

## ORAL HEALTH STATUS AND DENTAL TREATMENT NEEDS OF PRESCHOOL CHILDREN IN 6<sup>th</sup> OCTOBER CITY, EGYPT

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### ABSTRACT

**Aim:** The aim of this study was to examine the oral health status, significant caries index and utilization of dental care among preschool children.

**Subjects and Methods:** A cross sectional study was conducted on 581 children aged 2-5 years attending preschools and living in 6<sup>th</sup> October city, Egypt. The clinical examination of oral health status followed the World Health Organization's guidelines for oral health surveys, 1997. Dental caries was determined using the decayed, missed and filled teeth (dmft) index. Significant caries index (SiC) and care index (CI) were also calculated. Tooth brushing habits at school and lunchbox contents of those children were also analyzed using a questionnaire distributed to pre-school teachers.

**Results:** The overall prevalence of dental caries was 50.6% and the prevalence of early childhood caries was found to be 11.5%. The total mean dmft score of the examined children was  $2.1 \pm 2.722$  where the decayed component was dominant. The mean population SiC was  $5.19 \pm 2.410$  and the care index was found to be low with a mean of 6.2%. Visible plaque was found on tooth surfaces of 20.7% of the children and sugary snacks consumption was common among all children. **Conclusion** The prevalence of dental caries in this population was high and most of the decayed teeth were not treated. Implementation of oral health preventive and treatment campaigns is required to achieve optimal oral health in preschool children in this community.

**KEY WORDS:** caries prevalence; early childhood caries; preschool children; significant caries index; care index

### INTRODUCTION

Dental caries is among the most common dental problems affecting human race. This condition is a major health problem with high prevalence globally involving the people of all regions and societies. <sup>(1)</sup>

Early childhood caries is a devastating form of dental caries affecting children of all communities. It can be defined as the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger. <sup>(2)</sup>

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Prevalence of dental caries in preschool children varies greatly among populations.<sup>(3-6)</sup> Findings from epidemiological studies in the Middle East countries showed that the prevalence of dental caries is high among preschool children with the mean dmft ranging between 4 and 10.2.<sup>(7-9)</sup> A survey on the prevalence of caries in preschool children in Egypt showed that caries prevalence varies among different socio-economic levels, 66.42% of children in high socioeconomic level are caries free versus 37.59% in middle socioeconomic level and only 4.9% in lower socioeconomic group.<sup>(10)</sup>

Dental diseases are connected to lifestyles, and multiple risk factors may affect dental health habits and consequently dental health. Children affected with caries eat snacks between meals more frequently than those without caries, perhaps resulting from their guardians' indulgence in giving the children sweets or snacks upon request.<sup>(11)</sup>

The aim of this study was: first, to evaluate the dental caries prevalence, its intraoral distribution, dental treatment coverage and treatment needs of preschool children in 6th October City; second, to determine tooth brushing habits and dietary habits practiced by those children in kindergartens.

## SUBJECTS AND METHODS

This cross-sectional study was conducted in the community of 6th October city, Egypt, among preschool children. 6th October City is a satellite town and part of the urban area of Cairo, Egypt. It is a government planned community to help ease the central cities over-crowding issues. Many private dental schools are located in the area offering free dental treatment to residents of the city.

### Subjects

Children were recruited from the three largest preschools with low tuition fees, belonging to non-governmental organizations, offering services to residents of middle socio-economic level within

6<sup>th</sup> October city. The selected preschools agreed to participate in this study. A letter was sent to the children's parents informing them about the aim of the study and asking for their consent for participation in this study.

All children attending classes on the day of examination and having parents' consent were included in this study. The final study population was 581 children aged 2 to 5 years old (boys and girls). They were subdivided into four age groups: 2 - < 3 years (50 children), 3- < 4 years (252 children), 4- < 5 years (205 children) and 5- < 6 years (74 children).

### Clinical Examination

The caries status was determined using the decayed, missed and filled teeth (dmft) index as described by WHO which was mainly made visually at the cavitation level.<sup>25</sup> Initial carious lesions were not recorded. The clinical examination took place in the classrooms under daylight, with the use of disposable plane mouth mirrors. The dental examination followed the World Health Organization's guidelines for oral health surveys. [World Health Organization, 1997].<sup>(12)</sup>

Clinical examinations were carried out by three calibrated examiners throughout the survey. Calibration exercises were carried out on patients of a University dental hospital prior to the survey in order to reduce discrepancies in caries diagnosis between examiners. Duplicate examinations were systematically carried out on one out of every ten children during the survey. The Kappa statistic was used to assess the inter-examiner reproducibility. The inter-examiner reliability in caries diagnosis among the three examiners was Kappa values of 0.80 ( $P < 0.001$ ), 0.87 ( $P < 0.001$ ) and 0.88 ( $P < 0.001$ ).

