs and that their

Table 2. Response regarding dental professionals' attitude towards biostatistics.

Question	Number (%)					Median (1-5)
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	
General perceptions						
Biostatistics is a difficult subject	13 (12.7)	46 (45.1)	17 (16.7)	23 (22.5)	5 (2.9)	2
Biostatistics is more difficult than any other subject in dental training	6 (5.9)	29 (28.4)	16 (15.7)	41 (40.0)	10 (9.8)	3.5
Biostatistics would be more helpful for teachers and consultants if they understood dentistry	31 (30.4)	40 (39.2)	17 (16.7)	12 (11.8)	2 (2.0)	2
Within the dental field, biostatisticians have high status	22 (21.6)	37 (36.3)	29 (28.4)	11 (10.8)	3 (2.9)	2
It would benefit my career to better understand biostatistics	44 (43.1)	44 (43.1)	7 (6.9)	6 (5.9)	1 (1.0)	2
Perceptions of knowledge and training						
My training in biostatistics is adequate for my needs	17 (16.7)	36 (35.3)	22 (21.6)	27 (26.5)	0 (0)	2
The current level of training in biostatistics in dentistry is adequate	9 (8.8)	29 (28.4)	27 (26.5)	32 (31.4)	5 (4.9)	3
My previous biostatistics course work was taught effectively	17 (16.7)	34 (33.3)	25 (24.5)	21 (20.6)	5 (4.9)	2.5
I am able to tell when the correct statistical method has been applied in my study	12 (11.8)	41 (40.2)	30 (29.4)	16 (15.7)	3 (2.9)	2
I am able to design my own research projects with confidence	15 (14.7)	31 (30.4)	31 (30.4)	18 (17.6)	7 (6.9)	3
I am able to conduct my own statistical analyses with confidence	9 (8.8)	20 (19.6)	41 (40.2)	23 (22.5)	9 (8.8)	3
Perceptions of biostatistics and research						
Biostatistics should be an integral part of most research	56 (54.9)	41 (40.2)	4 (3.9)	1 (1.0)	0 (0)	1
Biostatistics is a necessary skill for a clinician involved in research	52 (51)	43 (42.2)	6 (5.9)	1 (1.0)	0 (0)	1
Biostatistics is a necessary skill for a clinician not involved in research	16 (15.7)	30 (29.4)	31 (30.4)	19 (18.6)	6 (5.9)	3
Biostatisticians are not necessary for most research	5 (4.9)	7 (6.9)	15 (14.7)	36 (35.3)	39 (38.2)	4
Perceptions of biostatistics and evidence based dentistry						
Biostatistics is an important part of evidence based dentistry	68 (66.7)	27 (26.5)	5 (4.9)	1 (1.0)	1 (1.0)	1
Knowledge of biostatistics is necessary when evaluating dental literature	60 (58.8)	37 (36.3)	4 (3.9)	1 (1.0)	0 (0)	1
Evidence based dentistry is important for clinical practice	60 (58.8)	35 (34.3)	6 (5.9)	1 (1.0)	0 (0)	1

previous biostatistics coursework had been taught effectively. However, only just over a quarter of respondents were confident of conducting statistical analysis on their own. Majority agreed that biostatistics should be an integral part of

research and knowledge of biostatistics is necessary for a clinician involved in research and had a positive attitude towards perceptions of biostatistics and EBD.

Most of the respondents in this study believed

biostatistics to be a difficult subject similar to the findings of the previous studies (Hannigan et al., 2014; Kumar et al., 2014; Zhang et al., 2012). However, majority disagreed that it is more difficult than any other subject in dental training.

Table 3. Analysis of perception of knowledge by gender, years of experience, academic position, department, and career focus.

Variable	Respondents who agree or strongly agree, Number (%)					
	I am able to tell when the correct statistical method has been applied in my study	p-value	I am able to design my own research projects with confidence	p-value	I am able to conduct my own statistical analyses with confidence	p-value
Gender						
Male	30 (50.0)	0.641	27 (45.0)	0.923	15 (25.0)	0.279
Female	23 (54.8)		19 (45.2)		14 (33.3)	
Years of experience						
≤15 years	41 (53.9)	0.758	37 (48.7)	0.432	23 (30.3)	0.776
More than 15 years	12 (46.2%)		9 (34.6)		6 (23.1)	
Academic position						
Faculty	27 (50.9)	0.799	29 (54.7)	0.083	16 (30.2)	0.915
Postgraduate student	26 (53.1)		17 (34.7)		13 (26.5)	
Department						
OMFS and diagnostic sciences	9 (52.9)	0.369	7 (41.2)	0.773	4 (23.5)	0.537
Preventive dentistry	21 (58.3)		17 (47.2)		12 (33.3)	
Prosthodontics	5 (29.4)		6 (35.3)		3 (17.6)	
Restorative dentistry	18 (56.3)		16 (50.0)		10 (31.3)	
Career focus						
Clinical (academic)	38 (55.1)	0.711	32 (46.4)	0.987	20 (29.0)	0.221
Clinical (nonacademic)	10 (52.6)		8 (42.1)		4 (21.1)	
Research and others	5 (35.7)		6 (42.9)		5 (35.7)	

