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Prevalence of Early Childhood Caries (ECC) among the Children of Officer Dental Clinic Prince Sultan Military Medical City

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Abstract

Purpose of the study: The aim is to study the prevalence of ECC in 2 to 5-year-old children in officer dental clinics and to study the risk factors of ECC in Saudi Arabia.

Methods: The study adopted a cross-section research design. The primary dentition of 2-5 old children was evaluated with a mouth mirror in daylight on officer dental clinic. The sample size was made of 183 children. They were classified according to the severity of ECC. A questionnaire was given to the parents to know about the child's feeding practices, socioeconomic status and awareness of dental care.

Results: The study determined the prevalence of ECC among the children of ages 2-5 years, which was approximately 62.8%. Most of the patients were of the age of 5 years. The socioeconomic status of many parents was good and the level of education was bachelor while the majority of their oral hygiene was fair. Many children received bottle feeding, with most of them commencing at the age of 2 years. From the test of hypothesis, age and type of carries had a difference, which was also the case between oral hygiene and level of education and oral hygiene and types of carries, while the level of education and type of carries did not make a difference.

Conclusion: The study was able to determine the prevalence of ECC among the children of ages 2-5 years, which was approximately 62.8%. The study also identified the social economic status of most parents in the country as being good. Most parents' oral hygiene was determined to be fair, while children with five years were most affected. Some of the risk factors that parents should be looked unto include reducing sugary foods for their children.

Keywords: Dental clinics; ECC; Dentition oral hygiene

Introduction

Dental caries, also known as tooth decay or cavity, is a bacterial infection in origin that causes demineralization and destruction of the hard tissues of the teeth (enamel, dentine and cementum). It is a result of the production of acid by bacterial fermentation of food debris accumulated on the teeth surface. Oral health is an important part and a gateway to a healthy quality of life. The good health of people who speak, chew, eat, smile and live without any pain or discomfort is important. Due to the most prevalent caries and periodontal conditions, caries from early childhood can cause dental injury in the early three years, affect the teeth of the lacrimal and, in the future, permanent teeth.

Caries are present in children and cause a series of sequels, including infections, aesthetic problems, feeding difficulties, language alterations and poor oral habits and medical, emotional and financial consequences. The vulnerability to the development of the disease may be determined, among other things, by factors such as a low socio-economic level and low levels of schooling, a bad diet and hygienic habits and medical history. Caries of Early Childhood (ECC) remains one of the world's most prevalent childhood diseases. ECC affects not only the oral health of children but also children's overall health [1].

There are also eating and speaking issues, as well as an increased risk for caries occurring on permanent dentition, which can lead to oral discomfort orthodontic issues and enamel defects. Premature loss of primary teeth also results in adult life orthodontic issues. In addition to being affected by childhood, parents will also be influenced by the responsibility for this disease. For example, the main reason for child hospitalization in Australia was shown to be dental problems in 2015. Thus, ECC not just contributes to temporary pain but also has important effects, including financial and health implications, for the quality of life of families and caregivers. Therefore, the research work will aim to identify the prevalence of ECC in 2-5 old children and determine the risk factors associated with ECC. The study is designed since no much work is done to assess ECC which a serious health problem in developing countries like Saudi Arabia [2].

Project objectives

- The aim is to study the prevalence of ECC in 2-5 old children in officer dental clinic.
- To examine whether there is a difference between various parental factors and occurrence of ECC.
- Study the risk factors associated with ECC.

