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A Cross-Sectional Survey of Libyan Parents' Attitudes and Knowledge Regarding Their Children's Exposure to Dental X-Ray in Derna City

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Abstract:
In clinical examination, dental X-rays provide critical information on tooth development and eruption, the detection of initial caries, and pulpal and periapical lesions. **This study aimed** to assess parents' attitudes, behaviors, and knowledge regarding their children's exposure to dental X-rays. **Materials and Methods:** A cross-sectional survey using a face-to-face interviewer-administered questionnaire was conducted from July to October 2024. The study population included all parents with children attending public and private primary and KG1&KG2 schools located in Derna City, Libya**. Result:** The study included parents of 125 children, of whom 85 (68%) were male and 40 (32%) were female, completed the face-to-face interview and answered all constructed questionnaires, given the participation rate of 100%. The mean age of the parents is 43.77 ± 9.4 years ranging from 28-71 years. The age group ≥40 years of parent were the most frequent 72(57.6%). The study found that parents had a negative attitude and behavior towards their children's exposure to dental X-rays (7.32±2.44, 3.98±1.26). Furthermore, the total mean score for parent knowledge (22.29±5.39) indicates that study parents have a poor understanding of the risks and benefits of their children's exposure to dental X-rays. **Conclusion:** In summary, parents had poor attitudes, behavior, and knowledge regarding their kids' exposure to dental X-rays. Parents' motivations throughout their children's dental care should be understood and openly discussed.

Keywords: Attitude; Behavior; Dental X-Ray; Knowledge; Parent; Pediatric.

1. INTRODUCTION

In clinical examination, dental x-rays provide critical information on tooth developmental and eruption, as well as the detection of initial caries, pulpal and periapical lesions (**Orhan K .2022**). In pediatric dentistry, dental radiographs are utilized for diagnosis in oral examinations of children and as supplemental diagnostic techniques in the assessment of pathological diseases, dental traumas, caries, and tooth development problems (**Espelid I.2003)**.According to the AAPD, the timing of the first radiographic examination should not depend on the patient's age, but rather on the child's individual circumstances, and radiographic examination should not be performed to detect any disease without clinical examination(**Dent.2018**).The radiation dose of panoramic radiographs is 14–24 mSv, while the radiation dose of bitewing radiographs is 5 MSv (**Sharmila S.2019**). Dental x-rays are one of the procedures that children frequently undergo during dental treatment, despite the low radiation dose (**Looe HK.2006**). There are radiographic guidelines available to help identify people who would benefit from a radiographic examination and prevent unnecessary dental radiographs **(Turpin D.2008&Chiri R.2013)**. To reduce the cumulative effect of radiation, the American Dental Association offers some guidelines for radiography applications. One of these is A) utilizing the fastest image receptor plate. B) Whenever feasible, collimation of the beam to the receptor's size .C) using appropriate film exposure and processing methods) wearing thyroid collars and protective aprons, and E) minimizing the number of pictures needed to gather vital diagnostic data (**Dent.2018**). Informed consent for x-rays is a topic that is frequently disregarded in dental care due to current medical and legal regulations **(Shah SS.2021).** It's unclear whether the public understands the information about radiation safety or if dentists provide it to them. The American Dental Association (ADA) asserts that even though dental radiographs pose a minimal risk of radiation exposure, it is the dentist's duty to minimize patient exposure by adhering to the ALARA principle (**American.2006).** During their child's dental appointment, parents are

entitled to information about radiography procedures (**Chiri R.2013**). There is a shortage of specific data regarding parents' attitudes and knowledge regarding dental radiographs used on their children, particularly in our nation. It is unknown what the parents' concerns are regarding dental radiographs, whether they are overblown, or whether they understand and agree with the consequences of dental radiographs. Determining parental awareness of the protective gear available for dental radiographs is also necessary. Thus, the purpose of this survey study was to assess parents' attitudes, behaviors, and knowledge regarding to exposure of their children to dental X-ray.

2. METHOD

Study design: A cross-sectional survey using face-to-face interviewer-administered questionnaire was conducted from July to October 2024.

Study area and population: The study population included all parents who have children that attended to public and private primary and KG1&2 school which locates in Derna city, Libya.

