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Original Article

Prevalence of self-reported fear of intraoral injections and its relationship to dental fear and subsequent avoidance of dental treatment among a group of Egyptian children: A Cross-Sectional Study.

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Abstract

Background: Fear of needles is common in childhood, with up to 50% being affected to some extent. Fear of intraoral injections can negatively impact children's quality of life and healthcare experiences. This study aimed to examine the prevalence of self-reported fear of intraoral injections and its association with dental fear and reported avoidance of dental treatment among 8 to 10-year-old children. Methodology: This cross-sectional study included 184 participants aged 8 to 10 years. Data were gathered using questionnaires that were completed in the diagnosis clinic of Pediatric Dentistry and Dental Public Health Department, Cairo University. The survey instruments used were the intraoral injection fear questionnaire, the Children Fear Survey Schedule-Dental Subscale (Arabic version), and the dental avoidance questionnaire. Results: The prevalence of reported intraoral injection fear among the participants was found to be 14.1%. The results showed a strong correlation between injection fear and dental fear. When an intraoral injection was needed, 30.4% of participants said they would avoid dental treatment. Conclusion: Intraoral injections affect fear sensation among eight to ten years old Egyptian children. High intraoral injection fear was associated with dental avoidance. High intraoral injection fear should be evaluated and addressed before dental treatment. The study is registered at clinicaltrials.gov, ID: NCT04335500.

Keywords: Intraoral injection fear, Dental fear, Dental treatment avoidance, and Children

I. INTRODUCTION:

Dental fear and anxiety are significant obstacles to clinical dentistry because they are difficult to manage in pediatric patients and may prevent them from using oral healthcare services (Chhabra et al., 2012).

Untreated dental fear and anxiety build a vicious cycle that extends from childhood to adolescence. High-fear people pay less visits to the dentist and have more decaying and missing teeth (Schuller et al., 2003). Individuals with high dental fear don't seek help except for acute emergency reasons, making their treatment more painful, increasing their negative attitude, and further avoiding dental care (Armfield, 2011).

Children who attend the dentist at an early age and follow regular visits schedule are more likely to have positive and safe dental practices. This is also a strategy to provide adequate oral health maintenance based on preventive treatments to avoid traumatic experiences from emergency treatments without prior

contact with the dentist. In other words, regular visits to the dentist that are not painful with no adverse effects for the child are the best preventive measures against dental fear (Carrillo-Díaz et al., 2021).

One of the dental setting's most frightening stimuli is the intraoral injection. High fear of injection should be recognized at an early age to provide proper treatment for the patient and to avoid painful dental experiences and assess the prevalence of intraoral injection fear within a specific population (Siddiqui et al., 2016; Berge et al., 2017).

Fear of needles is common in childhood, but due to the significant discrepancy between different self-report measures, the prevalence of injection fear varies significantly from one study to another. Fear of dental injections ranges anywhere from 11.7%−91%. Fear of needles and intraoral injections can negatively impact the quality of life of children and their healthcare experiences (McLenon and Rogers, 2019; Noble et al., 2020).

Neglected intraoral injection fear can reach extreme levels and is defined as blood injury injection phobia expressed as high fear, fainting, and avoidance of mandatory dental and medical treatment (Berge et al., 2016). Therefore, it is crucial to detect those fears early in life and intervene to resolve their consequences (McLenon and Rogers, 2019).

The literature review by Noble et al., 2020 shows that there has been little research on the prevalence of intraoral injection fear and how it relates to dental anxiety and avoidance. The prevalence of intraoral injection fear in the Egyptian population has never been estimated using the intraoral injection fear questionnaire, which was previously used in prevalence research in Norway (Noble et al., 2020).

Therefore, the current study aimed to determine the prevalence of self-reported fear of intraoral injections as well as its association with dental fear and reported avoidance of dental treatment among 8 to 10-year-old children.