Respondents in the current study reported a neutral to positive attitude on questions related to knowledge and training in biostatistics. This could be due to the extensive research activities among faculty members and postgraduates in RCSDP. Although this finding differed from the studies in India and United States (Batra et al., 2014; West and Ficalora, 2007) which reported a negative

attitude; the finding from the present study indicates that the commonly held belief that dental professionals have negative attitudes toward statistics may in fact not be true. Interestingly, more females than males in this study reported that they are confident in conducting their own statistical analysis. A meta-analysis of recent studies of gender and mathematics performance

reported that females have reached parity with males (Lindberg et al., 2010).

An improved understanding of biostatistics is necessary for dental professionals. The current study shows that there is lack of command over the subject of biostatistics among dental professionals in agreement with the past studies (Polychronopoulou et al., 2011; Windish et al.,

2007). However, they were aware of its importance in dentistry and reported a neutral to positive attitude. The fact that only 28.4% respondents were confident that they could conduct their own statistical analyses with confidence suggests that there is a need for changing the training pattern of biostatistics for dental professionals which would make them confident enough to apply biostatistics in their clinical practice. Biostatistics is perceived as an important element of EBD and successful efforts to teach biostatistics may benefit from incorporating biostatistical concepts into EBD teaching.

Results from this study could be affected by response bias as the demographic data was not available for non-respondents. Another limitation was that the survey has been limited to a single private dental institution in KSA, so it cannot be generalized as there would be variations in responses of government institutions. Moreover, the responses reported in this study are best interpreted as perceptions of the respondents based on their own definition of biostatistics. The survey was also brief, thus limiting the ability to assess understanding of all biostatistical concepts. Further research should consider developing and testing interventions to develop positive attitude towards biostatistics and to identify effective methods that will transform their perceptions towards the subject. Qualitative study will be more informative and accurate in understanding the attitude of dental professionals towards biostatistics.

Conflict of Interest

The authors have not declared any conflict of interest.

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Abbreviations: EBD, Evidence based dentistry; RCsDP, Riyadh Colleges of Dentistry and Pharmacy; KSA, Kingdom of Saudi Arabia.

REFERENCES

- Batra M, Gupta M, Dany SS, Rajput P (2014). Perception of dental professionals towards biostatistics. *Int. Sch. Res. Notice.* 2014(2014): 291807.
- Evans B (2007). Students attitudes, conceptions, and achievement in introductory undergraduate college statistics. *Math. Educ.* 17(2):24-30.
- Hannigan A, Hegarty AC, McGrath D (2014). Attitudes towards statistics of graduate entry medical students: the role of prior learning experiences. *BMC Med. Educ.* 14(1):70.
- Kumar L, Shahnawaz K, Choudhary SK, Sarker G, Barman SK, Singh JB (2014). Attitudes toward biostatistics among postgraduate medical students in Kishanganj, Bihar. *J. Evol. Med. Dent. Sci.* 3(3):758-761.
- Lindberg SM, Hyde JS, Petersen JL, Linn MC (2010). New Trends in Gender and Mathematics Performance: A Meta-Analysis. *Psychol. Bull.* 136(6):1123-1135.
- Pimenta R, Faria M, Pereira I, Costa E, Vieira M (2010). Comparison of attitudes towards statistics in graduate and undergraduate health sciences' students. In: Reading C (Ed.), *Data and context in statistics education: Towards an evidence-based society. Proceedings of the Eighth International Conference on Teaching Statistics (ICOTS8, July, 2010), Ljubljana, Slovenia.*
- Polychronopoulou A, Eliades T, Taoufik K, Papadopoulos MA, Athanasiou E (2011). Knowledge of European orthodontic postgraduate students on biostatistics. *Eur. J. Orthod.* 33(4):434-440.
- Wadhwa M, Kalyan P, Kalantharakath T (2015). Knowledge and attitude of medical and dental postgraduate students towards practice of biostatistics. *J. Postgrad. Med. Educ. Res.* 49(1):1-4.
- West CP, Ficalora RD (2007). Clinician attitudes toward biostatistics. *Mayo Clin. Proc.* 82(8):939-943.
- Williams A, Bower E, Newton J (2004). Research in primary dental care Part 6: Data analysis. *Br. Dent. J.* 197(2):67-73.
- Windish DM, Hout SJ, Green ML (2007). Medical residents' understanding of the biostatistics and results in the medical literature. *J. Am. Med. Assoc.* 298(9):1010-1022.
- Zhang Y, Shang L, Wang R, Zhao Q, Li C, Xu Y, Su H (2012). Attitudes toward statistics in medical postgraduate: measuring, evaluating and monitoring. *BMC Med. Educ.* 12(1):117.



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