The overall prevalence of dental caries was recorded for the surveyed children. The mean dmft scores, Significant Caries Index (SiC) and Care index (CI) were calculated. SiC is the mean dmft

of the one third of the sample within the highest caries score and CI is measured as  $ft/dmft \times 100\%$ . Presence of visible plaque on the gingival margins of tooth surfaces was also recorded. <sup>(13)</sup>

**Questionnaire**

The teachers were asked to complete a questionnaire specially designed for this study. The questionnaire consisted of three parts and the following information was collected: 1. the children’s personal data age and gender. 2. Tooth brushing habit at the school 3. The usual daily contents of the child’s lunch box. Four commonly consumed food items were chosen, type of sandwiches, fresh vegetables or fruits and sugary snacks to assess the dietary habits of those children during pre-school hours. Statistical analysis

SPSS package (Statistical Package for Social Sciences) version 12.0. Mean  $\pm$  standard deviation with median and range described numerical data. Percentage described qualitative data. Non-parametric t test (Mann Whitney) compared two independent groups and non-parametric ANOVA (Kruskal Wallis) compared more than two independent groups. Chi – square tested proportion independence.

**RESULTS**

A total of 581 children (338 boys and 243 girls) participated in this study. The number of children affected with dental caries was 294 (50.6%). The percentage of boys affected by caries was 53.2% versus 48% for girls. Table 1 shows caries distribution among the study sample in relation to age.

With respect to the intra-oral distribution of dental caries, the majority of children 227 (39.1%) had caries in posterior teeth only, 52 (8.9 %) had both posterior and anterior teeth caries, while very few 15 (2.6 %) had only anterior tooth caries. The prevalence of early childhood caries was found to be 11.5%.

The total mean dmft score of the examined children was  $2.1 \pm 2.722$ . Low caries index (dmft index 1-3) was found in 167 (28.7%) of the children, moderate caries index (dmft index 4-6) in 58 (10 %) children, and high caries index (dmft index  $\geq 7$ ) in 69 (11.9 %) children.

TABLE (1) Caries distribution among the study sample in relation to age

Age	Total examined	Caries affected	Caries free
	n (%)	n (%)	n (%)
2- < 3 years	50 (8.6%)	34 (5.85%)	16 (2.75%)
3- < 4 years	252 (43.3%)	154 (26.5%)	98 (16.9%)
4 - < 5 years	205 (35.3%)	77 (13.25%)	128 (22%)
5 - 6 years	74 (12.7%)	29 (5%)	45 (7.75%)
<b>Total</b>	581 (100%)	294 (50.6%)	287 (49.4%)

Analysis of the components of the dmft index showed that more than 90 % of the index consisted of decayed teeth, 1% missing teeth (extracted due to caries), and 7.4% filled teeth. The mean dmft value increased with age with a statistically significant difference between the age groups two and three years versus age groups four and five years old. (Table 2)

The mean population (SiC) was  $5.19 \pm 2.410$  and the care index was found to be low with a mean of 6.2% (Table 3).

A statistically significant difference between the mean dmft and gender was noted ( $p=0.04$ ) (Table 4).

Tooth brushing habit at school was low as only 20.7% of children brushed their teeth at school after breakfast or after the snack. Visible plaque deposits were recorded in 24.4% of the examined children. A significant difference was noted between the occurrence of visible plaque deposits and dmft score ( $4.06 \pm 3.215$  versus  $1.59 \pm 2.507$  at  $p \leq 0.001$ ) (Table 5).

