



Early Childhood Caries Prevalence and Severity in Relation to Oral Health Behaviors in Lebanese Pre-School Children

Hisham Hassan Tabbara*

Primary Health Care Corporation (PHCC), Doha, Qatar

*Corresponding author: Hisham Hassan Tabbara, Primary health care corporation (PHCC), Doha, Qatar

Received:  May 02, 2022

Published:  May 25, 2022

Abstract

The purpose of this study is to assess the impact of selected dental health behaviors on the prevalence and severity of Early Childhood caries (ECC), among a group of Lebanese preschool children. A total of 500 preschool children, age 3 to 5 years were chosen with stratified random sample technique with proportional allocation of the subjects, into different strata. Out of the 500 students chosen, 409 complied and returned the questioner and hence were included in the study. The study was performed in six schools distributed in different areas of Beirut, 3 private and 3 public schools. Every child was examined using a disposable plastic dental mirror under an adequate source of light. Early childhood caries was diagnosed as present when one or more decayed (non cavitated or cavitated lesions), missing (due to caries), or filled tooth surface on any primary tooth in children up to 71 months of age [1] was detected. The severity of ECC was classified according to Whyne AH (1999) [2]. Type 1 ECC (mild to moderate); Type 2 ECC (moderate to severe); Type 3 ECC (severe). All eligible children were given a questionnaire to be filled in at home by parents and returned by a specific date. Dental health behaviors included in the questionnaire were as follows: Age of commencement of tooth brushing, Adult supervision of tooth brushing, Amount of toothpaste used, Application of toothpaste, Dummy use with and without sweetener, Previous visits to dentist and selection of labels with no added sugar. The data were collected, tabulated and statistically analyzed, using package for social science "SPSS" version 13. The age of the study sample ranged from 3- 5 years with a mean 4.0 ± 0.9 . About half of the sample was males (49.1%). The majority of children were in public schools (60.9%). Nearly all children (93.4%) brushed their teeth. Two thirds (68.8%) however, started brushing at or after 24 months of age. Most of the children (91.1%) were supervised by their parents during brushing and 75.1% of them used an amount of tooth paste that was half the length of the toothbrush. This amount was put on the brush by parents in 73.8% of the cases. Nearly a quarter of the children (23%) used the pacifier whether alone or with sweetener. Only 30.1% choose drinks without sugar. More than half of the examined children (53.3%) had not previously visited a dentist. Of those who had caries, 38.9% had mild caries, 27.1% had moderate caries while only 4.4% had severe caries. The mean age increased significantly ($P < 0.0001$) with increasing severity of caries (for no caries, mild, moderate and severe caries, mean ages= 3.7 ± 0.8 , 4.1 ± 0.9 , 4.3 ± 0.8 and 4.4 ± 0.7 respectively). No significant difference was observed between males and females in caries severity ($P = 0.87$). More children in public school had severe caries compared to children in private schools (6.8% and 0.6% respectively). Similarly, more children in private schools were caries free compared to children in public schools (49.4% compared to 16.9% respectively). The difference between children in public and private schools in caries severity was statistically significant ($P < 0.0001$). Significantly more children who brushed were caries free compared to non-brushers (30.6% and 14.8% respectively, $P < 0.0001$). More children who started brushing at 12 and 18 month were caries free compared to children who started brushing at 24 months or later (55.8%, 50.7%, 20.8% respectively, $P < 0.0001$). No relation was observed between caries severity and parental supervision of brushing, amount of toothpaste placed on brush or who places toothpaste on toothbrush ($P = 0.10, 0.06$ and 0.10 respectively). Significantly more children who did not use pacifier were caries free compared to those who used pacifier alone or with sweetener (33.7%, 16.7% and 0% respectively, $P = 0.009$). Significantly more children who chose sugarless drinks were caries free compared to those who did not choose sugarless drinks (39.8% and 25.2% respectively, $P = 0.02$). More children who have previously visited a dentist were caries free compared to children with no prior visits (36.1% and 23.9% respectively, $P = 0.003$). These findings deserve further investigation among Lebanese preschool children.

