

Dental Caries Prevalence among a group of Egyptian Nurseries Children

Abou El-Yazeed, M.*; Rashed, M. **; El sayed, M. **; Salah, A. *

* Orthodontics and Pediatric Dentistry Department, National Research Centre, Egypt.

** Pediatric Dentistry and Dental Public Health Department, Faculty of Oral and Dental Medicine, Cairo University, Egypt.

el_yazieddent@yahoo.com

Abstract: Dental caries in children attending nurseries has a significant dental public health problem and health disparity implications. **Aim:** This study was carried out to investigate the prevalence of dental caries among a group of Egyptian children at nurseries in El Kalubia Governorate, Egypt. **Subjects and Methods:** A total number of 999 Egyptian children 496 boys and 503 girls with their ages ranged from three years to less than six years. Children were selected randomly and examined from those attending nurseries. The examined children were subdivided according to their ages into five age groups with six month intervals. Clinical examination was conducted at the nurseries and was exclusively visual with the help of tongue depressor according to the World Health Organization oral examination criteria for mass population and carried out under natural day light with children lying on ordinary desks. **Results:** Dental caries prevalence was high among the study subjects (60.4%) with the mean dmf value 3.31 ± 3.99 . The results of this study showed that the prevalence of dental caries increases with age and there is no statistically significant difference between boys and girls (P value equal 0.24). The sequence of caries attacks follows specific pattern where the right mandibular first primary molar had the highest caries percentage (36.5 %) then maxillary molars and maxillary anteriors teeth and finally the left lower primary lateral incisor which exhibit the lowest caries percentage (1.00%). **Conclusions:** Dental caries prevalence is relatively high among the examined subject and these findings stress the need for implementing an effective oral health preventive program for those children as well as an educational dental health programs for their guardians and teachers to improve their oral health status.

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1. Introduction

Dental caries is one of the most prevalent chronic diseases in mankind worldwide. It is a multifactorial disease that starts with microbiological shifts within the complex biofilm (dental plaque). Caries is affected by the consumption of dietary sugars, salivary flow, exposure to fluoride and preventive behaviors, it is therefore very important to prevent dental caries, but this will not be successful unless the available scientific knowledge about changing the etiological factors of the disease is applied (Poureslami and Amerongen, 2009).

Dental caries is an infectious, transmissible bacterial disease; the most predominant bacterial species are streptococcus mutans and lactobacilli species, as in ordinary pattern of dental caries (Selwitz et al., 2007). In children the caries attack pattern depends on three factors: the timing of the tooth eruption, the time span of the harmful dietary habit and the type of muscle movements during sucking and swallowing. Many authors reported that the attack pattern of the early childhood caries changes at age three, when it begins to affect the first and second primary molars (Brodeur et al., 2006;

Hallett et al., 2006 , Berkowitz ,2006 and Andrea, et al 2010.

A comprehensive review of the epidemiology of dental caries in children showed that its prevalence varies from population to another (Kaste et al., 1992, Milnes, 1996 and Wyne, 1999 and Leake et al., 2008). The World Health Organization's 2003 report on oral health provides an overview of global caries epidemiology that confirms its international pandemic distribution. Globally, WHO reports caries prevalence in school-age children at 60-90%. The American Centers for Disease Control and Prevention released report which revealed high ongoing prevalence of dental caries in children, with 27% of nurseries, 42% of school-age children and 91% of adults having caries (Petersen et al., 2005 and Edelstein, 2006). In Boston, United States the prevalence of early childhood caries in 1- to 3-year-old children seeing primary-care pediatricians at two urban medical centers in Boston was compared to that prevalence in similarly aged US children surveyed as part of the Third National Health and Nutrition Examination Survey, it was found that overall the prevalence among one to three year-old urban Boston children was 3.0 %, while the