II. PARTICIPANTS AND METHODS

A. Study design and setting

The current study was an observational cross-sectional study carried out at the Pediatric Dentistry Department, Faculty of Dentistry, Cairo University. The Faculty of Dentistry at Cairo University's Ethics Committee of Scientific Research approved with approval number 4.1.1 concerning the scientific content and compliance with research and human subject regulations. The study's reporting was performed using the STROBE guidelines.

B. Sample size

In order to apply a statistical test to the research question on the prevalence of intraoral injection fear among 8–10-year-old children, a power analysis was performed. According to the results of Berge et al. **(Berge *et al.*, 2016)**, in which the prevalence of intraoral injection fear was (13.9%) and by adopting a confidence interval of (95%), a margin of error of (5%) with a finite population correction, the predicted sample size (n) was a total of (184) cases. Epi info for Windows version 7.2 was used to calculate the sample size.

C. Participants

Children aged from 8-10 years with or without previous dental experience attending the outpatient diagnostic clinic in Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Cairo

University, were selected to participate in this study. Patients were screened by the department's staff members and referred to the principal investigator to confirm their adherence to the eligibility criteria.

D. Eligibility criteria

Inclusion criteria:

- School-aged children (8 - 10) years old.
- Children with or without previous dental experience.
- Both sexes were included.

Exclusion criteria:

- Refusal of participation
- Children with systemic diseases or mental problems

E. Outcomes

This survey aimed to assess the prevalence of intraoral injection fear as the primary outcome, the prevalence of dental fear, and dental avoidance as the secondary outcomes.

F. Data sources and measurement

The data was obtained through three written questionnaires for assessing the prevalence of intraoral injection fear, dental fear, and dental avoidance in children. The questionnaires were distributed and filled in under the supervision of the primary investigator in the diagnosis clinic.

Each child was allowed to complete three different short questionnaires with the assistance of the parent, the primary investigator, or the department interns. The children first answered the intraoral injection fear scale; then, they filled out the Children Fear Survey Schedule-Dental Subscale (Arabic version) and the dental avoidance questionnaire. All the questionnaires were in the Arabic language.

Intraoral injection fear scale:

The intraoral injection fear scale **(Berge *et al.*, 2017)** consisted of a 12-item for the assessment of intraoral injection fear. The questions estimated the degree of fear aroused as a reaction to several fear provoking procedures during an intraoral injection. The different stages of fear during injection steps, such as topical anesthetic administration and the topical gel sensation, fear of the injection itself and the needle tip, fear of the anesthetic solution, the sight of someone being anesthetized, the numbness sensation after the anesthesia, feeling that the anaesthesia will not work and the photograph of a dental syringe, were among the topics covered in the questions.

Each response was scored from 1 to 5 (1 = Not afraid at all, 2 = a little afraid, 3 = a fair amount, 4 = pretty much afraid, and 5 = very afraid) with a total score ranging from 12 to 60. The cut-off score point was 38; above 38 was coded 1 and was considered high fear of intraoral injections, and below or equal to 38 was coded 0 and was considered low fear of intraoral injections **(Berge *et al.*, 2017)**. The time taken by the child to answer the questionnaire ranged from 5 to 10 minutes.

Children Fear Survey Schedule-Dental Subscale (Arabic version):

The Dental Subscale of Children's Fear Survey Schedule (CFSS-DS) **(El-Housseiny *et al.*, 2016)** was first developed by Cuthbert and Melamed **(Cuthbert and Melamed, 1982)** as a short version of the children's fear survey schedule.

The CFSS-DS is a 15-item questionnaire to assess dental fear and the fear-triggering stimuli in the dental setting. The questions rated the child's dental fear in 15 dentally related situations such as dentists, injections, opening the mouth, strangers, drilling, choking, hospitals, and white coats. The time taken by the child to answer the questionnaire ranged from 5 to 10 minutes.

