Dental Anxiety as Measured with the Dental Sub-Scale of Children Fear Survey Schedule Among School Girls in Al-Qassim, Saudi Arabia

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Abstract: this study aimed to gather some data about the prevalence of dental anxiety and how age level, socioeconomic status, frequency of dental visits, and experience with fillings relate to dental anxiety among school girls in Al-Qassim region, Saudi Arabia. The parents of 890 school girls 6 to 15 years of age completed a questionnaire which consisted of the Arabic version of the children's fear survey schedule dental subscale (CFSS-DS) on behalf of their girls. Socio-demographic data including socioeconomic status, previous dental visits and previous fillings were also recorded. Total CFSS-DS scores were calculated and the relationship between socio-demographic variables and anxiety level was determined. The CFSS-DS mean total score was 33.64 and the percentage of girls who were highly anxious was 30.48%. The top three anxiety provoking items were "choking" "having a stranger touch you" and "the dentist drilling". Older girls (10-15 years) had significantly lower CFSS-DS scores than younger girls (6-9 years) (P<0.05), and there was no statistically significant association between socioeconomic status, previous dental visits, or previous fillings and dental anxiety (P>0.05). Dental anxiety decreased significantly with increasing age in this Saudi subpopulation of girls.

1. Introduction

Dental anxiety is a common problem that develops mostly in childhood and adolescence. (Porritt et al., 2013) The term often refers to a general, and often anticipatory, state of apprehension, (Gustafsson et al., 2010) and it is often used to include all different types of dental fear in the dental literature. (Porritt et al., 2013) Dental anxiety is associated with psychological and dental health consequences. The psychological consequences include lower use of dental care services, treatment avoidance, and uncooperative behavior during consultation, while the dental health consequences include more untreated caries, a worse periodontal condition, and a higher number and probability of missing teeth in anxious children. (Carrillo-Diaz et al., 2012) Therefore, it is essential to identify anxious children at the earliest age possible rather than simply deal with them later. It is also important that the prevalence of dental anxiety, and its impact in a population, is established and monitored. (Porritt et al., 2013) The reported prevalence of dental anxiety among children represents a wide range in the dental literature (5.7–19.5%) and varies because of different study designs, populations, cultures, measures,

informants, and age group studied. (Gustafsson et al., 2010; Ma et al., 2015).

One of the broad methods which were used to assess the level of dental anxiety in children is the use of scales completed by either the child (self-report scales) or the parent (parental scales). (Gustafsson et al., 2010) These scales not only assess the anxiety level of the child, they also try to find concomitant or predictive factors associated with the anxious behavior. It might be hypothesized that the actual treatment can be improved when the dentist has more information on the level of a child's dental anxiety and factors possibly associated with its occurrence. (Klaassen et al., 2003) Examples of these scales from the dental literature include the children's fear survey schedule dental subscale (CFSS-DS), Dental Fear scale (DFS), Dental Anxiety Scale (DAS), Modified Dental Anxiety Scale (MDAS), and the Venham Picture Test (VPT). (Klingberg and Broberg, 2007) Among these scales the CFSS-DS was the most popular. It has been shown to cover more aspects of the dental situation and measure dental anxiety more precisely than other scales. The CFSS-DS has been studied in several countries and translated into several languages. (Chellappah et al., 1990; Alvesalo, et al.,

1993; Ten Berge et al., 2002; Wogelius et al., 2003; Nakai et al., 2005; Lee et al., 2007; Arapostathis et al., 2008; Boman et al., 2008; Ma et al., 2015) The results of these studies showed that the CFSS-DS exhibits good internal and test–retest reliability in English as well as in several other languages. (Ma et al., 2015) The CFSS-DS requires children to rate how frightened they are in response to 15 dental-related situations. (Porritt et al., 2013) Using parental ratings, scores equal to or exceeding 37, 38 or 39 have been reported as cut-offs for dental anxiety , while for self-ratings, 37 and 42 have been used. (Gustafsson et al., 2010) Studies have reported high dental anxiety scores in Asian and American populations, (Cuthbert and Melamed, 1982; Chellappah et al., 1990) decreasing scores as age increased, (Cuthbert and Melamed 1982; Klingberg et al., 1994; Wogelius et al., 2003) and higher CFSS-DS scores mostly among girls. (Chellappah et al., 1990) In Saudi Arabia, the Arabic version of the CFSS-DS was assessed in a clinic based sample in Jeddah and it has shown high internal consistency and test-retest reliability. (El-Housseiny et al., 2014a; El-Housseiny et al., 2014b).