Sample size and sampling method: A total of 125 parents who were selected by the systematic random sampling method were invited to participate in the study.

Inclusion criteria: Parents were selected from all private and government school in the city were included in the study.

Methodology:

Briant et al.'s 2023 study served as the basis for the questionnaire's construction (**BIRANT S. 2023**). In order to evaluate the knowledge and attitudes of parents in the city of Derna about dental radiography for their children, it was translated into Arabic and contained sections on demographics, parent behaviour, attitude, and knowledge status. The questionnaire was pretested among the family members and friends before it used to clean up the flaws and to make sure that it valid for the purpose of the study. Data were gathering from face-to-face interviewer-administered questionnaire carried out by two well-trained dental hygienists and Diagnostic X-ray technician and using the Arabic language to translate the questions and to fill the constructed questionnaire.

We utilized a Likert scale with three points (agree, don't know, and disagree) to answer questions about parents' attitudes, behaviors, and knowledge, and we averaged these points for each part and interpreted them as parent attitudes:(the average total of 4 points means more parent have excellent attitude, if the average total 5-6 points means more parent have good attitude, and if the average total score >6 means more parent have negative or bad attitude.), for parent behavior (the average total of 2 points means more parent have excellent behavior, and if the average total > 2 points means more parent have bad behavior). for parent knowledge (an average total of 10 points indicates that more parents have excellent knowledge, an average total score of 11-14 points indicates that more parents have very good knowledge, an average mean score of 15-16 points indicates that more parents have good knowledge, and a total average score of >16 points indicates that parents have poor knowledge).

We measured internal consistency (or "reliability") using Cronbach's alpha, which merely gives you an overall reliability coefficient for a set of variables.

The resulting α coefficient of reliability, which goes from 0 to 1, gives you an overall assessment of a measure's reliability; in other words, the higher the α α coefficient, the more the items have shared covariance and most likely measure the same underlying concept.

Attitude of parents for their children to dental x-ray exposure

Four question was designed to measure the attitude of parents regarding exposure their children to dental x-ray as shown in table (2), with Likert 3-point scale measurement (1=I agree, 2=I do not know, 3=disagree).

Behavior of parents for their children to dental x-ray exposure

Two question was designed to measure the attitude of parents regarding exposure their children to dental x-ray as shown in table (3), with Likert 3-point scale measurement (1=I agree, 2=I do not know, 3=disagree).

Knowledge of parents for their children to dental x-ray exposure

Ten question was designed to measure the attitude of parents regarding exposure their children to dental x-ray as shown in table (4), with Likert 3-point scale measurement (1=I agree,2=I do not know,3=I disagree).

Statistical analysis:

Version 25.0 of the Statistical Packages for the Social Sciences (IBM, Ottawa, Canada) was used to analyze the data. The mean, standard deviation, and frequency tables were used to summaries the data. The t-test for a

continuous variable, one-way Anova and Pearson correlation coefficient tests were used. The level of statistical significance was considered as $P < 0.05$.

3. ETHIC APPROVAL

All participants were informed about the objective of this study, and informed consent was obtained from all the parents. The study was conducted in accordance with the Helsinki Declaration.

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4. RESULT

Table (1), displays the sociodemographic details of the study population. The study included parents of 125 children in total, of whom 85 (68%) were male and 40 (32%) were female, completed the face-to-face interview and answered all constructed questionnaires, given the participation rate of 100%. The mean age of the parents is 43.77 ± 9.4 years range from 28-71years.The age group ≥40 years of parent were the most frequent 72(57.6%). The majority of parents (58.9%) had a university degree. Also, (25.6%) of our parents had 4 children.it shows that the most frequent reason for both children and parents to visit dental clinic was as an emergency (when feeling pain),106(84.8%) and 85.65), respectively.

Attitude of the parents regarding exposure of their children to dental X-ray: According to Table (2), the majority of parents 88 (70.4%) let their children to be exposed to dental x-rays while receiving dental treatment, even though some parents questioned whether dental x-rays were safe and advantageous 29 (23.2%), 43 (34.4%), respectively. The belief that dental x-rays are required during dental treatment was the most frequent justification given by parents for allowing their children to get them (55.6%).