Keywords: Early childhood caries; oral hygiene habits; dental health behaviors; tooth brushing

Introduction

Dental caries is the most common chronic disease that can be prevented in children [3]. Previous studies reported the prevalence rate of dental caries to be 27.3-69.5% among preschool children [4-6]. Children's dental caries not only influence their wellbeing [7] quality of life [8] and growth [9] but can be a risk factor for caries in permanent teeth [10]. As early childhood caries starts on surfaces that can be easily accessed by routine tooth brushing, oral hygiene levels may be associated with caries risk. Increased frequency and better oral hygiene levels are associated with lower caries levels in preschool children. Several studies show that increased tooth brushing frequency and parental involvement decrease carious lesions on smooth surfaces [11-15]. However, a study reports that the absence of tooth brushing is not associated with a greater prevalence of incisor caries [12], while others find no relationship between tooth brushing frequency and caries [13-16]. Additionally, except for one report [12], studies investigating the age of tooth brushing demonstrate few associations with caries status [17-19]. Studies that assess plaque scores or gingival status in preschool children find a positive and significant association between gingivitis, mutans streptococci levels and caries [13,20]. Studies also declared that dental caries could be associated with oral health behavior, eating habits, and frequency of tooth brushing in children [4,6,21-23]. Most studies also show that dental knowledge is positively related to caries prevalence. That is, parents who have high scores on dental knowledge usually have children with high caries levels. Regardless of the anomalous finding, these studies confirm the generally agreed-upon principle that education alone is insufficient to produce behavior change [24]. More investigations should be conducted to clarify the parents' knowledge about their children's oral health behavior accurately and to identify what they need to improve it [25].

Materials and Methods

The present study was conducted to assess the impact of dental health behaviors on the prevalence and severity of ECC among a group of Lebanese preschool children. It's a descriptive, cross-sectional study that included various public and private pre-schools in Lebanon. Disposable plastic mirrors were used for screening after drying the area to be examined and before deciding the presence and severity of ECC. The examination was conducted in each school in a prepared room with a suitable source of light for screening, where the child was seated on an ordinary straight back chair. A total of 500 preschool children, aged 3 to 5 years were chosen with the stratified random sample technique with proportional allocation of the subjects, into different strata. Out of 500 students chosen, 409 complied and returned the questionnaire and hence were included in the study. The study was performed in schools distributed in different areas of Beirut. The students in these schools came from different areas in Lebanon. And hence the results obtained could be generalized on all Lebanese pre school children. The selected schools were three private and three public schools. As for the private schools the students in the study sample were distributed

as follows:

- a) The first school with 54 students.
- b) The second school with 45 students.
- c) The third school with 61 students.

The students in the public schools were distributed as follows:

- a. The fourth school with 128 students.
- b. The fifth school with 55 students.
- c. The sixth school with 66 students.

Intra-examiner calibration was done before starting the survey where ten children were examined under the supervision of the main supervisor in order to make sure that the investigator achieved optimally uniform examination and to minimize variations which might affect the judgment of the examiner and hence the diagnosis. Every child was examined using a disposable plastic dental mirror with an adequate source of light. Early childhood caries was diagnosed as present when one or more decayed (non cavitated or cavitated lesions), missing (due to caries), or filled tooth surface on any primary tooth in children up to 71 months of age [1] was detected. The severity of ECC was classified according to Whyne AH (1999) [2].

Type 1: Early Childhood Caries (mild to moderate).

The existence of isolated carious lesion(s) involving molars and / or incisors.

Type 2: Early Childhood Caries (moderate to severe).

Labiolingual carious lesions affecting maxillary incisors, with or without molar caries, and unaffected mandibular incisors.

Type 3: Early childhood caries (severe).

Carious lesions affect almost all the teeth including the lower incisors. All eligible children were given a questionnaire to be filled in at home by the parents and returned by a specific date. Out of 500 students given the questionnaire, 409 returned the filled questionnaire on the specific date.

Dental health behaviors included in the questionnaire are Age, Gender, Age of commencement of tooth brushing, Adult supervision of tooth brushing, Amount of toothpaste used, Application of toothpaste, Dummy use with and without sweetener, Previous visits to dentist, Selection of labels with no added sugar. Descriptive statistics were calculated in the form of frequencies and percents for qualitative variables and mean and standard deviation or medians for quantitative variables. The relation between caries severity and quantitative variables was analyzed using analysis of variance while chi square was used for analysis of association between caries severity and qualitative variables. Significant associations in these bivariate analyses were used to build an ordinal regression model to predict factors affecting caries severity. In all cases, significance was set at the 5% level. Statistical analysis was performed using SPSS version 13.

