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Dental anxiety in children and its relationship to dental caries and gingival condition

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Taani DQ, El-Qaderi SS, Abu Alhaija ESJ: Dental anxiety in children and its relationship to dental caries and gingival condition

Abstract: The aim of this study was to determine the levels of dental anxiety, dental caries and gingivitis among 12–15-year-old schoolchildren, in Irbid Governorate/northern Jordan, and to evaluate the correlation between these variables. Two schools were selected by a simple random method from each of the five geographic areas in Irbid Governorate. All children (1021), from the 10 selected schools, who participated in this study completed a questionnaire modified from Kleinknecht's Dental Fear Survey (DFS questionnaire). Children underwent oral examination for dental caries and gingival condition, using Decayed, Missing and Filled Teeth (DMFT) Index and Löe and Silness Gingival Index (GI), respectively. Results of this survey showed that the prevalence of low to moderate 'general dental fear' among the study population was 43% while that of 'high dental fear' was 10%. The self-reported 'general fear of dental treatment' was higher among girls than boys. Fear of specific stimuli (pain) was the most common source of dental fear. The sight and sensation of the anaesthetic needle and the sight, sound and sensation of the drill were rated the most fear-eliciting stimuli. The mean DMFT (2.89) and GI (1.80) of boys was not significantly different from the DMFT (3.37) and GI (1.53) of girls ($P > 0.05$). Spearman's correlation test demonstrated no association between 'general dental fear' and dental caries ($r = 0.06$) or gingivitis ($r = 0.007$).

Key words: children; dental anxiety; dental caries; gingival condition

Introduction

Dental anxiety and fear of dental treatment in children has been recognized in many countries as a public health dilemma (1). Such a condition may lead to neglect of dental care and,

therefore, represents a problem to both dentists and patients alike (2). In a study of Finnish children with high rates of utilization of dental services, it was observed that 15% of the Finnish children surveyed did not seek care because of fear of dental treatment (3). Similarly, many investigators have reported fear about dental treatment in children (4–6) that may result in management difficulties (7). It has been reported that children with active caries are more fearful than other children, presumably because they have had negative treatment experience (8). A study of Finnish schoolchildren demonstrated that boys with a DMFT score of ≥1 had a significantly higher mean dental fear than those who were caries free (1). Moreover, when DMFT was used as an index of dental treatment experience, individuals with a DMFT score of ≥1 at the age of 15 years were five times as likely to be dentally fearful at age 18 years when compared with those with a DMFT score of 0 (9). A study of children aged 5–11 years by Milgrom *et al.* (10), suggested that conditioning is an important contributor to dental fear in childhood and adolescence. There are no previous studies of dental fear among children in Jordan. Furthermore, as studies of dental anxiety in relation to oral health care and oral health condition are scarce, the aims of this cross-sectional study were to:

1 Evaluate the level of dental fear among 12–15-year-old schoolchildren in northern Jordan.

2 Describe the gender distribution of dentally anxious schoolchildren according to the perceived sources of fear.

3 Assess the prevalence of dental caries and gingivitis in the children and correlate it to dental fear.

Methods

Sample

A total of 1021 children in grades 6, 7 and 8 in 10 representative schools in northern Jordan, were surveyed. These children were selected from the list which was obtained from the 'Directorate of Education' in Irbid Governorate. For the purpose of the study, Irbid Governorate was subdivided into five geographic areas: these were Central (10 schools), Eastern (12 schools), Western (12 schools), Northern (12 schools) and Southern (12 schools). Two schools containing sixth to eighth grades were chosen by a simple random method in each geographic area.

Survey instruments

A 15-item questionnaire was modified from the Dental Fear Scale (DFS) of Klienknecht *et al.* (11) and used in this study. This questionnaire has a four-point scale (1, no fear or reaction to 4, great fear or reaction) and is composed of 15 items (situations such as making dental appointment, the sight of injection, feeling the drill, etc.) assessing the fear level elicited by various components of dentistry and an item related to overall rating of 'general fear of dentistry'. This questionnaire also contains items addressing the perceived source of fear, age, gender and other socio-demographic variables.

All schoolchildren were met in their classrooms by one of the authors to explain the purpose of the study and to clarify the questionnaire. All children present in classes on the day of data collection completed the questionnaire. The children were not permitted to confer or to consult with each other. In order to ensure content validity, the questionnaire was translated from English into the children's native language (Arabic) by one of the authors, pre-tested, and then back-translated to English by the other authors to ensure comparability with the original form. The questionnaire took 15–20 min to be completed.