overall prevalence among one to three years old US children was 6.3 % (Nunn et al., 2009). In Brazil a cross sectional study was done to investigate the prevalence of caries in children from 0-36 months and its relationship with sugar consumption, it was found that caries was present in 38% of the babies, and an average dmft-t was 3.208 (Peelm et al., 2008). In Australia a cross-sectional sample of 2515 children aged from 4 to 5 years was examined in nurseries using decayed, missing, filled teeth/surface (dmft/dmfs), 12.3% had an anterior caries pattern, 21.4% had a posterior pattern, 24.3% children had non-severe caries and 29.4% had severe caries experience. The sample mean dmft was 1.4 ± 2.77 and the mean dmfs was 2.28 ± 6 (Hallet and O'Rourke, 2006). In Kai Fu Changsha, China a cross sectional study was conducted to investigate the dental caries prevalence in primary teeth among nurseries children the results showed that the prevalence of dental caries was 39.65% and the mean dmft score was 1.32(Que and Hau, 2009). In Switzerland a cross sectional study was conducted to describe the caries prevalence in two years old children, it was found that about 12.6% of the children had early childhood caries and about 4.4% of the children had severe early childhood caries with the mean dmft was 4.3 (Menghini et al., 2008). In Israel a cross sectional study was undertaken to assess the prevalence of dental caries in the earliest age at which children were organized as a group in the national education system and to find possible associations with variables that may help to identify "groups at risk", in this population a total of 965 children, 5 years old were examined, it was found that 84% of the children were affected with mean dmft of 4.7 ± 3.6 (Zadik, 2006). In Egypt the prevalence of early childhood caries varied among different researches. A study in Cairo was done to investigate dental caries prevalence in 900 child with their age ranged from 3-12 years old. The mean dmfs was 10.2 and it reached its maximum level at age 8-9 years old, the mean DMFT reached its maximum level at age 11-12 years (El-Sayed, 1996). Another study in Cairo was carried out to determine the prevalence of early childhood caries among Egyptian children by reviewing the patients assessment charts of the patients attending the Pediatric Dentistry Department, Faculty of Oral and Dental Medicine, Cairo University throughout the year 2003-2004, the results of this study revealed that the prevalence of early childhood caries among the children attending the department clinics was 8.022%, while boys showed higher caries prevalence than girls (Awad, 2006). In Giza governorate a cross sectional study was conducted to investigate the prevalence of nursing caries among 2073 nurseries children from

rural areas with their age ranged from 1-4 years, it was found that the prevalence of dental caries was 14.32% with females were more affected more than males (Abd El-monem, 1997).

Aim of the study

Dental caries is considered a major health problem in the field of pediatric dentistry; as its prevention and management require intervention of multidispelinary approaches, from this scope this study was carried out to throw light on the situation of dental caries among a group of Egyptian children at some nurseries in El Kalubia Governorate.

2. Subjects and Methods

The protocol of this study was first submitted to the ethical committee of the National Research Centre, Egypt. A consent form was obtained from the nursery principles to conduct this study, as well as a written permission was also obtained from the parents or guardians to perform the examination. Only children of parents or guardians who gave permission were included in the study. A total number of 999 Egyptian children were included in this study, their ages ranged from three to less than six years old. Children were classified into two main groups (males and females). Each group was subdivided according their ages into five subgroups with six months interval. Subgroup I - Children with an age ranged between (3-3.5), II - Children with an age ranged between (>3.5 -4), III - Children with an age ranged between (>4- 4.5), IV - Children with an age ranged between (>4.5- 5) and V - Children with an age ranged between (>5- <6). Personal data including name, age, sex, address and site of the nursery were recorded. The examination was carried out in the day light, with the children lying on ordinary desks facing a window in the class room. In this study decayed (d), missed (m) and filled (f) primary teeth (dmf) index was used. All data were analyzed using Microsoft Excel Software with statistical subroutines add in SPSS version 11. The obtained data arranged, tabulated and subjected to statistical analysis using non parametric tests for interpretation. Non parametric tests were used to test the level of significance between boys and girls, maxillary and mandibular teeth as well as between both the right and left sides (independently).

3. Results

The dental caries prevalence among the examined subjects was 60.4% with the mean dmft values was 3.31 ± 3.99 . Comparison between caries experience in boys and girls shows that the dmft values for girls had higher prevalence as compared to that of boys where the mean dmft equal 3.20 ± 3.91 and 3.41 ± 4.01 for boys and girls respectively but no

statistically significant difference was found between them where P value equal 0.2430 (Table, 1). As regarding the dmf values of the maxillary and mandibular teeth, highly statistically significant difference was noticed when comparing their values where P value equal zero, meanwhile comparing the dmf values of the right and left sides showed that

there is no statistically significant difference between them with P value equal 0.5184 (Table, 1).

Table (2) and Figure (1) shows the total mean of dmf values for the five age groups separately, where the mean±SD were 2.5806±3.3729, 2.5067±3.8847, 2.9520±3.9863, 3.3667±3.5992 and 3.7723±4.1323 respectively and a statistically significant difference was found between them where P value equal 0.005.