Each pre-coded response ranged from 1 to 5 (1 = Not afraid at all, 2 = a little afraid,

3 = a fair amount, 4 = pretty much afraid, and 5 = very afraid), Sum score range [15-75] **(El-Housseiny *et al.*, 2016).** The cut-off score point was 38. , above 38 was coded 1 and was considered high dental fear; below or equal to 38 was coded 0 and was considered low dental fear.

Dental avoidance questionnaire:

The questionnaire respondents were also asked to estimate the likelihood that dental work would proceed forward when an intraoral injection was required. The choices were: (definitely not, probably not, yes). Respondents who answered "certainly not" or "probably not" were classified as avoiders (coded 1), whereas "yes" responses were classified as non-avoiders (coded 0). The typical response time was between one and two minutes **(Vika *et al.*, 2008; Berge *et al.*, 2016)**.

G. Addressing the potential sources of bias

- Selection bias: All children fulfilling the inclusion criteria coming on the examination days were included.

Information bias: Information bias was avoided by explaining to the children the aim of the study without guiding them to specific answers.

Reporting bias: All the assessed outcomes were reported.

H. Statistical analysis

Data management and statistical analysis were performed using the Statistical Package for Social Sciences (SPSS) version 18. Numerical data were summarized using means, standard deviations, and confidence intervals. Data were explored for normality by checking the data distribution and using Kolmogorov-Smirnov and Shapiro-Wilk tests.

- The independent t-test compared comparisons between the 2 groups for normally distributed numeric variables.

- Qualitative data were shown as numbers and percentages and were compared using the chi-square test.

- Correlation between age and total scores was performed using the Pearson correlation test. The correlation coefficient was used to measure the strength of a linear association between two variables, as follows:

- Exactly –1. A perfect negative linear relationship.
- No linear relationship
- Exactly +1. A perfect uphill (positive) linear relationship.
- P-values ≤0.05 were considered significant.

III. RESULTS

This study included 184 children; 93 females (50.5%) and 91 (49.5%) males. For 39 (21.2%) children, this was the first dental visit, while 145 (78.8%) children were not the first visit. The mean age of the children was 8.97±0.82, with a minimum of 8 and a maximum of 10 years.

Responses for intraoral injection fear and Children Fear Survey Scale Dental-subscale questionnaire

The frequency and percentage of responses for Intraoral injection fear and Children Fear Survey Scale Dental-subscale questionnaires are presented in Tables (1) and (2), respectively.

Prevalence of intraoral injection fear and dental fear:

Among all participants, the mean score of the injection fear questionnaire was 24.41±10.8 (ranging from 12 to 52, with a median=22). The mean score of the children's fear (dental sub-scale) questionnaire was 25.43±10.68 (ranging from 15 to 71, with a median=23), as presented in Table (3).

Regarding the injection fear questionnaire, 85.9% of the participants were below the cut-off, and 14.1 % were above the cut-off. Regarding the children's fear (dental subscale) questionnaire, 87.5% of the patients were below the cut-off, and 12.5% were above the cut-off.

Correlation between cut-off injection fear and cut-off children fear:

Among patients above injection fear cut-off, 53.8% were below children fear cut-off, and 46.2% were above children fear cut-off. Among patients below the injection fear cut-off, 93% were below the children fear cut-off, and 7% were above the children fear cut-off.

Among patients above the children fear cut-off, 47.8% were below the injection fear cut-off, and 52.2% were above the injection fear cut-off. Among patients below the children fear cut-off, 91.3% were below the injection fear cut-off, and 8.7 % were above the injection fear cut-off.