Materials and Methods

Prevalence of ECC

As previously stated, ECC remains one of the world's most abundant diseases. ECC is 1.76 billion (95 percent CI: 1.26 billion; 2.39 billion) in children with lactating teeth. Functionally, ECC is not confined to Low Socio-Economic (LES) children. For example, more than 50% of children aged six years who carry on deciduous teeth are prevalent in recent data from Australia. There are up to 89.2 percent of ECC-based children in Qatar and 36 percent in Greece from different parts of the world. In the USA, there have been reports of about the same prevalence (approximately 40 percent) among children aged 2-11 years. A published Germany study recently showed only 10% (up to 26% for initial lesions) of children three years of age with ECC and an increase of up to about 50% in the 6/7 age group. Although the dmft index (decayed teeth) has deteriorated over time, the incidence has not decreased. Nonetheless, when looking at a smaller region level, Germany's study was also able to indicate different trajectories and a rise in dmft values [3-5].

While most districts in a central German city have shown a decrease in dmft, dmft has increased over time in other districts. Early childhood caries remains a major concern, following a decrease in the incidence of dental decay in children in western countries. The prevalence is very different from race, culture and ethnicity, socio-economic status, habits, standards of food and oral hygiene and several characteristic factors that vary from region to region. Previous work shows that the prevalence of early childhood caries in most developed countries is between 1 and 12%. The prevalence in less developed and poor countries in developing countries has been reported to be up to 70%, which in low socio-economic groups is seen to be more prevalent. Epidemiological studies in Europe have demonstrated a significant percentage of early-childhood caries preschool children, reflecting the prevalence of the disease, randomly dispersing in the populations, affecting families that are vulnerable disproportionately. In Sweden, there was a prevalence of early childhood caries of 2.1% to 7%, in Italy, 19% and in Greece, 36%. Some Asian countries, including Palestine (76%) and the United Arab Emirates (74.1%), have recorded high prevalence (10%). A contradictory prevalence of early childhood caries has been observed in other continental countries: In India (51.9%) and in Israel (64.7%). Moreover, Ismail and Sohn study have found 85.5 percent in rural Chinese children. In the USA, the prevalence in other Western countries is estimated at between 3 percent and 6 percent, with the highest incidence between the ages of 3 to 4 years and boys are significantly more vulnerable than girls aged between 8 months and seven years. From the literature review on the prevalence of ECC in 2-5 old children in Saudi Arabia have not being looked upon. Hence the study seeks to focus on this area [6].

Risk factors of ECCs

ECC is a multifactorial disease noted for its prevalence. Foods and drinks from sugar can result in caries dysbiosis of the microbial composition. Since ECC is known as baby bottle caries, the most important risk factor for ECC development is feeding. Children who sleep with bottles of sweetened tea or milk with different cariogenic sugars are at high risk for ECC growth. Without sugar clearance oral bacteria produce lactic acid quickly, demineralizing the enamel as a result of drinking during the night. Today, the risk of caries will be increased not only by the baby bottle but also by several other sweetened drinks drank during the day or even at night. ECC is both low-SES and high-SES families' disease.

Other key factors that increase the ECC risk include irregular tooth brushing and/or tooth brushing (mechanical removal of plaques) without caregivers' supervision. Therefore, twice a day, thorough brushing of the tooth should be done with supervision. The ECC risk factor may include sleep problems and insufficient sleep because sleep problems contribute to more prevalent use of nighttime bottles for sugar-sweetened drinks. Because the role of parents with their children developing ECC is still unclear, several studies focused on various associations.

Methodology research design

This study will use a cross-sectional research design. The design is appropriate as the purpose of this research is to determine the prevalence of Early Childhood Caries (ECC) among 25 elderly children in the ODC [7].

Sampling and sampling design

A sample design is a clear plan for collecting a sample from a particular population. It refers to the technology or the process that would be adopted by the researcher when selecting sample items. The analysis will use stratified samples as well as simple random samples. Three levels of station managers, technical staff and support personnel will be created. Then interviews will be done using simple random sampling within each stratum. The

sample is stratified according to the severity of ECC. The selected sample should be 183 children of ages between 2 and 5 who have visited the clinic for the problem of ECC.