Results

In order to study the impact of dental health behaviors on the prevalence and severity of ECC, this epidemiologic survey was conducted among 409 preschool children in Lebanon. The data were collected, tabulated and statistically analyzed, using package for social science "SPSS" version 13. And since we have a responsibility, as researchers, to insure and defend the credibility of our work, intra-examiner consistency has been assessed before collecting the data. Table 1 shows the personal characteristics of the study sample. The age of the study sample ranged from 3- 5 years with a mean 4.0 ± 0.9 . About half of the sample was males (49.1%). The majority of children were in public schools (60.9%). Table 2 show the relation between caries severity and oral hygiene habits. Significantly more children who brushed were caries free compared to non-brushers (30.6% and 14.8% respectively, $P < 0.0001$). more children who started brushing at 12 and 18 months were caries free compared to children who started brushing at 24 months or later (55.8%, 50.7%, 20.8% and 20.3% respectively, $P < 0.0001$). No relation was observed between caries severity and parental supervision of brushing, amount of toothpaste placed on brush or who places toothpaste on toothbrush ($P = 0.10, 0.06$ and 0.10 respectively). Table 3 shows the relation between caries severity and other dental habits. Significantly more children who did not use pacifier were caries free compared to those who used the pacifier alone or with sweetener (33.7%, 16.7% and 0 respectively, $P = 0.009$). Significantly more children who chose sugarless drinks were caries free compared to those who did not choose sugarless drinks (39.8% and 25.2% respectively, $P = 0.02$). More children who have previously visited a dentist were caries free compared to children with no prior visits (36.1% and 23.9% respectively, $P = 0.003$).

Table 4 shows caries prevalence and severity in the study sample. One third of the examined children was caries free (29.6%). Of those who had caries, 38.9% had mild caries, 27.1% had moderate caries while only 4.4% had severe caries. Table 5 shows the relation between caries severity and personal characteristics. The mean age increased significantly ($P < 0.0001$) with increasing severity of caries (for no caries, mild, moderate and severe caries, mean ages = $3.7 \pm 0.8, 4.1 \pm 0.9, 4.3 \pm 0.8$ and 4.4 ± 0.7 respectively). No significant difference was observed between males and females in caries severity ($P = 0.87$). More children in public school had severe caries compared to children in private schools (6.8% and 0.6% respectively). Similarly, more children in private schools were caries free compared to children in public schools (49.4% compared to 16.9% respectively). The difference between children in public and private schools in caries severity was statistically significant ($P < 0.0001$). Table 6 shows the result of ordinal regression analysis to predict factors affecting caries severity. Factors with significant effect on caries severity were type of school ($P = 0.003$), age when brushing started ($P = 0.05$) and using pacifier ($P = 0.01$).

Discussion

This study was undertaken primarily to determine the possible

association of certain dental health behaviors on the prevalence and severity of ECC among a group of Lebanese preschool children. The social data showed the personal characteristics of the study sample, and the family characteristics. The severity of caries increased significantly with increased age ($p < 0.0001$). This finding was in agreement with many studies [25-27]. A possible explanation might be that the longer the teeth subjected to certain dietary and behavioral attitudes the more liable they were to decay. Therefore, the severity of caries increased as the age increased from 3 to 5 years [25]. More children in public schools had severe caries, compared to those in private schools. Similarly, more children in private schools were caries free compared to those in public schools. The difference between children in public and private schools in caries severity was statistically significant ($p < 0.0001$). These results came in agreement with many studies in Europe [28-32] and Middle East [33] which demonstrated the powerful effect of social class on oral health status. Lower socioeconomic classes in poor areas in Lebanon usually place their children in public schools with minimum fees contrary to higher socioeconomic classes which place their children in expensive private schools.

Social class may influence caries risk in several ways. Individuals from lower socioeconomic status experience financial, social and material disadvantage, that compromise their ability to care for themselves, obtain professional health care services and live in a healthy environment [34], all of which lead to reduced resistance to oral and other diseases [35]. As for the gender no significant difference was observed between males and females in caries severity ($p = 0.87$). This result agrees with a study [36] and disagrees with another study [37], where boys showed a significantly higher ECC severity index compared to girls ($p = 0.01$). The study showed caries prevalence and severity, where (29.6%) of the examined children were caries free, (70.4%) had caries and were distributed as follows: (38.9%) had mild caries, (27.1%) had moderate caries while only (4.4%) had severe caries. Regarding the relation between caries severity and oral hygiene regimen, significantly more children who brushed their teeth were caries free compared to non-brushers ($p < 0.0001$). This comes in agreement with many studies conducted in European countries [11,13,38] where the daily frequency of tooth brushing had been shown to be a major determinant of ECC experience. However, no such relationship was noted in a study in the united states [16]. Also, another study showed higher MS, initial DMFS scores and greater increments of caries for children who brushed their teeth more frequently than other children [39], with no clear explanation for this correlation. More children who started brushing earlier at 12 and 18 months were caries free compared to children who started brushing at 24 months or later ($p < 0.0001$). This agrees with a study [38], while other studies investigating the age of tooth brushing demonstrate few associations with caries status [18,19,40].