This study was intended to begin providing a database on the prevalence of dental anxiety among Saudi population in Al-Qassim region. This study also attempts to determine how age level, socioeconomic status, frequency of dental visits, and experience with dental treatment (fillings) relate to dental anxiety in a relatively wide age range (6–15 years) of school girls in Al-Qassim region, Saudi Arabia.

2. Material and Methods

This cross sectional study was conducted among healthy Saudi Arabian school girls 6 to 15 years old from 10 different public schools in Al-Qassim region (normal girls with no organic, physiologic, biochemical, psychiatric, mental, or communication disorders). A convenience sample of 1200 school girls in grades 1 through 6 in 6 primary schools and grades 7 through 10 in 4 junior high schools were surveyed over a period of 6 months (August 2014 -February 2015). The Ethics Committee of Qassim University approved the study.

Self-administered questionnaire which consisted of two parts was distributed to the girls. The first part requested socio-demographic information of the girls including age, socioeconomic status (high, middle, or low), previous visit to a dentist (Yes/ No), and previous fillings (Yes/No). The socioeconomic status of the girls was determined using two parameters: the annual family income and the level of education of both parents, and was divided into three classes in a slightly modified manner from that used by a previous author to accommodate the difference in family income in Saudi Arabia; (Al-Jundi, 2006) high class:

where one or both parents had at least 16 years of education, and a yearly family income no less than 48 thousand US dollars. Low socioeconomic class: where both parents had <10 years of education, and a yearly family income less than 16 thousand US dollars. Middle class: where one or both parents had more than 12 years of education, with a yearly family income between 16 and 48 thousand US dollars. The second part of the questionnaire consisted of the CFSS-DS. Since younger girls are unable to complete both parts of the questionnaire on their own and to enable comparisons between different age levels, it was decided to use the parent's version of the CFSS-DS. The same Arabic version of the CFSS-DS which was used in Jeddah, (El-Housseiny et al., 2014a; El-Housseiny et al., 2014b) and which has proven to be valid and reliable was used in this study. A five-point scale ranging from 1 (not afraid), 2 (a little afraid), 3 (fairly afraid), 4 (quite afraid) to 5 (very afraid) was used to rate the level of anxiety for each of the 15 items. Total scores ranged from 15 to 75. The questionnaire included a cover letter to inform the parents about the purpose of the study and a consent form which all parents signed. The Arabic version of the CFSS-DS was translated into English and both Arabic and English versions were compared to confirm that they matched. The first part of the questionnaire which requested socio-demographic information was also translated into Arabic by a native speaker to ensure that all questions were well understood by parents and then back translated into English and matching of both versions was confirmed.

Data from the questionnaires were recorded on a computer, and statistical analyses were performed by the SPSS computer software 20 (IBM, Armonk, NY, USA). Simple descriptive statistics (distribution of frequencies) were calculated for the girls with regards to each socio-demographic variable assessed which included socioeconomic status, previous dental visits, and previous fillings. In addition, descriptive statistics (mean, and SD) were calculated to analyze the results of the CFSS-DS. One-way anova and tukey post hoc tests were performed to test for differences in mean scores for each item in the CFSS-DS and for the total score among the different age levels. Simple descriptive statistics (distribution of frequencies) were calculated to estimate the percentage of girls who were highly anxious, and chi-square test was performed to test for differences between the different age levels. Chi square test was also used to determine the relationship between socioeconomic status, previous dental visits, previous fillings and the level of anxiety. A cut point of $p < 0.05$ was considered statistically significant.

3. Results

Data was obtained for 890 school girls whose questionnaires were complete. Three hundred and ten questionnaires were excluded from the study because answers to some of the CFSS-DS items were missing, which gives a response rate of 74.1%. Table 1 shows

the socio-demographic data for the girls. Almost half of the girls were from the middle socioeconomic class. In addition, the majority of the girls had visited the clinic previously; however, not all the dental visits included fillings as only half of the girls had fillings.