Data collection methods

In this study, Data collection will be a survey questionnaire that will be used to collect data to ensure the collection of data contains all the facts. The survey questionnaire included different areas focusing on to know about the feeding practices of the child, their parents' socioeconomic status and awareness towards dental care. Subtitles were made available to guarantee that no ambiguity occurred. The study used a questionnaire, so a large number of respondents will easily answer. The questionnaires were issued manually to the parents. In a random way, the series of questions avoided any devaluation of the underlying variables. Questions were articulated in such a way that multiple choices were contained that respondents had to select choices from the available options [8-10].

Data analysis

The findings will be compiled with the aid of spreadsheets, using data editing, data sorting and data coding to establish relationships. The data will be imported into SPSS, where the variables will be defined and coding of significant categorical variables. Data will be analyzed through both descriptive and inferential statistics. When presenting the results, descriptive statistics will be used to summarize the demographic characteristics of the children visiting the clinic and provide a summary of their parents' feeding practices of the child, their socio-economic status and awareness towards dental care. Inferential statistics will be actively used in this project to answer research questions. The test will involve the *Chi-square* test to show if the independent variables under study have any significant association [11-14].

Results

Descriptive statistics

Clinical examination was done to 183 children between 2 to 5 years old in the dental officer clinic. 35 children are 2 years old (19.1%), 41 (22.4%), 31 (16.9), 76 (41.5%) are 3, 4 and 5 years old respectively as shown the Table 1 below.

Table 1: Data related to age.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	2	35	19.1	19.1	19.1
	4-3	41	22.4	22.4	41.5
	4-5	31	16.9	16.9	58.5
	5	76	41.5	41.5	100
	Total	183	100	100	

From the table above, we can conclude that most of those kids affected by ECC were five years since this age had the largest sample with more than 41% of the sample.

When the weight of the children, results showed 97.3% of the children are normal weight, 1.6% are overweight, while 1.1% are underweight. The results are as shown in the table below (Table 2) [15].

Table 2: Data related to weight.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Normal	178	97.3	97.3	97.3
	Overweight	3	1.6	1.6	98.9
	Underweight	2	1.1	1.1	100
	Total	183	100	100	

The study also determined the social and economic status of the parents and the results indicated that the socio-economic status of 89.6% of the families in the study is good, 7.1% are very good, while 1.1% is bad socio-economic status as shown below (Table 3).

Table 3: Socio-economic status.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No answer	4	2.2	2.2	2.2
	Bad	2	1.1	1.1	3.3
	Good	164	89.6	89.6	92.9
	Very Good	13	7.1	7.1	100
	Total	183	100	100	

There was also the determination of parents' education level which was divided into three categories namely bachelor, high education and limited education and the study found that 166 (90.7%) of the parents are bachelor education level, 8 (4.4%) while 6 (3.3%) had limited education (Table 4) [16-20].

Table 4: Educational level.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No answer	3	1.6	1.6	1.6
	Bachelor	166	90.7	90.7	92.3
	High education	8	4.4	4.4	96.7
	Limited education	6	3.3	3.3	100
	Total	183	100	100	

In the case of determining the hygiene level of the patients, the results showed 62.8% of the patients were fair oral hygiene, 13.7% were good and only 11.5 were poor oral hygiene (Table 5) [21].

Table 5: Oral hygiene.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No answer	22	12	12	12
	Fair	115	62.8	62.8	74.9
	Good	25	13.7	13.7	88.5
	Poor	21	11.5	11.5	100
	Total	183	100	100	

The study found that 115 patients out of 183 have caries. The results imply that 62.8% of the patients who visited the clinic were diagnosed with ECC.

From the results, types of caries in the article are ECC 30.1%, sever ECC 32.8% and 36.6 free of caries as shown in the Table 6.

The teeth affected showed that the upper incisors are the most infected teeth 32.8% as shown tabulated table, which is followed by lower incisors with 6.6%, 2nd molar with 2.7% and first is least affected with 1.1% [22].