Behavior of the parents regarding exposure of their children to dental X-ray: According to Table (3), a smaller proportion of parents 34(27.2%) want the dentist to explain why their children require dental x-rays and to adopt protective measures to protect their children while they are exposed to dental x-rays.

Knowledge of the parents regarding exposure of their children to dental X-ray: According to Table (4), only 40.8% of parents had appropriate understanding about the negative effect of dental x-rays on child general health, while 8.8% believe that exposing their child to dental x-rays will cause permanent damage to the child's body. It also shows that 47.2% of parents are aware that increasing the number of dental x-rays taken increases the danger of radiation damage, whilst 32.8% believe that the benefits of dental x-rays outweigh the hazards to the kid. The majority of parents (58.4%)

were aware that a dental x-ray would assist the dentist in providing better dental care for their child. However, just 33.6% of parents are aware that there are ways to protect their children from radiation such as wearing a lead apron. Parents knowledge of the distinction between radiation used for dental and medical purposes was 21.6%, while 31.2% believe that dental x-rays are more damaging to children than adults. On the other hand, 14.4% of parents believe that their children's exposure to dental x-rays is too low to do significant harm. Also, 28.8% of parents agree that exposure to the environment radiation (sun, telephone) is greater than radiation from dental x-rays.

Assessment of questionnaire: Table (5) shows that all question items related to parent attitude, behavior, and knowledge regarding their children's exposure to dental X-rays have shared covariance and most likely measure the same underlying concept using Cronbach Alpha (0.748,0.647,0.824), respectively. The study found that parents had a negative attitude and behavior towards their children's exposure to dental x-rays (7.32±2.44, 3.98±1.26). Furthermore, the total mean score for parent knowledge (22.29±5.39) indicates that study parents have a poor understanding of the risk and benefit of their children's exposure to dental x-rays.

The impact of parental demographic data on their attitudes, behaviors, and knowledge about their children's exposure to dental X-rays: It is shown in Table 6. It appears that the average scores of parents' attitudes, behaviors, and knowledge about their children's exposure to dental X-rays are unaffected by the parents' age, gender, education level, number of children, frequency of visits, and presence during examination and treatment by the dentist. However, there was a significant difference in the average behavior and knowledge scores of the parents whose children had dental radiographs when we used the Anova Test, with a p-value of 0.044 and 0.038, respectively, compared to the average score of the parents whose children did not have dental radiographs. Additionally, a mildly positive significant association between attitude and knowledge was observed using the Pearson correlation coefficient test (r=0.368, p-value=0.000).

5. DISCUSSION

Discussion: According to our research, parents' average scores for attitude (7.32±2.44), behavior (3.98±1.26), and knowledge (22.29± 5.39) were low when it came to getting their child's dental x-ray. Pediatric dental radiographs are utilized in numerous dental specialties for everything from diagnosis to treatment planning **(Sreenivasan SK. 2022).** Despite the relatively low radiation dose in the dental setting, dental x-rays are one of the most frequently