TABLE (2) Mean dmft values and its components in relation to age

Age	variable	dt	mt	ft	dmft
2-< 3 years	n	50	50	50	50
	Mean	1.18	0.00	0.00	1.22
	±s.d.	2.229	0.000	0.000	2.225
	median	0.00	0.00	0.00	0.00
	minimum	0	0	0	0
	maximum	8	0	0	8
3- <4 years	n	252	252	252	252
	Mean	1.31	0.01	0.10	1.42
	±s.d.	2.016	0.126	0.527	2.180
	median	2.00	0.00	0.00	0.00
	minimum	0	0	0	0
	maximum	8	2	4	10
4-< 5 years	n	205	205	205	205
	Mean	2.55*	0.04	0.32	2.91*
	±s.d.	2.705	0.277	0.841	3.146
	median	2.00	0.00	0.00	2.00
	minimum	0	0	0	0
	maximum	10	2	4	12
5-6 years	n	74	74	74	74
	Mean	2.55*	0.01	0.15	2.8*
	±s.d.	2.500	0.116	0.612	2.746
	median	2.00	0.00	0.00	2.00
	minimum	0	0	0	0
	maximum	8	1	4	12
<b>Total</b>	n	581	581	581	581
	Mean	1.90	0.02	0.17	2.1
	±s.d.	2.435	0.189	0.655	2.722
	median	1.00	0.00	.00	.00
	minimum	0	0	0	0
	maximum	10	2	4	12

\* $P < 0.001$ 

TABLE (3) Significant caries index in relation to age

Age	N	mean	± s.d.	Median	Minimum	Maximum
2- < 3 years	9	5.33	2.179	5.00	3	8
3 - < 4 years	57	4.74	2.057	4.00	2	10
4 - < 5 years	97	5.45	2.646	5.00	2	12
5 - 6 years	30	5.13	2.270	4.00	3	12
Total	193	5.19	2.410	5.00	2	12

TABLE (4) Mean dmft values and its components in relation to gender

Sex	variable	dt	mt	ft	dmft
Female	n	243	243	243	243
	Mean	1.64	0.01	0.2	1.85
	±s.d.	2.276	0.143	0.7	2.562
	median	0.00	0.00	0.00	0.00
	minimum	0	0	0	0
	maximum	8	2	4	12
Male	n	338	338	338	338
	Mean	2.08*	0.02	0.15	2.25**
	±s.d.	2.53	0.217	0.621	2.825
	median	2.00	0.00	0.00	1.00
	minimum	0	0	0	0
	maximum	10	2	4	12

\*P < 0.03 \*\*P < 0.04

TABLE (5) Mean dmft values in relation to presence of plaque deposits

Plaque Deposits	variable	dt	mt	ft	dmft
Absent	N	437	437	437	437
	Mean	1.53	0.01	0.12	1.66
	±s.d.	2.308	1.26	0.523	2.562
	median	0.00	0.00	0.00	0.00
	minimum	0	0	0	0
	maximum	8	2	4	12
Present	N	144	144	144	144
	Mean	3.63*	0.02	0.55*	4.2*
	±s.d.	2.696	0.198	1.166	3.215
	median	3.00	0.00	0.00	3.00
	minimum	0	0	0	0
	maximum	8	2	4	12

\*P < 0.001

Regarding eating habits of children during school hours the results showed that all children had breakfast at school. Bread was the most frequently consumed food, as cheese and jam sandwiches were the main food item consumed at breakfast (98.9% cheese sandwiches and 95.1% jam sandwiches). All children had a snack after breakfast. The type of snack was almost similar among the children, 97.8% in the form of sweets which was available daily in their lunchboxes compared to 59 % fresh fruits and 30 % fresh vegetables only available once or twice per week.

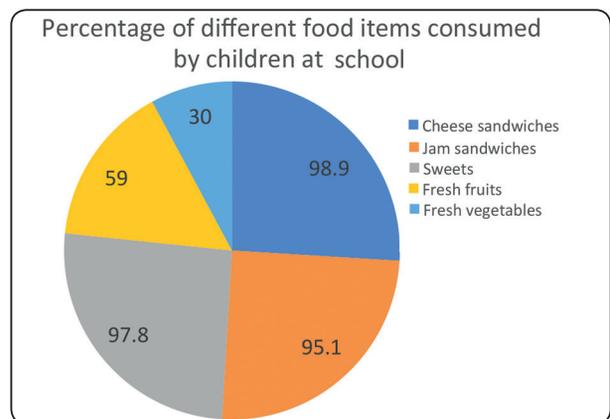


Fig. (1) Percentage of different food items consumed by children at school

## DISCUSSION

The aim of this study was to determine caries prevalence and dental care provided in a group 2- < 6 years' old preschool Egyptian children. In addition, determine the children's eating habits and oral hygiene practices during their stay in the pre-school hours. Those types of studies aid in the development of preventive pre-school-based programs as well as assess dental treatment services required.