Table 6: Types of carries cross educational level.

Count	Educational level	Total

			Bachelor	High education	Limited education	
Types of carries		0	1	0	0	1
	ECC	1	46	5	3	55
	Free	1	64	1	1	67
	Server ECC	1	55	2	2	60
Total		3	166	8	6	183

The study showed that 76.5% of the children are Bottle feeding, while only 22.4 % are breastfeeding.

Most of the patients 145 (79.2%) have two years' bottle time, 30 (16.4%) for three years or more and only 7 (3.8%) children for one year as shown in the table below.

From the study, when mothers were asked if they have any knowledge about the importance of pediatric dental care, the majority which sums up to 96.2% said yes while only 3.8% didn't understand the importance of pediatric dental care as shown in the Table 7 [23].

Table 7: Oral hygiene * educational level cross tabulation.

Count		Educational level				Total
			Bachelor	High education	Limited education	
Oral Hygiene		1	16	4	1	22
	Fair	1	112	1	1	115
	Good	1	18	3	3	25
	Poor	0	20	0	1	21
Total		3	166	8	6	183

The results showed 98% agreed that they went to consult a dentist they notice caries or changes in the tooth color while only 2% disagreed (Table 8) [24].

Table 8: Feeding habits * educational level cross tabulation.

Count		Educational level				Total
			Bachelor	High education	Limited education	
Feeding Habits		1	1	0	0	2
	Bottle Feeding	1	130	6	3	140
	Breast Feeding	1	35	2	3	41
Total		3	166	8	6	183

The study also showed most agreed that there is the importance of early checkup with 93.4 agree while only 6.6% disagreed (Table 9) [25].

Table 9: Time of bottle * educational level cross tabulation.

Count		Educational level				Total
			Bachelor	High education	Limited education	
Time of bottle		1	0	0	0	1
	1 Year	0	5	1	1	7
	2 Year	1	135	5	4	145
	3 Year and More	1	26	2	1	30
Total		3	166	8	6	183

The result also showed it is important to early checkups with a dentist, which was supported by 94% while not important represented the other 6% (Table 10) [26].

Table 10: Feeding habits.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No answer	2	1.1	1.1	1.1
	Bottle feeding	140	76.5	76.5	77.6
	Breast feeding	41	22.4	22.4	100
	Total	183	100	100	

Most people indicated that they get their information concerning ECC from the dentist, which occupied 95%, while social media represented another 5% (Table 11).

Table 11: Time of bottle.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No answer	1	0.5	0.5	0.5
	1 Year	7	3.8	3.8	4.4
	2 Year	145	79.2	79.2	83.6
	3 Year and more	30	16.4	16.4	100
	Total	183	100	100	

The study also showed that most parents were equipped with general knowledge about the risk of ECC, with 95.4% agreeing to this, while only 4.4% didn't have general knowledge.

Inferential statistics

These include statistical tests that measure the association between variables. The study used *chi-square* to test the hypotheses. The first hypothesis was to determine if there is any difference between education and types of carries. The results were as shown in the Table 12.

Table 12: Types of carries.

Table 12: Types of carries.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No answer	1	0.5	0.5	0.5
	ECC	55	30.1	30.1	30.6
	Free	67	36.6	36.6	67.2
	Server ECC	60	32.8	32.8	100
	Total	183	100	100	

The *chi-square* test showed a value of 6.270 with a p-value of 0.713. The p-value is large than the critical value of 0.05. This indicates we fail to reject the null hypothesis and conclude that there is no significant difference between education and Types of carries; we may not reject the null hypothesis [27].

Test of hygiene and level of education

The cross-tabulation table and the *chi-square* table are as shown below (Table 13).