requested instruments during dental procedures and are frequently performed several times during infancy and adolescence **(Chiri R. 2013).** One of the dentist's duties is to educate the parents on the advantages and dangers of dental radiographs. Today's medical law ignores the importance of informed consent for dental radiography. It is unclear whether parents are completely told about radiation and radiation safety when they take their children to the dentist, but even if they are, it is unclear if they truly comprehend the information. Parents have every right to comprehend and enquire about the advantages and disadvantages of dental radiography in this situation. Globally, there is emphasis on the significance of informing patients about the advantages and risks of radiological tests **(Kose TE.2022 & McNierney A.2015).** Only 27.2% of the parents in our study requested an explanation from the dentist on the necessity of dental radiography compare to other study done by **(Briant S. 2023).** The public is generally aware of the negative consequences of environmental radiation, such as the sun's rays, but is not well-informed about the dangers of medical radiation **(Ludwig RL.2002)**. Furthermore, individuals are not aware that environmental radiation exposure such as that from the sun is higher than that from dental radiographs **(Babu NV.2017).** According to our study, 71.2% of parents were unaware that the radiation from dental radiographs was lower than that from the environment. Few parents appear to be aware of the hazards, even if they understand the significance of dental radiography (**Chiri R.2013**). Additionally, Arzani et al. noted that parents' knowledge of pediatric dental radiography is lacking, which could be because dentists don't spend as much time educating parents about radiographs **(Arzani V .2021).** According to this study, parents lack sufficient knowledge regarding dental radiography. The lack of information provided by dentists is the cause of parents' inadequate level of knowledge. The primary cause of this can be attributed to the Libyan dentists' extremely short examination and treatment hours as well as the health system’s regrettable shortcomings. Parents in Libya are expressing concerns with the use of pediatrics dental radiography since they are not well-informed about the advantages and disadvantages of this procedure. This study is one of the first to assess the children of Libyan parents' dental care in terms of their knowledge, attitudes, behaviors, and associated factors with pediatrics dental radiographs. Few parents thought dental x-rays were detrimental, according to Shah et al., although more than half of the parents thought they were safe **(Shah SS.2021)**. Even Nevertheless, just 23.2% of participants in this research thought dental radiographs were safe, 55.6% thought they were helpful and required for dental treatment, and 70.4% said they would permit their children to have dental radiographs. Manju et al. stressed that there is a favorable correlation between parental education level and a positive attitude towards dental x-rays (**Sharmila S.2019)**, while Chiri et al. claimed that despite their parents' low level of dental radiography expertise, they had positive attitudes towards the field (**Chiri R.2013**). In contrast to the Chiri et al. study, this study shows a weak positive association between parents' attitudes and knowledge levels. Furthermore, there is no correlation between attitude and education level, even though it is evident that participants' knowledge level increases with their education level. It has been noted that experience, rather than knowledge, can influence how people feel about dental radiography during development (**Sharmila S.2019& Chiri R.2013**). According to this study, parents' opinions can be positively influenced by their experiences using dental radiography for their kids. This study's including of parents who child applied to elementary schools rather than pediatric dentistry clinics in Derna City was one of its strong points. Any bias against dental radiography will be eliminated as a result. The sample size of our participants

was small given the limitation of our study. Therefore, to get a more accurate result, we advise conducting additional research with a larger sample size, including parents from various socioeconomic backgrounds.

Table 1). The Demographic data for all participants.

Demographic variables	N (%)
Age groups	125
≤40	53(42.4%)
>40	72(57.6%)
Gender	125
Male	85(68%)
Female	40(32%)
Educational Level	125
Primary /middle school	2(1.6%)
High school	10(8%)
High institute	24(19.2%)
University	73(58.4%)
Postgraduate	16(12.8%)
Child number	
1	9(7.2%)
2	25(20%)
3	31(24.8%)
4	32(25.6%)
5	18(14.4%)
6	10(3%)
Frequency of parent visiting the dentist.	125
Every 2 years or more	1(0.8%)
Once per year	9(7.2%)
Once per 6 months	9(7.2%)
For emergency only	106(84.8%)
Frequency of children visiting the dentist	125
Every 2 years or more	5(4%)
Once per year	9(7.2%)
Once per 6 months	4(3.2%)
For emergency only	107(85.6%)
Has your child had a dental radiography	125
Yes	58(46.4%)
No	48(38.4%)
I did not remember	19(15.2%)
Do you accompany your child's dental examination?	125
Yes	115(92%)
No	10(8%)
Do you accompany your child's dental treatment?	125
Yes	110(88%)
No	15(12%)

Table (2): Attitude of the parents regarding exposure of their children to dental X-ray

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Questions for parent attitude	I Agree N (%)	I do not know N (%)	Disagree N (%)
I think dental x-rays are safe for my child/children	29(23.2%)	49(39.2%)	47(37.6%)
I think dental x-rays are beneficial for my child/children	43(34.4%)	44(35.2%)	38(30.4%)
I think that dental X-rays are necessary for my child/children dental treatment.	70(56%)	31(24.8%)	24(19.2%)
I allow dental x-rays to be taken for my child/children	88(70.4%)	22(17.6%)	15(12%)

Table (3): Behavior of the parents regarding exposure of their children to dental X-ray.