Table 1. The socio-demographic data for the girls

Characteristic	N (%)			
	6-9 years	10-12 years	13-15 years	Total population
Socioeconomic status: High Middle Low	78 (27.6) 145 (51.2) 60 (21.2)	79 (25.7) 149 (48.5) 79 (25.7)	98 (32.8) 126 (42.1) 75 (25.1)	255 (28.7) 420 (47.2) 214 (24.1)
Previous dental visits: Yes No	212 (74.9) 71 (25.1)	264 (86) 43 (14)	263 (88) 36 (12)	739 (83.1) 150 (16.9)
Previous fillings: Yes No	128 (45.2) 155 (54.8)	151 (49.2) 156 (50.8)	141 (47.2) 158 (52.8)	420 (47.2) 469 (52.8)

Table 2 demonstrates the descriptive statistics (mean, and SD) for each of the 15 CFSS-DS items and the ranking of the CFSS-DS items from the most anxiety provoking to the least anxiety provoking according to the mean score. The highest scores and the most anxiety provoking items for the girls were found on the items "choking", "having a stranger touch you", and "the dentist drilling". Surprisingly, the CFSS-DS item "injections" ranked fifth among the most anxiety provoking items preceded by the item "having somebody put instruments in your mouth". Older age levels (10-12, and 13-15 years) had less CFSS-DS scores than the youngest age level (6-9 years) in all of the items; however, anova and tukey post hoc tests revealed that the scores of older age levels were significantly lower in the following items: "doctors", "injections", "having somebody examine your mouth", "the noise of the dentist drilling", "having somebody put instruments in your mouth", "having to go to the hospital", and "having the nurse clean your teeth".

The eldest age level (13-15 years) had significantly lower scores than the middle age level (10-12 years) with respect to the following items "injections" and " having somebody examine your mouth" (P<0.05). Table 3 shows the descriptive statistics (mean and SD) of the total CFSS-DS score

for the girls where a higher score represented greater anxiety. The mean total score for the total population of girls was 33.64 (SD=10.33). Anova and tukey post hoc tests revealed significant main effect of age level on the total CFSS-DS score; as the total CFSS-DS score decreased significantly with increasing the age level. On the other hand, chi square test revealed no statistical association between the CFSS-DS total score and the socioeconomic status (P=0.178), previous dental visits (P=0.151), or previous fillings (P=0.266). To estimate the percentage of girls who were highly anxious, the girls were further divided into three subgroups according to the total CFSS-DS score; the first one comprised non-anxious girls with scores from 15 to 31 points, the second one comprised girls who are in the borderline between non anxious and highly anxious girls with scores from 32 to 37 and the third one comprised highly anxious girls with scores of 38 or more. The number and percentage of highly anxious girls who scored 38 or more among the total population of girls and 6-9, 10-12, and 13-15 year-age- levels was 271 (30.5%), 107 (37.81%), 75 (24.43%), and 73 (24.41%) respectively. In addition, chi square test revealed statistically significant differences between the age levels (P<0.05) (see Table 4).

Table 2. Mean CFSS-DS scores for each item

Item	6-9 years	10-12 years	13-15 years	Total population	Rank
1	2.16±1.22	1.97±1.14	1.98±1.09	2.04±1.15	9
2	1.69±0.98	1.48±0.81*	1.65±0.89	1.60±0.90	13
3	2.83±1.43	2.52±1.45*	2.24±1.28***	2.52±1.41	5
4	1.64±0.99	1.60±0.91*	1.43±0.76*	1.56±0.89	14
5	1.67±1.05	1.62±0.90	1.53±0.81	1.61±0.92	12
6	3.37±1.32	3.29±1.45	3.20±1.38	3.29±1.39	2
7	2.39±1.26	2.33±1.33	2.15±1.28	2.29±1.30	8
8	3.05±1.38	2.90±1.39	2.81±1.39	2.92±1.39	3
9	2.58±1.45	2.47±1.38	2.35±1.32	2.46±1.39	6
10	2.60±1.41	2.32±1.33*	2.27±1.31**	2.39±1.36	7
11	2.84±1.3	2.51±1.27**	2.39±1.24***	2.58±1.28	4
12	3.75±1.24	3.69±1.37	3.57±1.28	3.67±1.3	1
13	1.82±1.13	1.50±0.85***	1.58±0.94*	1.63±0.99	11
14	1.32±0.79	1.23±0.72	1.20±0.61	1.25±0.712	15
15	2.13±1.26	1.78±1.07***	1.66±0.94***	1.85±1.11	10