Although the sample size was only modest, the surveyed children could be representative of the preschool children in 6th October city when compared to the small population of the city. There was a wide range in the number of children examined in each age group especially in children aged two and five years old. This may be attributed to the fact that not all parents send their two years old child to a pre-school, in addition children from the age of five years and six months are accepted in grade one in some private schools.

Dental caries was diagnosed at the cavitation level mainly through visual inspection as recommended by the WHO, 1997<sup>(12)</sup> This ensures a high level of agreement between examiners but might have underestimated the number of carious teeth in the population.

Dental caries constitutes a health problem for pre-school children as 50.6% of examined children in this study were affected with dental caries which was almost similar (48.4%) to preschool children in an urban community in Singapore.<sup>(14)</sup> The mean dmft was  $2.1 \pm 2.722$  in the current study which was similar to that of preschool children in the same socioeconomic level in another Egyptian study on a group of preschool children in Cairo Egypt [Metwalli et al., 2008].<sup>17</sup> Similarly Gopal et al., 2017<sup>(15)</sup> reported that the prevalence of early childhood caries in 3- to 6-year-old preschool children was found to be 27.3% with a mean dmft of 2.36. While, other studies- reported in some European -countries lower mean dmft scores.<sup>(16,17)</sup> On the other hand, the findings of

other surveys in Saudi Arabia showed higher mean dmft.<sup>(18)</sup> The mean population SiC was also lower than other studies.<sup>(19,20)</sup> Differences in caries prevalence and dmft scores can be attributed to regional and cultural differences between the studied populations in different studies.

A statistically significant difference in dmft scores in relation to gender with males having higher scores was observed in the present study which disagrees with other studies.<sup>(10,18)</sup>

Most of the children presented with untreated caries which was similar to the findings of Wyne, 2008 and Limbu et al., 2017<sup>(7,19)</sup> The high percentage of the decayed component shows that most of the children had unmet treatment needs.

The care index is used to measure the efficacy of different countries in treating dental caries which was found to be low in the current study (6.2%) and the mean population (SiC) was  $5.19 \pm 2.410$ . Nearly similar results (SiC = 5.35) were reported among preschool children in Johannesburg, South Africa.<sup>(21)</sup> The results of the current study reflect that a small number of children accessed dental services which indicate the need for more organized dental services in this locality. Slightly lower SiC (4.09) was reported by Perara et al., 2012;<sup>(22)</sup> while higher SiC was reported in another study [Limbu et al 2017].<sup>(19)</sup> Additionally, higher care index (14.5) was reported by Reifur et al., 2017.<sup>(23)</sup>

One quarter of the examined children had visible plaque deposits which were significantly correlated with the dmft score. Similar results were reported by Hashim et al., 2013 where a strong association between mean plaque score and mean decayed, missing, filled teeth was observed. Additionally in their study children who brushed their teeth twice or more per day had lower plaque scores.<sup>(24)</sup>

Moreover in the present study sugary snacks consumption was common among all children while consumption of fresh fruits or vegetables was low. Daily consumption of sugary snacks by preschool children was also reported in other studies.<sup>(25,26)</sup>

Plaque deposits and high sugar consumption are important risk factors in the etiology of dental caries. The present findings could imply that for preschool children, advice to brush teeth twice a day one of them at pre-school after breakfast may be more effective in preventing dental caries than advice to restrict sugary snacks. The balance between the deleterious effects of sucrose consumption and the benefits of tooth brushing is an important theme. Various factors influence children's food choices as classmates, socioeconomic status, advertising, packaging and marketing techniques and thus are difficult to change. [Korwanich et al.,2007] <sup>(27)</sup>

Teachers can be key persons in influencing preschool children's oral hygiene performance and eating behaviors. Knowledge of oral hygiene practices and dietary habits may be gained through part of the preschool daily program given by teachers thus engraving those habits early in life and subsequently be maintained through adulthood.

## CONCLUSIONS

1. The prevalence of dental caries in this population was high and most of the decayed teeth were not treated.
2. Presence of visible plaque deposits was correlated with high dmft scores.
3. Majority of children consumed sugary snacks daily.

## RECOMMENDATIONS

1. Community-based educational programs that increase teachers' and parents' oral health knowledge should be conducted.
2. Implementation of oral health preventive and treatment campaigns is required to achieve optimal oral health in preschool children in this community.

## Limitations of the study:

Dental caries was diagnosed at the cavitation level mainly through visual inspection which might have underestimated the number of carious teeth in this population.

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