Table (1): Comparison between caries experience in boys and girls, maxillary and mandibular teeth as well as right and left sides

Caries experience	Dmf (Mean ± S.D.)	P value
Boys	3.20±3.91	0.2430
Girls	3.41±4.01	
Maxillary teeth	1.33 ± 2.14	0.000*
Mandibular teeth	1.98 ± 2.34	
Right side	1.64±2.06	0.5184
Left side	1.98±2.34	

*Significance at P < 0.05

Table (2): Mean dmf values for the five age groups

Caries experience	Group I Mean ± SD	Group II Mean ± SD	Group III Mean± SD	Group IV Mean± SD	Group V Mean± SD	P value
dmf	2.5806±3.3729	2.5067±3.8847	2.9520±3.9863	3.3667±3.5992	3.7723±4.1323	0.0052

*Significance at P < 0.05

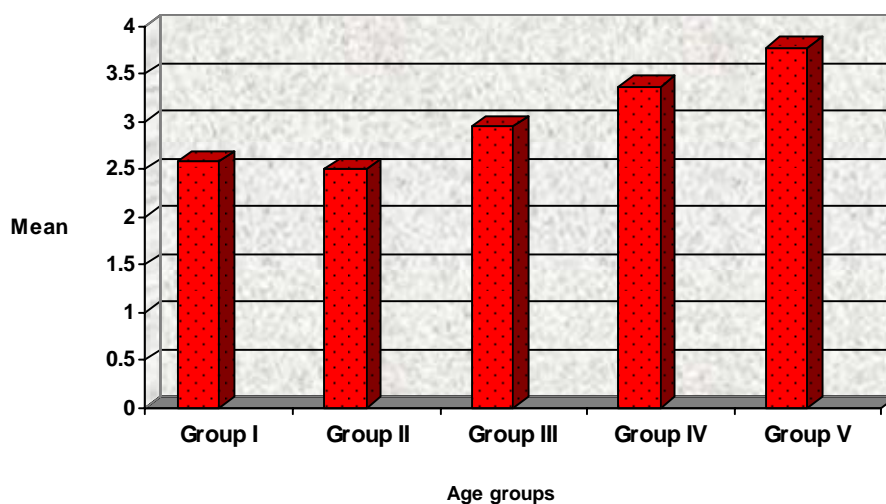


Figure (1): Mean dmf values for the five age groups

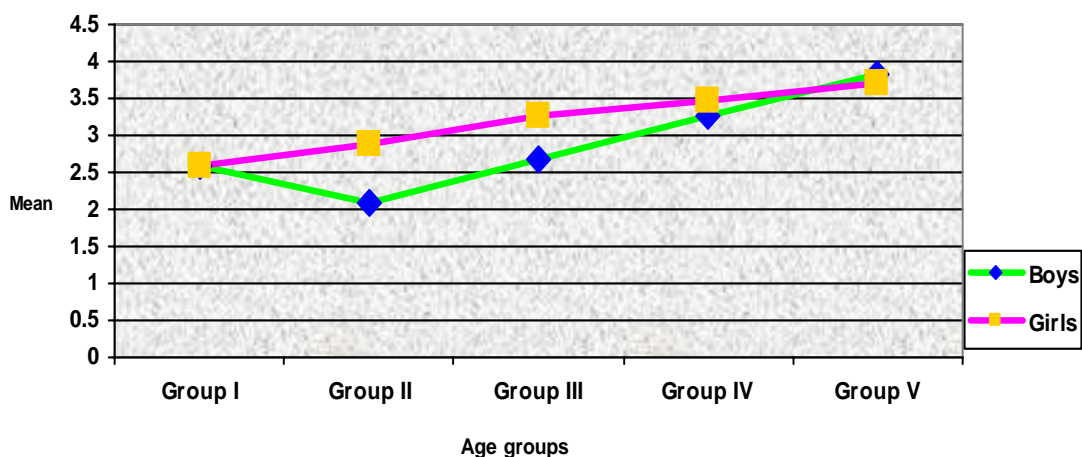


Figure (2) Mean dmf values of caries experience for boys and girls

Table (3) Mean \pm Standard Deviation of the dmf values of the five age groups by arch and side