Results are expressed as mean ± SD
* P<0.05, ** P< 0.01, *** P<0.001 compared to the youngest age level (6-9 years)

Table 3. Total CFSS-DS scores for the girls

Age Level (years)	N (%)	Total score
6-9	283 (31.83)	35.84±12.03
10-12	307 (34.53)	33.21± 9.72**
13-15	299 (33.63)	32.01±8.75 ***
Total population	889 (100)	33.64±10.33

Results are expressed as mean ± SD
** P< 0.01, *** P<0.001 compared to the youngest age level (6-9 years)

Table 4. Number and percentage of girls after subgrouping the total CFSS-DS score into categories

Age Level (years)	N. (%)			
	<32	32-37	≥38	Total
6-9	120 (42.4)	56 (19.79)	107 (37.81)	283
10-12	148 (48.2)	68 (22.15)	75 (24.43)	307
13-15	151 (50.5)	75 (25.08)	73 (24.41)	299
Total population	419 (47.13)	199 (22.38)	271 (30.48)	889

4. Discussion

In this study, the mean total score of the girls was 33.64, falling in the range reported by previous studies (22.1-35.7). (Cuthbert and Melamed, 1982; Chellappah et al., 1990; Alvesalo, et al., 1993; Milgrom et al., 1994; Klingberg et al., 1994; Nakai et al., 2005; Wogelius et al., 2008; Arapostathis et al, 2008) However, the mean CFSS-DS score of girls in this study exceeded the mean CFSS-DS score among girls reported in another city in Saudi Arabia (Jeddah) which was 23.0, (El-Housseiny et al., 2014a) this suggests that Saudi girls in Al-Qassim region experience more dental anxiety than children in Jeddah and many other countries; however, it is difficult to make firm comparisons given the differences between samples in terms of age ranges,

selection of the children in the sample (school versus dental clinic versus representative population sample), and other factors. For example, when compared to the study in Jeddah, this study assessed the dental anxiety level in the school setting and Saudi girls were only studied, whereas in Jeddah the anxiety level was assessed among boys and girls in a clinic setting and more than half of the children were from other nationalities than Saudi.

The most anxiety provoking items in this study were choking, having a stranger touch you, and the dentist drilling which is in agreement with previous authors. (Nakai et al., 2005) Choking, injections, and drilling have been found to be among the most anxiety provoking items in studies in other cultures. (Chellappah et al., 1990; Alvesalo et al., 1993;

Klingberg et al., 1994; Ten Berge et al., 2002; Wogelius et al., 2003) This generally indicates that these specific dental concerns of children appear to be constant across cultures even if the overall level of anxiety varies by culture. In the study in Jeddah, injections, the dentist drilling, choking, and having a stranger touch you were the most anxiety provoking items in a descending order and girls had higher scores than boys in these items. (El-Housseiny et al., 2014a) Although the order of the items is slightly different in this study but overall, the items are the same. The reason behind having injections in the fifth rank in this study can be explained by the fact that the majority of the girls had visited the dentist previously; having previous visits to pediatric dentists generally contributes to minimizing the anxiety level from injections since pediatric dentists do not allow the child to see the injection syringe. In addition, they use distraction and substituted words, such as 'sleepy juice', when administering dental anesthesia to children to keep them from realizing they are receiving an injection. Even if the previous visits were to general dentists, general dentists may not regularly use local anesthesia during restoration, or may only use hand instruments, when treating children as reported by some authors. (Klingberg et al., 1995).