Clinical examination

Following the completion of the questionnaire, the children were assessed for dental caries by visual examination using artificial light while sitting on a chair beside the window, utilizing the criteria and the dental examination procedures recommended by the World Health Organization (12). The Decayed, Missing and Filled Teeth (DMFT) Index was used. The gingival condition was evaluated by examining the gingivae related to the six indexed teeth, using Löe and Silness Gingival Index (GI) (13). Having completed the oral examination, 1021 completed questionnaire forms were recovered and compiled for statistical analysis. Twelve children were absent on the days of the study. Thus, the response rate was 98.8% (1021 of 1033 pupils).

Data analysis

The data were analysed using the Statistical Package for Social Sciences (SPSS, version 11). Descriptive analysis including the mean and standard deviations were computed for all items of dental fear, DMFT and GI. The scores of each of the responses to the 15 items of the questionnaire were summated to obtain an estimated value of dental anxiety, as dentally anxious subjects were defined as those with a DFS score of >1 (11). Furthermore, descriptive statistics including frequency distributions were used together with chi-square test and *t*-test was used to test differences between mean values of

independent samples. Pearson's correlation test was used to assess the association between dental fear and dental diseases as assessed by DMFT and GI. The chosen level of significance was set at $P \leq 0.05$.

Results

The mean age and gender distribution of the sample population (1021 children) are presented in Table 1. The mean age of boys (12.96 ± 0.83 years) and of girls (12.92 ± 0.78 years) was almost identical. The proportion of girls (55%) was slightly higher than that of boys (45%).

Table 2 shows the distribution, by sex, of the surveyed children according to their degree of 'general dental fear'. It was found that 42.9% of participating children had low to moderate dental fear while only 10% had high level of dental fear. The proportion of girls with a high level of dental fear was significantly higher than that of boys ($P < 0.001$).

The distribution of those children who reported dental fear according to the perceived source of fear is given in Table 3. The most common source of fear was fear of specific stimuli, as 63% of the surveyed children expected a painful dental procedure. About 12% of the children reported a fear of a catastrophe, while 13% had generalized fear. However, 5.7% of children reported fear of the dentist's comment about their oral hygiene, while only 3.9% did not trust the dentist. A statistically significant difference was noted between boys and girls with regard to the perceived fear of specific stimuli, fear of catastrophe and generalized fear (*P*-value: 0.00, 0.004, and 0.00, respectively; Table 3).

Table 1. **Frequency distribution of the study population by age and sex ($n = 1021$)**

Variables	Male	Female
Sex (%)	460 (45.05)	561 (54.94)
Mean age (years)	12.9 ± 0.83	12.9 ± 0.78

Table 2. **Distribution of the study population by gender according to their degree of 'general dental fear': no fear, low to moderate fear, and high fear**

Degree of fear	All subjects	Male	Female	*P*-value
No fear (%)	480 (47.0)	242 (52.7)	238 (42.4)	0.001
Low to moderate fear (%)	439 (42.9)	192 (41.8)	247 (44.0)	0.501
High fear (%)	102 (10.0)	26 (5.7)	76 (13.5)	0.000

Table 3. **Distribution of the surveyed children according to the perceived origin or sources of fear resulting from adverse reaction to dentistry ($n = 1021$)**

Variables	All subjects	Male	Female	*P*-value
Fear of specific stimuli (%)	643 (63.0)	289 (62.8)	354 (63.1)	0.00
Fear of catastrophe (%)	121 (11.9)	69 (15.0)	52 (9.3)	0.004
Distrust of dentist (%)	40 (3.9)	15 (3.3)	25 (4.5)	0.327
Generalized fear (%)	133 (13.0)	36 (7.8)	97 (17.3)	0.000
Fear of reprimand (by the dentist) (%)	58 (5.7)	28 (61.1)	30 (5.3)	0.611

The overall mean values of responses to 'fearfulness of stimuli' are shown in Table 4. Of the several stimuli that were assessed in both boys and girls, the highest fear ratings were given to the sight and sensation of the needle and the sight, sound and feeling of the drill (items 8–12, Table 4). The next fear-inducing stimuli involved item 4 (sitting on the dental chair). Generally, girls tended to have higher mean values than boys, rating them more fearful than boys. Such variation of dental fear among boys and girls was statistically significant for all items except for items 2 and 3 (when approaching the dental office or sitting in the waiting area) (Table 4).

General dental fear as related to the mean DMFT and GI is presented in Table 5. When the self-reported 'general fear of dental treatment' among these pupils was measured, we found girls to be more anxious than boys ($P < 0.01$). The mean DMFT score for boys (2.89 ± 4.24) was not significantly different from that of girls (3.37 ± 4.37) ($P > 0.05$). The mean GI score for boys (1.80 ± 0.6) was also not significantly different from that of girls (1.53 ± 0.68) ($P > 0.05$). Spearman's correlation test showed almost no obvious association or correlation between general dental fear and DMFT ($r = 0.06$) on the one hand, and between general dental fear and GI scores ($r = 0.007$) on the other.