The Chi-square test revealed a statistical significance difference (p=0.00). Table (4)

Association between the injection fear and dental fear cut-offs and the different study variables:

Gender difference:

Regarding the injection fear questionnaire, there was no significant difference between both genders. As for the children's fear (dental subscale) questionnaire, 17.2% of the females were above the cut-off level compared to 7.7% of the males. The difference between both genders was statistically significant (p=0.048)

Order of the dental visit:

Regarding the injection fear questionnaire, there was no significant difference between the first visit and other than the first visit. (p=0.802). As for the children's fear (dental subscale) questionnaire, 9% of the patients who were not on their first visit were above the cut-off level compared to 25.6% of patients on their first visit. The difference between both groups was statistically significant (p=0.005)

Age:

Regarding the injection fear, a significantly higher mean age was recorded for patients below the cut-off (9.02±0.83) compared to 8.65±0.75 in those above cut-offs. The difference was statistically significant (p=0.029). While for the Children fear, higher mean age was recorded for patients below the cut-off (8.98±0.83), compared to 8.91±0.79 in those above cut-offs. The difference was not statistically significant (p=0.73)

Avoidance

In 56 participants (30.4%), avoidance was reported to be present and was absent in 128 participants (69.6%). There was no statistically significant difference in avoidance between gender, age, and order of dental visits.

Relating avoidance to injection fear cut-off, 64.3% of the patients showing avoidance were below the cut-off level, and 35.7% were above the cut-off. Among patients who were above the injection fear cut-off, 76.9% showed avoidance, and 23.1% didn't show avoidance. This difference was statistically significant.

Relating avoidance to children's fear cut-off, 73.2% of the patients showing avoidance were below the cut-off level, and 26.8% were above the cut-off. Among patients who were above the dental fear cut-off, 65.2% showed avoidance, and 34.8% didn't show avoidance. This difference was statistically significant. Tables (5) and (6).

Table (1) Frequency and percentage of responses to intraoral injection fear questionnaire

	Not afraid at all	**Little afraid**	**A fair amount**	**Pretty much afraid**	**Very afraid**
Q1: When the dentist tells you that you will need an anesthetic injection	74	30	30	19	31
	40.2%	16.3%	16.3%	10.3%	16.8%
Q2: when you feel the sting from the syringe	64	44	30	14	32
	34.8%	23.9%	16.3%	7.6%	17.4%
Q3: When the dentist applies anesthetic ointment to your gums	156	15	6	3	4
	84.8%	8.2%	3.3%	1.6%	2.2%
Q4: for the anesthetic liquid itself	137	17	16	6	8
	74.5%	9.2%	8.7%	3.3%	4.3%
Q5: When you see a picture of a person being anesthetized at the dentist	115	17	24	10	18
	62.5%	9.2%	13.0%	5.4%	9.8%
Q6: When someone tells you that they have had an anesthetic injection at the dentist	144	10	10	7	13
	78.3%	5.4%	5.4%	3.8%	7.1%
Q7: That the sting from the syringe will be painful	62	39	26	19	38
	33.7%	21.2%	14.1%	10.3%	20.7%
Q8: When you are sitting in the dentist's chair preparing to have an anesthetic injection	87	29	26	9	33
	47.3%	15.8%	14.1%	4.9%	17.9%
Q9: When you can feel the anesthetic starting to work	135	17	14	5	13
	73.4%	9.2%	7.6%	2.7%	7.1%
Q10: That the anesthetic will not work	98	17	36	12	21
	53.3%	9.2%	19.6%	6.5%	11.4%
Q11: When you see the needle of a syringe	68	28	31	11	46
	37.0%	15.2%	16.8%	6.0%	25.0%
Q12: When you see a picture of a dentist's	122	19	16	10	17
	66.3%	10.3%	8.7%	5.4%	9.2%

Table (2) Frequency and percentage of different responses to Children Fear Survey Scale Dental-subscale questionnaire