Questions for parent Behavior	I Agree N (%)	I do not know N (%)	Disagree N (%)
I always ask the dentist to explain why a dental X-ray is needed for my child.	34(27.2%)	30(24%)	61(48.8%)
I always request protective clothing (such as a lead apron) to protect my child against possible radiation while having a dental X-ray.	34(27.2%)	36(28.8%)	55(44%)

Table (4): Knowledge of the parents regarding exposure of their children to dental X-ray

Questions for parent knowledge	I Agree N (%)	I do not know N (%)	Disagree N (%)
Dental x-rays can harm the child's general health.	51(40.8%)	47(37.6%)	27(21.6%)
A dental X-ray causes permanent damage to the body.	11(8.8%)	78(62.4%)	36(28.8%)
The number of dental X-rays taken increases the risk of damage caused by radiation.	59(47.2%)	51(40.8%)	15(12%)
The benefits of dental x-rays outweigh the risks for the child.	41(32.8%)	67(53.6%)	17(13.6%)
A dental X-ray helps the dentist better plan treatment for a child.	73(58.4%)	46(36.8%)	6(4.8%)
Radiation from x-rays used for medical purposes is higher than radiation from dental x-rays.	42(33.6%)	62(49.6%)	21(16.8%)
I know that there are ways to protect my child from radiation with a dental X-ray, such as wearing a lead apron	27(21.6%)	91(72.8%)	7(5.6%)
Exposure to a dental X-ray is too minor to cause significant harm to my child.	18(14.4%)	88(70.4%)	19(15.2%)
Dental X-rays are more harmful to children than adults.	39(31.2%)	77(61.6%)	9(7.2%)
Exposure to environmental radiation (eg, sun, telephone) is higher than radiation from dental x-rays.	36(28.8%)	77(61.6%)	12(9.6%)

Table 5. Reliability, Central Tendency, and Variability of Scales.

Scale	Items	Alpha	Mean	SD
Attitude	4	0.748	7.32	2.44
Behavior	2	0.647	3.98	1.26
Knowledge	10	0.824	22.29	5.39

Table 6. The impact of parental demographic data on their attitudes, behaviors, and knowledge about their children's exposure to dental X-rays.

Variables	Attitude*	Behavior**	Knowledge***	Test	p-value
Age groups					0.803*
≤40	7.26±2.36	4.07±1.29	22.69±5.30	T-Test	0.492**
>40	7.37±2.51	3.91±1.25	22.00±5.47		0.477***
Gender					0.278*
Male	7.16±2.43	3.95±1.26	22.05±5.30	T-Test	0.692**
Female	7.67±2.44	4.05±1.29	22.80±5.61		0.476***
Educational level					
1.≤High school.				One-way	0.385*
2.University& High institute.				Anova	0.206**
3.Postgraduate.					0.188***
Child number					0.180*
≤3	7.04±2.26	3.89±1.27	22.04±5.28	T-Test	0.403**
>3	7.63±2.60	4.08±1.26	22.56±5.53		0.592***
Frequency of parent visiting the dentist?					
1-Every 2 years or more				One-way	0.471*
2-Once per year				Anova	0.955**
3-Once per 6 months					0.627***
4-For emergency only					
Frequency of children visiting the dentist?					
1-Every 2 years or more				One-way	0.790*
2-Once per year				Anova	0.100**
3-Once per 6 months					0.331***
4-For emergency only					
Has your child had a dental radiography?					
Yes				One-way	0.587*
No				Anova	0.044**
I did not remember					0.038***
Do you accompany your child's dental examination?					0.191*
Yes	7.24±2.44	3.99±1.28	22.38±5.34	T-Test	0.828**
No	8.30±2.35	3.90±1.19	21.30±6.18		0.545***
Do you accompany your child's dental treatment?					0.07*
Yes	7.18+2.45	3.95±1.25	22.19+5.29	T-Test	0.485**
No	8.40±2.09	4.20±1.42	23.06±6.23		0.557***

* P-value for Attitude.
** P-value for Behavior.
*** P-value for Knowledge.

Conflicts of interest:
There are no conflicts of interest.
Financial support and sponsorship:
Nil.

6. CONCLUSION

In summary, parents had poor attitudes, behavior, and knowledge regarding their kids' exposure to dental X-rays. Nonetheless, parents' motivations throughout their children's dental care should be understood and openly discussed.

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