Table 13: Most affected teeth.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No answer	104	56.8	56.8	56.8
	1st molars	2	1.1	1.1	57.9
	2nd molars	5	2.7	2.7	60.7
	Lower incisors	12	6.6	6.6	67.2
	Upper incisors	60	32.8	32.8	100
	Total	183	100	100	

The *chi-square* test showed a value of 30.260 with a 2-sided p-value of 0.00. The p-value is less than 0.05, which is critical. The value indicates we reject the null hypothesis and conclude that there is a difference between oral hygiene and level of education.

Test of types of carries and oral hygiene

The test is carried out to show if there is any difference between the groups. The results include a cross-tabulation and a *chi-square* table as shown below (Table 14) [28].

Table 14: Feeding habits * types of carries cross tabulation.

Count		Types of carries				Total
			ECC	Free	Server ECC	
Feeding Habits		0	0	1	1	2
	Bottle Feeding	1	40	52	47	140
	Breast Feeding	0	15	14	12	41
Total		1	55	67	60	183

The results show the free type of carries with good oral hygiene highly occurred. The *chi-square* test results showed a value of 55.471, with a p-value of 0.00. The results indicate we reject the null hypothesis and conclude there is a difference between oral hygiene and types of carriers.

Test of age and type of carries

The test was done on these two variables to show whether there is a difference between them. The results were as shown in the cross-tabulation and *chi-square* tables below (Table 15).

Table 15: Time of bottle * Types of carries cross tabulation.

Count		Types of carries				Total
			ECC	Free	Server ECC	
Time of bottle		0	0	0	1	1
	1 Year	0	4	2	1	7
	2 Year	1	42	61	41	145
	3 Year and more	0	9	4	17	30
Total		1	55	67	60	183

The table shows the age of 2 years with a free type of carries were highly involved.

From the *chi-square* results above, the test value was 54.958, with a p-value of 0.00<0.05. The results indicate that the null hypothesis is rejected and concludes that there is a difference between age and type of carries.

Test of education level and feeding habits

The results tabulation showed as many have reached Bachelor level, their feeding habit is bottling feeding, indicating there have acquired the knowledge of the importance of bottle feeding. The results are as follows (Table 16) [29].

Table 16: Oral hygiene * types of carries cross tabulation.

Count		Types of carries				Total
			ECC	Free	Server ECC	
Oral hygiene		0	8	6	8	22
	Fair	0	28	53	34	115
	Good	0	17	7	1	25
	Poor	1	2	1	17	21
Total		1	55	67	60	183

Association between the level of education and time of bottle

The study also determined the relationship time on the bottle with the level of education and the results showed that most of those who have received degree are able to know the time for the bottle is two years as shown in the table below (Table 17).

Table 17: Feeding habits * most affected cross tabulation.

Count		Most affected					Total
			1st molars	2nd molars	Lower incisors	Upper incisors	
Feeding habits		2	0	0	0	0	2
	Bottle feeding	80	0	5	11	44	140
	Breast feeding	22	2	0	1	16	41
Total		104	2	5	12	60	183

Feeding habits versus caries

The study also compared feeding habits and caries. The results showed that bottling feeding was associated with the majority of the types of caries. The results are tabulated below (Tables 18-22).

Table 18: Knowledge of mother about important of pediatric dental care.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No	7	3.8	3.8	3.8
	Yes	176	96.2	96.2	100
	Total	183	100	100	

Table 19: Going to the dentist when noticing caries or changes in the tooth color.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No answer	1	0.5	0.5	0.5
	No	4	2.2	2.2	2.7
	Yes	178	97.3	97.3	100
	Total	183	100	100	

Table 20: Does the mother think it is important to do early checkup.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No	12	6.6	6.6	6.6
	Yes	171	93.4	93.4	100
	Total	183	100	100	

Table 21: Does the mother think it is important to do early checkup with a dentist.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Important	172	94	94	94
	Not important	11	6	6	100
	Total	183	100	100	

Table 22: Source of information.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dentist	173	94.5	94.5	94.5
	Social Media	10	5.5	5.5	100
	Total	183	100	100	

Time of bottle versus type of carries

The study determined the relationship between the type of carries and time of bottle and the results shows two years was the time of bottle and free type of carries most occurring as shown below (Table 23).