This study found significant effect of age on dental anxiety level; older girls (10-15 years of age) had significantly lower mean CFSS-DS score than younger girls (6-9 years of age), which is in agreement with previous authors. (Cuthbert and Melamed, 1982; Klingberg et al., 1994; Wogelius et al., 2003) In addition, this study calculated the percentage of anxious girls in the total population and in each age level after subdividing the total CFSS-DS score into 3 categories, the girls whose total score was 38 or more were considered highly anxious (30.48% of the total population) which is in agreement with previous authors who suggested that CFSS-DS scores of 38 and higher represent high dental anxiety in children; the one likely to interfere with dental treatment. (Klingberg et al., 1994; Wogelius et al., 2003). In addition, when the percentages of highly anxious girls were compared between the different age levels, significant differences were observed between younger girls (6-9 years of age) and older girls (10-12 and 13-15 years of age) (37.81% vs. 24.43% and 24.41% respectively) (P< 0.05). In this study, a borderline area for dental anxiety was set at scores between 32 and 37, which is also in agreement with previous authors. (Ten Berge et al., 2002) Girls scoring in this range (22.38% of the total population) also suffer from some degree of dental anxiety or may be at risk for developing high dental anxiety, therefore, this group of girls also needs extra attention and guidance to prevent the development of high

dental anxiety. The percentage of highly anxious girls in this study is close to the percentages reported in Riyadh, (Al-Madi and Abdel Latif, 2002) and Jeddah (Alaki et al., 2012) in Saudi Arabia which were 29% and 30.7% in Riyadh and Jeddah, respectively. The percentages reported in Saudi Arabia were generally higher than the percentage reported in Jordan (10%) which is an Arabic country, (Taani et al., 2005) they were also higher than the percentages reported for highly anxious children in earlier studies which ranged from 5.7-19.5%. (Chellappah et al., 1990; Klingberg et al., 1994; Ten Berge et al., 2002; Wogelius et al., 2003) This further emphasizes that Saudi girls in Al-Qassim region experience high dental anxiety among Arabs and many other non-Arab countries.

When the relationship between socioeconomic status, previous dental visits, previous fillings and dental anxiety was assessed in this study, the results indicated that there was no statistically significant relationship. This replicates some earlier findings, (Folayan et al., 2003; Rantavuori et al., 2009) and negates others. Some authors found children from upper socio-economic homes to be better behaved during dental procedures. (Wright and Alpern, 1971) They also found that higher frequency of dental visits was associated with less dental anxiety, (Carrillo-Diaz et al., 2012) and that children with fillings are less anxious than those who have not experienced any dental treatment. (Nicolas et al., 2010) On the contrary, one study found that there was no association between socioeconomic status and level of dental anxiety in Nigerian children. (Folayan et al., 2005) Another study found that treatments experienced in previous years were only weak predictors of dental anxiety. (Rantavuori et al., 2009) Few studies also found no association between fillings and child dental anxiety. (Karjalainen et al., 2003) Therefore, it seems that research results are still inconclusive with regards to the association of socioeconomic status, previous dental visits and previous fillings with dental anxiety in children. Research results seem clearer with regards to the effects of dental extractions on dental anxiety, as most reports has identified exposure to this treatment as a predictor of dental anxiety in children, (Karjalainen et al., 2003) a factor which was not assessed in this study.

It is worth-mentioning that this study had few limitations which necessitate careful interpretation of the results; one of which is that it focused on assessing the dental anxiety level among Saudi school girls in Al-Qassim region since girls were reported by many studies to have higher anxiety levels than boys. (Chellappah et al., 1990; Ten Berge et al., 2002; Nakai et al., 2005). This study also used the parent's

version of the CFSS-DS, unfortunately parents may overestimate the level of anxiety among their children according to recent studies. (El-Housseiny et al., 2015) In view of these limitations, further studies are required to measure whether there is an association between gender and dental anxiety in Al-Qassim region or not. These studies should focus on interviewing younger children and allowing older children complete the questionnaire on their own without parental help.

5. Conclusions

Dental anxiety was affected by age level in this Saudi subpopulation of girls. The most anxiety provoking items in this study were choking, having a stranger touch you, and the dentist drilling. Socioeconomic status, previous dental visits or previous fillings were not important associated factors in the development of dental anxiety.

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