	Not afraid at all	**Little afraid**	**A fair amount**	**Pretty much afraid**	**Very afraid**
Q1: Dentist	147	15	8	0	14
	79.9%	8.2%	4.3%	0%	7.6%
Q2: Doctors	154	14	8	1	7
	83.7%	7.6%	4.3%	.5%	3.8%
Q3: Injections	64	26	35	12	47
	34.8%	14.1%	19.0%	6.5%	25.5%
Q4: Having somebody examine your mouth	165	11	5	1	2
	89.7%	6.0%	2.7%	.5%	1.1%
Q5: Having to open your mouth	150	15	12	1	6
	81.5%	8.2%	6.5%	.5%	3.3%
Q6: Having stranger touch you	115	19	25	5	20
	62.5%	10.3%	13.6%	2.7%	10.9%
Q7: Having somebody look at you	131	14	18	4	17
	71.2%	7.6%	9.8%	2.2%	9.2%
Q8: The dentist drilling	103	20	29	10	22
	56.0%	10.9%	15.8%	5.4%	12.0%
Q9: The sight of the dentist drilling	119	22	21	8	14
	64.7%	12.0%	11.4%	4.3%	7.6%
Q10: Noise of the dentist drilling	108	18	32	7	19
	58.7%	9.8%	17.4%	3.8%	10.3%
Q11: Having somebody put instruments in your mouth	129	19	21	4	11
	70.1%	10.3%	11.4%	2.2%	6.0%
Q12: Choking	87	28	43	8	18
	47.3%	15.2%	23.4%	4.3%	9.8%
Q13: Having to go to hospitals	145	10	11	8	10
	78.8%	5.4%	6.0%	4.3%	5.4%
Q14: People in white uniforms	171	4	4	1	4
	92.9%	2.2%	2.2%	0.5%	2.2%
Q15: Having the nurse clean your teeth	142	15	18	0	9
	77.2%	8.2%	9.8%	0%	4.9%

Table (3) Descriptive statistics of injection fear and children fear total scores

		Injection fear score	Children fear score
Mean		24.41	25.43
95% Confidence Interval for Mean	Lower Bound	22.84	23.88
	Upper Bound	25.99	26.99
Median		22.00	23.00
Std. Deviation		10.80	10.68
Std error		0.80	0.79
Minimum		12	15.00
Maximum		52	71.00

Table (4) Correlation between cut-off injection fear and cut-off children fear (dental sub-scale)

			Cut-off injection fear	
			Below cut-off	Above cut-off
Cut-off Children fear	Below cut-off	Count	147	14
		% within Cut-off children fear	91.3%	8.7%
		% within Cut-off injection fear	93.0%	53.8%
	Above cut-off	Count	11	12
		% within Cut-off children fear	47.8%	52.2%
		% within Cut-off injection fear	7.0%	46.2%
Total		Count	158	26
		% within Cut-off children fear	85.9%	14.1%
		% within Cut-off Injection fear	100.0%	100.0%
P value			0.00*	

Significance level p≤0.05, *significant

Table (5) correlation between avoidance and injection fear cut-off (Pearson chi-square test)

			Cut-off. Injection fear	
			Below cut-off	Above cut-off
Avoidance	No	Count	122	6
		% within Avoidance	95.3%	4.7%
		% within Cut-off	77.2%	23.1%
	Yes	Count	36	20
		% within Avoidance	64.3%	35.7%
		% within Cut-off	22.8%	76.9%
Total		Count	158	26
		% within Avoidance	85.9%	14.1%
		% within Cut-off.	100.0%	100.0%
P value			0.00*	

Significance level p≤0.05, *significant

Table (6) Correlation between avoidance and children fear cut-off (Pearson chi-square test)

			Cut-off children fear (dental sub-scale)	
			below cut-off	above cut-off
Avoidance	No	Count	120	8
		% within Avoidance	93.8%	6.3%
		% within Cut-off.	74.5%	34.8%
	Yes	Count	41	15
		% within Avoidance	73.2%	26.8%
		% within Cut-off	25.5%	65.2%
Total		Count	161	23
		% within Avoidance	87.5%	12.5%
		% within Cut-off.	100.0%	100.0%
P value			0.00*	

Significance level p≤0.05, *significant

IV. DISCUSSION:

The intraoral injection fear scale is the first developed scale to estimate intraoral injection fear in children and adolescents; it demonstrated satisfying reliability and validity according to the previous study by **Berge *et al.*, (2017)**. Therefore, this study aimed to estimate the prevalence of intraoral injection fear and its relationship to dental fear among eight to ten-year-old children and to explore the possible consequences of such problems in terms of avoidance of dental care.