The relation between carries severity and parental supervision of tooth brushing was not significant ($p = 0.10$). This agrees with other studies which showed that adult supervision of children's toothbrushing was not associated with ECC experience [37], while

it disagrees with other studies where parental assistance and brushing was a major determinant in ECC experience [11,13,38]. As for the amount of toothpaste placed on the brush and who places it on the brush, there was no relation observed with caries severity ($p=0.06$). This disagrees with another study which found that there was as significantly increased prevalence and severity of ECC in children that applied a full brush length of toothpaste compared with children that applied a pea sized amount of toothpaste ($p<0.0001$) [37]. Also another study recommended that parents apply only a pea sized amount of dentifrice for their young children [41]. Also, who placed the toothpaste on the brush had no significant relation with carries severity ($p= 0.10$). This comes in agreement with another study, where who applied the toothpaste on the brush had no significant effect on ECC experience [37]. This might be due to the fact that applying the toothpaste on the brush can be done even by that child due to the simplicity of application and hence has no effect on caries severity. The results of the relation between caries severity and other dental habits showed that significantly more children who did not use pacifier were caries free compared to those who used the pacifier alone or with the sweetener ($p=0.009$). This agrees with many studies, which showed that ECC may occur and children who are given sweetened pacifiers [16,42,43].

Also another study showed that there was an increased ECC experience in children given a pacifier with sweetener compared with children given a pacifier only or not given a pacifier at all ($p= 0.007$) [37]. The explanation might be that pacifiers dipped in sugar solutions or honey, on prolonged contact with the teeth were cariogenic. This was due to the prolonged use of the pacifier, where it might stay in the child's mouth overnight [salivary flow is less during sleep], or for many hours during the day. More children whose parents chose sugarless labels were caries free compared to those who were not given sugarless labels. This comes in agreement with many studies [44,45]. Sugarless labels decrease the liability of dental decay unlike labels containing sugar which is highly cariogenic and hence in addition to other factors might lead to ECC. In studies of preschool children the total weight intake of sugar items does not vary between those with and without caries [46,47] or only shows minor differences [48]. However, many studies have found an association between the frequency of sugary intake and caries [11-14,48-51]. The above mentioned dental health behaviors including choosing sugar free labels and not using a pacifier reflect parental dental knowledge and education which lead to lower ECC experience. More children who had previously visited a dentist were caries free compared to children with no prior visits ($p= 0.003$). This agreed with a study [52], while it contradicts another study [53]. A possible explanation is that when a child had a previous visit to a dentist, necessary intervention and parental counseling had been supplied.

Conclusion

The present study has contributed to knowledge about the ECC experience and selected dental health behaviors in a group of Lebanese pre-school children aged 3 to 5 years, at private and public schools in Beirut. The results of this study showed that the

prevalence of ECC was found to be (70.4%). As for the severity (38.2%) had mild early childhood caries, (27.1%) had moderate early childhood caries, while only (4.4%) had severe early childhood caries. ECC was not found in (29.6%), who were caries free. The findings showed that ECC and certain dental health behaviors are significantly associated since children who brushed their teeth were significantly more caries free compared to non-brushers. The earlier they started to brush, the more they were caries free. Children who had previous visits to the dentist were more caries free compared to children with no prior visits. Caries severity could be predicted from factors such as when was brushing started and using the pacifier. In addition to healthy oral practice, oral health awareness programs, especially among parents and caregivers, prevention should be established through applying pit and fissure sealants and fluoride in pre-schools.

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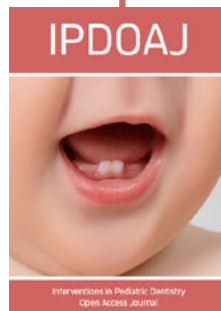
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DOI: [10.32474/IPDOAJ.2023.08.000291](https://doi.org/10.32474/IPDOAJ.2023.08.000291)



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