Table 23: Knowledgeable * educational level cross tabulation.

Count		Educational level				Total
			Bachelor	High education	Limited education	
Knowledgeable	No	1	5	0	2	8
	Yes	2	161	8	4	175
Total		3	166	8	6	183

Feeding habits versus most affected

The results of the association between feeding and most affected showed bottle feeding was the appropriate mode of feeding with upper incisors being the most affected teeth. The results are tabulated below (Table 24).

Table 24: Knowledgeable.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No	8	4.4	4.4	4.4
	Yes	175	95.6	95.6	100
	Total	183	100	100	

The study determined the relationship between general knowledge and educational level and the results showed that most were knowledgeable and the majority had reached bachelor level as shown below:

Discussion

Early childhood caries is known to be contagious and communicable dental illness in the deciduous teeth and may have significant long-term impacts including otitis media orthodontic disorders, speech disorders, infant deleterious oral behaviours and potential psychosocial issues. A single pattern of decomposition begins with the main leakage incisors and is followed by leachate molars in order to erupt. The study was aimed at finding the prevalence of ECC among children of ages between 2 years and five years. The results showed the prevalence was highest among the age of 5 years with 76 patients. Out of 183 patients, 115 was found to have the carries, which represent 62.8%. Therefore, the prevalence of ECC among the 2-5 years' children was found to be 62.8%. The present study confounds with the results from Alotaib et al., wherein their study which included two hundred and twenty-four children.

One hundred twenty-seven males (56.7%) and 97 females (43.3%) were accordingly divided into two age groups, 3-4 years of age (9.82%) and 5-6 years of ancient age (90.18%). Of the 163 diagnosed ECC (72.77 percent), there were only 92 males and 71 females, while 61 (27.23 percent) had no clinical caries. There is a pattern of high early caries in comparison with other countries, comparable to Peru with 62.3 percent and 41.9 percent in India. For countries like Chile, however, the prevalence is 20.3%, while England and Sweden have a prevalence range between 1 and 17% and 20% in the USA and Brazil. The low prevailing prevalence of dental caries is due to intervention programs that should be taken into account in developing countries. The most likely cause of decreased dental caries in most industrialized countries has

been increased fluoride consumption. The current study indicates the upper incisors are highly affected with carries showing a percentage of 32.8% for those diagnosed with carries. Most of the children had a normal weight with more than 95%. The most occurring type of ECC was found to be free ECC with a percentage of 36.6. When studying the parents of patients, the majority were bachelor degree holders who contribute to a percentage of 90.7%, while their social, economic status was good with 86.9 % proportion. Finally, their oral hygiene was found to be majorly fair, with 74.6% agreeing to this. Most children were fed by means of bottles with a percentage of 75.6% of which of these 79.2% received for a period of 2 years [30].

The study determined the relationship between the independent variables. The result from the test for the difference between education level and types of carries showed there was no difference between the variables. This concludes that the variables were not independently distributed. The results of the relationship between oral hygiene and the type of carries showed the variable had no difference, meaning the variables were independently distributed. Finally, when testing if there any difference between age and types of carries, the results showed there was a difference between the variables.

Conclusion

The current study used a sample size of 183 patients, where 115 were diagnosed with ECC. Therefore, the study was able to determine the prevalence of ECC among the children of ages 2-5 years, which was approximately 62.8%. The study also identified the social-economic status of most parents in the country as being good. The oral hygiene of most parents was determined to be fair, while children with five years were most affected. The study there can provide awareness to most parents and from it, they can know when their children are at risk of ECC so that to consider early checkups. From the study, the clinic is mandated to actively create awareness to many parents for regular checkups so that to lower the prevalence of ECC.

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