Children aged eight to ten years old were chosen in this study as this age is optimum for developmental and cognitive maturation. Children at this age are interactive, can communicate better and longer with others, express themselves and understand things properly. Most of them can read and answer the questionnaires independently or with minimal help from their parents **(Thompson *et al.*, 2019)**. Different age ranges in comparable studies were examined by **Vika *et al.*, (2008) and Berge *et al.*, (2016)** with ages (18) and (10 to 16) years old, respectively.

Both children with and without previous dental experience were enrolled in the study to compare fear levels in both groups. According to **Shim *et al.*, (2014)**, children with no previous dental experience have higher subjective fear, while those with previous dental experience show lower levels of fear. In children with previous dental experiences, the dental experience memory may significantly influence the child's future behavior and dental fear. One of the leading causes of dental fear and avoidance is negative dental experiences. When someone remembers how painful a previous session was, they may assume that the next one would be equally painful, leading to dental anxiety. This memory of dental pain gets exaggerated with time. On the other hand, positive dental experiences reduce dental fear and anxiety through childhood and into adulthood and discourage the dental avoidance attitude **(Rajeev *et al.*, 2020).**

Participants from both genders were recruited in the study as previous studies reported that gender difference is clinically and statistically significant; this may be because girls express their fears and emotions more openly than boys **(Won *et al.*, 2017).**

Children with systemic diseases or mental problems were excluded from the study as these conditions might affect their cognitive maturation, impair their understanding and answering the questionnaires, and alter the degree of dental and injection fear **(da Rosa *et al.*, 2020).**

Regarding the current study results, the prevalence of injection fear in this study was 14.1 %. This was in line with the range suggested by the systematic review of **McLenon and Rogers, (2019)**, who reported that within the published literature on the worldwide population, the fear of dental injections ranges from 11.7%−91%. This finding also followed **Berge *et al.*, (2016)**, who stated that the prevalence of intraoral injection fear among 10 to 16 years old students was 13.9%. In contrast to these findings, the longitudinal study by **Noble *et al.*, (2020)** showed that the prevalence of injection fear in dentally anxious individuals might be as high as 91%.

Regarding the results of the injection fear questionnaire, children were least afraid of topical anaesthetic gel application, which is against **Hedén *et al.*, (2016)**, who reported that as for parents, children felt more fear emotions than pain sensation during the insertion of the needle when topical anesthesia is applied.

On the other side, the highest fear scores were recorded from the answers to the question "Do you fear the sight of the tip of the syringe" which is in agreement with **McMurtry *et al.*, (2015) and Orenius *et al.*, (2018)**, who both stated that the sight of the syringe is one of the triggering stimuli to injection fear and even phobia that needs

further treatment techniques and handling by specialists.

The strong overlap between those highly fearful of intraoral injections and those highly fearful of dental treatment indicated a close relation between intraoral injection fear and dental fear among children. The prevalence of dental fear in the current study was 12.5%, correlated with injection fear. This was in agreement with **Vika *et al.*, (2008) and Berge *et al.*, (2016)**, who concluded that blood injury injection phobia is directly related to dental anxiety. This is justified by the fact that injection fear is one of the highest fear inducing stimuli in the dental setting, which is the main causative factor of dental anxiety.

Regarding gender, for the intraoral injection fear questionnaire, females were more fearful than males. The difference was statistically significant only in the answers to the two questions "do you feel afraid that the anaesthetic will not work" and "when you see a picture of a dentist's syringe", which was in line with **McLenon and Rogers, (2019)**, who concluded that the prevalence was higher in girls than boys and was higher in women than men for both needle fear and needle phobia,. Regarding the children's fear (dental subscale) questionnaire, females were significantly more fearful than males. That was in contradiction to the findings of **Yon *et al.*, (2020)**, who found no association between dental fear and gender, but was in accordance with **Berge *et al.*, (2016) and Siddiqui *et al.*, (2016)** who found that females showed more fear than males regarding dental treatment. This might be attributed to the fact that females express their fears more freely and truthfully than males on self-report measures.