Discussion

Dental fear or anxiety may be described as a subjective state of feeling or reaction to a known source of danger which lies in the subconscious mind (14). The most commonly reported source of fear in the present study was 'fear of specific stimuli' mainly pain, while other categories such as fear of catastrophe, fear of reprimand for neglect of oral hygiene and generalized fear cause less concern to the surveyed children. Such fear of pain may be a major obstacle to seeking dental care (15) and appears to be strongly associated with extreme deterioration of oral and dental health (16). The finding that painful dental experiences and expectations of trauma were identified as the major sources of adverse reactions to dentistry in other reports (11, 17) is consistent with our results. About 43% of children had low to moderate 'general dental fear'. The prevalence of high dental fear (10%) which is observed in our survey was

Table 4. **Mean and standard deviations (SD) of the first 14 items of the 'dental fear score' as expressed by children in form of 'score of fear' by gender**

Suggested source of fear	Total	Male	Female	*P*-value
1. Making an appointment	1.84 ± 0.97	1.55 ± 0.77	2.08 ± 1.04	0.000
2. Approaching the dental office	1.78 ± 0.92	1.60 ± 0.82	1.93 ± 0.97	0.06
3. Sitting in the waiting area	1.92 ± 0.97	1.78 ± 0.91	2.04 ± 0.99	0.456
4. Being seated in the dental chair	2.31 ± 1.11	2.08 ± 1.04	2.50 ± 1.12	0.000
5. Smell of the dental office	1.82 ± 0.96	1.63 ± 0.87	1.97 ± 1.00	0.004
6. Seeing the dentist walk in	2.01 ± 1.07	1.76 ± 0.93	2.22 ± 1.14	0.000
7. Having oral examination	2.11 ± 1.07	1.91 ± 0.98	2.28 ± 1.12	0.000
8. Seeing the injection needle	3.04 ± 1.10	2.76 ± 1.13	3.27 ± 1.01	0.000
9. Feeling the needle injected	3.03 ± 1.07	2.75 ± 1.10	3.27 ± 0.99	0.000
10. Seeing the drill	2.88 ± 1.14	2.53 ± 1.13	3.16 ± 1.06	0.005
11. Hearing the drill	2.67 ± 1.16	2.29 ± 1.13	2.99 ± 1.09	0.031
12. Feeling the drill	2.91 ± 1.08	2.61 ± 1.09	3.15 ± 1.00	0.000
13. Having the teeth cleaned	1.55 ± 0.94	1.32 ± 0.68	1.75 ± 1.07	0.000
14. Feeling the pain after the local anaesthesia	2.05 ± 0.99	1.85 ± 0.90	2.21 ± 1.04	0.000

Table 5. **The mean and standard deviation (SD) of DFS score (item number 15 of the questionnaire: general dental fear) related to the mean (± SD) of Decayed, Missing and Filled Teeth (DMFT) and Gingival Index (GI)**

Variables	All subjects ($n = 1021$)	Male ($n = 460$)	Female ($n = 561$)	*P*-value
General dental fear	1.90 ± 1.02	1.74 ± 0.93	2.02 ± 1.07	0.01
DMFT score	3.11 ± 4.31	2.89 ± 4.24	3.37 ± 4.37	NS*
Gingival Index Score	1.65 ± 0.671	1.80 ± 0.63	1.53 ± 0.68	NS*

NS*: The *P*-value is not significant (≥0.05).

close and/or comparable with that reported among children in other countries such as the USA, Scotland and Singapore (18–20).

Fear reactions or responses to different stimuli (Table 4) vary considerably, as each subject has a special pattern of fear responses made to particular stimuli within a definite dental treatment situation. For example, girls demonstrated higher levels of dental anxiety than boys, and those differences were more pronounced for certain dental situations than others. The most common fear-inducing aspects of the dental treatment to the participating children in this study were the procedures related to the needle and the drill. Therefore, the findings of our study are in agreement with most previous reports (11, 21).

The fact that the sight of needle and sound of drill were rated approximately as high as the actual sensations associated with their use suggested that the children were conditioned to the sensation, and hence the real stimulus (needle or drill sensation) was no longer needed to elicit a fear reaction. Recent studies reported that dental anxiety is primarily associated with learned negative behaviour, and a higher level of this condition may be attributed to the aggressive conditioning process during childhood and adolescence (10, 22).

Dental anxiety is likely to be a predictor of dental caries, and may be a risk factor for dental caries incidence (19). The present study demonstrated that no significant difference was found between male and female pupils regarding DMFT and gingival scores. No correlation was found in this study between 'general dental fear' and DMFT or GI scores. The lack of correlation in our study may be related to the fact that dentally anxious individuals differ widely in terms of reaction to various dental treatment stimuli. However, more studies should be carried out with greater sample sizes and covering larger geographic areas and larger age groups in Jordan.

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