Variables	dmf values														
	Group I		P value	Group II		P value	Group III		P Value	Group IV		P	Group V		P value
	Boys (n=48)	Girls (n=45)		Boys (n=35)	Girls (n=40)		Boys (n=147)	Girls (n=124)		Boys (n=45)	Girls (n=45)		Boys (n=221)	Girls (n=249)	
Right side	1.38 \pm 1.82	1.29 \pm 1.79	0.82	1.02 \pm 1.67	1.40 \pm 2.15	0.41	1.26 \pm 1.80	1.59 \pm 2.18	0.18	1.51 \pm 1.82	1.71 \pm 1.77	0.60	1.95 \pm 2.27	1.85 \pm 2.08	0.61
Left side	1.21 \pm 1.61	1.29 \pm 1.69	0.82	1.05 \pm 1.96	1.47 \pm 2.02	0.37	1.43 \pm 1.95	1.66 \pm 2.29	0.38	1.75 \pm 2.12	1.75 \pm 1.89	1.00	1.87 \pm 2.09	1.86 \pm 2.18	0.96
Upper arch	1.14 \pm 1.82	1.06 \pm 1.85	0.84	1.05 \pm 2.32	1.32 \pm 1.95	0.59	1.14 \pm 2.09	1.21 \pm 2.15	0.79	1.51 \pm 2.30	1.15 \pm 1.09	0.59	1.60 \pm 2.31	1.35 \pm 2.12	0.23
Lower arch	1.44 \pm 1.92	1.51 \pm 1.94	0.86	1.02 \pm 1.58	1.55 \pm 2.41	0.27	1.54 \pm 2.00	2.04 \pm 2.57	0.08	1.75 \pm 1.89	2.31 \pm 2.18	0.58	2.23 \pm 2.37	2.36 \pm 2.59	0.56
Total	2.58 \pm 3.36	2.58 \pm 3.43	0.78	2.09 \pm 3.60	2.88 \pm 4.13	0.51	2.69 \pm 3.63	3.26 \pm 4.37	0.13	3.27 \pm 3.77	3.47 \pm 3.45	0.49	3.83 \pm 4.19	3.71 \pm 4.09	0.38

* Significance at $p < 0.05$

Table (3) shows the mean \pm standard deviation of the dmf values of the five age groups by arch and side. It was observed that boys and girls of age group five have the highest dmf for both right and left sides. By assessing the dmf value of both upper and lower arch it was observed that boys of age group two have the lowest dmf values for both upper and lower arch.

The percentage of decayed, missed and filled primary teeth for all examined children was shown in table 4. It was found that the upper right first primary molar had the highest decayed and filled percentage where d component equal 19.2% while for the filled percentage f component equal 1.1%. On

the other hand the upper right primary canine had the lowest decayed and filled percentage where d component equal 2.1% and f component equal zero. As regarding the percentage of decayed, missed and filled lower primary teeth for all examined children. It was found that the lower right first primary molar had the highest decayed percentage where its d component equal 36.5 while the lower left primary lateral incisor had the lowest decayed percentage where its d component equal 1.00. It was also noticed that there were no missing lower primary lateral incisors and lower right primary canine where their m component equal zero.

Table (4): Percentage of decayed (d), missed (m) and filled (f) teeth for all examined children in both arches

Tooth	% d	% m	% f
URE	16.6	0.30	0.00
LRE	30.5	2.00	2.90
URD	19.2	1.80	1.10
LRD	36.5	2.70	2.70
URC	2.10	0.00	0.00
LRC	1.90	0.00	0.00
URB	6.30	0.20	0.00
LRB	1.10	0.00	0.00
URA	12.1	0.50	0.00
LRA	1.30	0.50	0.00
ULA	11.8	0.50	0.00
LLA	1.30	0.20	0.00
ULB	7.00	0.20	0.00
LLB	1.00	0.00	0.00
ULC	2.50	0.00	0.00
LLC	2.30	0.10	0.00
ULD	18.8	2.00	0.90
LLD	34.3	3.30	3.00
ULE	16.5	0.20	0.60
LLE	30.2	2.00	3.40

4. Discussions

Information about dental caries prevalence and severity forms the basis for caries prevention programs and treatment needs in population; therefore there is a continuous need for more studies about the prevalence and severity of dental caries. The present study was carried out to determine the caries prevalence among a group of Egyptian nurseries children in El Kalubia Governorate. In this study the mean dmf of the total subjects shows lower values than the results of similar studies that were conducted in Kuwait by Vigild et al., 1996 and in Saudi Arabia by Wyne, 2008, this may be attributed to the difference in the life style and socioeconomic level of the children of these countries as they consume more cariogenic food, junk food and drink high amount of carbonated soft drinks as compared to that of Egyptian children.