According to the order of the dental visit, for the intraoral injection fear questionnaire, there was no significant difference among cut-off scores of children on their first visit and children with previous experience, which was against **Berge *et al.*, (2016)** who reported that injection fear in patients without previous dental experience or patients who can't remember having a dental injection at a young age was higher than in patients with previous dental experience. That also contradicts the results of **McLenon and Rogers, (2019)**, who found that the injection fear decreases greatly from the first visit to the other succeeding visits. This might be attributed to the participants' different study settings and socioeconomic levels in the current study.

Concerning the children's fear (dental subscale) questionnaire, patients on their first visits were more fearful than patients who were not on their first visits, and the difference between the two groups was significant. This was in agreement with **Rath *et al.*, (2021)**, who found that subjects who were acquainted to the dental environment earlier in life were less anxious than those who received dental treatment for the first time.

Regarding the mean age of patients according to the injection and children fear cut-off frequency, higher mean age was recorded for patients below the cut-off compared to lower age in those above cut-offs. This result was statistically significant for the injection fear cut-off and was insignificant for the dental fear cut-off. This finding contradicted the results of **Slabšinskienė *et al.*, (2021)**, who found that the dental fear level didn't rely on age and was in accordance with **Boka *et al.*, (2017)**, who reported that dental fear declined with increasing child age. This can be attributed to the developmental changes since increasing age is related to cognitive abilities and change in various types of fear expressions, including dental and injection fear.

Avoidance of dental treatment was present in 30.4% of the current population. The percentage in the present study was much higher than **Vika *et al.*, (2008) and Berge *et al.*, (2016)**, where avoidance rates were 11 % and 10.6%, respectively. This might be attributed to the different study settings. While the current study was held in the outpatient clinics of a dental school just before the participants

received their dental service, this could be considered a fear-provoking setting compared to other studies held in schools or areas that are less fear-provoking.

Among patients who were above the injection fear cut-off, 76.9% showed avoidance, and 23.1% didn't show avoidance. This difference was statistically significant and agreed with **Siddiqui *et al.*, (2016)**, who stated that the fear of dental injections could affect the degree of attendance at dental appointments. This might be attributed to the general feeling that going to the dentist is a fear-provoking experience for specific procedures, such as the sight of an anesthetic needle or the feeling of an anesthetic injection.

Among patients who were above the dental fear cut-off, 65.2% showed avoidance, and 34.8% didn't show avoidance. This difference was statistically significant. This result was in accordance with **Heyman *et al.*, (2016)**, who concluded that the severity of dental fear was strongly related to the likelihood of avoiding dental services in the past and related to numerous presenting problems. This avoidance behavior can also depend on other uninvestigated variables in this study, like the type of dental procedure performed and the parental attitude towards dental treatment.

Study limitations

The cross-sectional nature of this study hinders causal inferences. Generalizing the results to other populations should be carried out with caution since the sample studied belonged to a public dental clinic at the Faculty of Dentistry, and inclusion and exclusion criteria made the study sample different from the general population.

Also, performing the study at a public dental institute can elicit dental fear and affect the children's responses to the questionnaires.

V. CONCLUSIONS

Intraoral injections affect fear sensation among eight to ten years old Egyptian children, with a strong correlation between injection fear and dental fear. The degree of injection fear is affected by age but not affected by gender difference and order of the dental visit. The high intraoral fear injection is associated with avoiding necessary dental treatments.

ABBREVIATIONS

IOIFS: Intraoral injection fear scale; CFSS-DS: the Children's Fear Survey Schedule- Dental Subscale.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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