On the contrary it was found that the mean dmf of the total sample was higher than the results of Masiga and Holt, 1993 in Nairobi and a similar study conducted on Brazilian nurseries children aged from 2-6 years done by Freire et al., 1996, this may be attributed to the low socioeconomic status of the children in these countries which in turn may lead to the decrease in consumption of sweets and carbonated soft drinks. It was observed that the dmf values increase as age increases. As age factor is considered in all articles the most important factor that affects dental caries prevalence, so with age

increase the higher will be the dental caries prevalence (Que and Hou, 2009), this may be related to the fact that as the age increases the time that the teeth subjected to cariogenic food will also increase which may raise the possibility for decay, these observations were confirmed by the results of similar studies conducted by Allukian, 2000, Saravanan et al., 2008 and Que and Hou, 2009. Although there was gradual increase in the dmf values by age along the five examined groups no statistical significant differences were found between them, this may be attributed to the short age interval between groups. On the other hand when correlating the dmf values between group one and five a statistically significant difference was found, this is in agreement with the results obtained by Ferreira et al., 2007 and Simin, 2010 and may be related to the increase of age interval (three years) between group one and five. The comparison between the dmf values of the upper and lower teeth showed a significant relation, this may be due to the morphological variation of the occlusal anatomy as well as variation in the chronology between the upper and lower primary teeth; this is in agreement with the work of Al Hadded et al., 2006.

There was no statistically significant difference between the dmf values of the right and left sides, formally we can explain this by the absence of morphological or chronological difference between them, as both the right and left primary teeth

nearly erupt around the same average eruption dates (Mc Donald et al., 2005). The present study showed no statistical significant difference by comparing the male and female dmf values where P equal 0.2430 which is in agreement with varying studies in other countries (Segovia-Villanuve et al., 2006 and Wanjau and Plessis 2006), this may be attributed to the fact that the dietary and oral hygiene practices related to dental caries are mostly controlled by parents/guardians at this early age, consequently it is considered too early to develop any gender difference in caries prevalence between males and females at this age.

Concerning the caries prevalence on the scale of tooth unit for the entire study sample, it was found that among the anterior primary teeth, the maxillary primary central incisors were the teeth with the highest caries prevalence where the decayed percentage for upper right primary central incisors equal 12.1% and for upper left primary central incisors equal 11.8%. Our results are similar to a study conducted on Tanzanian and Saudi nurseries children applied by Kerusno et al, 1991 and Wyne et al., 2002, this is due to the close interproximal contact between maxillary central incisors and the direct exposure during intake and pooling of cariogenic fluid around these teeth. On the other hand the lower primary incisors had the lowest decayed percentage among the anterior teeth this is explained by the fact that the lower incisors are protected from direct exposure to acidic food by the tongue, also they are close to the sublingual salivary gland duct where it helps in diluting the acidic environment around the lower incisors, this result was confirmed by the results recorded by Wyne et al., 2001 and Carino et al., 2003.

Among the posterior teeth it was found that the mandibular first primary molars showed the highest caries prevalence where the decayed percentage was 34.3% and 36.5% for the right and left primary molars respectively, these results are similar to the work of Kerusno and Honkala, 1991. The increase of the caries prevalence in the first primary molar may be attributed to the tooth morphology as well as to the fact that it is the first erupting primary molar in the mouth. Meanwhile the upper second primary molars had the lowest decayed percentage among the posterior teeth, this may be attributed to their closer proximity to the parotid gland duct and their eruption chronology as it is the last primary teeth erupt in the mouth (Mc Donald et al., 2005).

Analysis of each component of the total dmf index of the sample showed a marked influence of the decayed component upon the total values of dmf scores, this is in agreement with Wei et al., 1993,

Mattos-Graner et al., 1996 and Shang et al., 2008. The high decayed component of dmf score indicates huge unmet treatment need among this young population, this is may be attributed to the lack of community awareness about the idea that prevention and treatment of caries should begin at early childhood, also to the bad cultural beliefs which assume that primary teeth should not be treated as it will be replaced by permanent teeth, these beliefs may influence dental caries prevalence especially in disadvantaged communities.

5. Conclusion

Dental caries prevalence is high among nurseries children in El Kalubia Governorate, Egypt (60.4%) with the mean dmf value, 3.31+ 3.99. No statistical significant difference was found neither between dmf values of boys and girls nor between values of right and left sides, meanwhile this difference was significant between upper and lower teeth. The untreated decayed teeth dominated the dmf score among all examined children. This study documents widespread neglect of oral health of nurseries children at El Kalubia Governorate, Egypt.

Recommendations

1. Dental health education programs must be carried out for the children, their parents and their nursery care takers through the collaboration of all community organizations.
2. It is necessary to develop broad national strategy for the implementation of dental caries preventive measures.

Corresponding Author:

Abou El-Yazeed, M.

Associate Professor -Department of Orthodontics and Pediatric Dentistry

National Research Centre - Dokki -Giza 12311

Egypt

el_yazieddent@yahoo.com

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