

The dental health of 5 year-old children living in Damascus, Syria

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Objective: The aim was to record the dental health of 5 year old Syrian children attending nursery schools in Damascus City and to compare the dmft data with reported parental behaviors in relation to oral health. **Methods:** Dental examination criteria were based on those published by WHO. A questionnaire was distributed to the parents of the child participants, which recorded, social information and oral health practices. Chi square tests and multiple logistic regressions were used to determine risk factors for dental caries. **Results:** The mean dmft was 3.27 (sd 3.71) and 61% of the sample had caries present. Children with poor oral hygiene ($p < 0.0001$) and not attending a dental clinic for preventive advice ($p = 0.001$) were at risk for having caries regardless of all variables included in analysis. **Conclusion:** A high proportion of 5 year-olds suffer from dental caries and population based preventive programs should be implemented.

Key words: Dental caries, parent, attitude, children, nursery schools, Syria

Introduction

The prevalence and severity of dental caries is a major health problem in many Middle Eastern countries, where preventive programmes have not been implemented (Amin and Al-Abad, 2008). In Saudi Arabia, previous studies have shown a high prevalence of caries in both preschool and school children (Amin and Al-Abad, 2008; Gandeh and Milaat, 2000). Paul (2003) reported that 90% of 5-year-old Saudis from Al-Kharj had plaque, one-third never brushed their teeth, two-thirds had never visited a dentist, only 16.5% were caries free and their mean dmft was 7.1. A Jordanian study (Sayegh *et al.*, 2005) reported that 67% of 4-5 year-olds had caries and 31% had a dmft greater than 4. The proportion of Ajman, UAE, 5-year-olds with caries was 73% and their mean dmft score was 4.5 (Hashim *et al.*, 2009, 2010). Several studies have investigated predictive factors for dental caries and found that the attitude of parents is one of the most critical factors deciding the oral health of their pre-school children. In addition their attitudes towards the dental care of their children are related to socio-economic status and to their own experience of dentistry (Christensen, 2004; Mattila *et al.*, 2005; Poutanen *et al.*, 2007; Tickle *et al.*, 2003). Dental caries has been considered a major public health problem for Syrian children (Beirut and van Palenstein Helderma, 2004). Syrian epidemiological data on caries did not indicate a decrease in the dmft or DMFT values for any age groups nor in the percentage of untreated caries despite, an enormous increase in the number of dentists working in Damascus (Beirut and van Palenstein Helderma, 2004). The prevalence of dental caries for 5-year-olds in Damascus was 77% in 1985 and 74% in 1991 and the mean dmft scores were 5.2 and 4.6 respectively (Beirut and van Palenstein Helderma, 2004). Recent studies investigating the dental health of nursery school children and predictive factors for dental caries in Syria

are unavailable. Therefore, this study was undertaken to record their dental health and to determine potential factors that might predict the presence of dental caries among 5 year-old Syrian children attending Damascus city nursery schools. The oral hygiene practices of children and their parents, parental attitudes towards dental care, parental socio-economic and educational level were surveyed to provide a background predictive dataset.

Methods

This cross-sectional study was undertaken in 2009 in collaboration with the Training and Research Centre for Oral Health, Ministry of Education, Damascus, Syria. Ethical approval was obtained from the Board of Scientific Affairs at the Faculty of Dentistry, University of Damascus. Children were selected from public nursery schools ($n = 2205$) in Damascus city and managed by the Syrian Women's Union ($n = 750$), the Ministry of Education ($n = 659$) and the Teacher's Association ($n = 796$). Six nursery schools (2 from each body) were randomly selected from 4 areas of diverse socio-economic status. Approval was obtained from the Ministry of Education in order to conduct this study in the selected nursery schools. Children were recruited to the study by writing to the parents.

Questionnaires were given to children with letters asking the parents to complete them. Questions covered socio-demographic data; child's oral hygiene regime; child's dental visiting history; and, child's sugar consumption.

Dental examinations were performed in classrooms by one trained examiner (MD) to detect the clinically evident caries lesions using an artificial light, a plane dental mirror and a dental probe to clean the teeth. Numbers of decayed, missing and restored teeth were recorded and the mean dmft score calculated. The World Health Organization, WHO (1997), diagnostic criteria were used and caries was

only recorded if there was a visible break in the enamel or a marked shadow under the enamel. Where any doubt existed the enamel surface was classified as sound.

Visible plaque was recorded on buccal and occlusal surfaces for all primary teeth as follows: 0, no visible plaque; 1, hardly detectable on cervical thirds or on occlusal surfaces; 2, easily detectable plaque on cervical and occlusal surfaces; 3, heavy plaque accumulations on cervical or occlusal surfaces (Carvalho *et al.*, 1998; Karjalainen *et al.*, 2001).

SPSS v17 (Chicago, US) and Epi-Info 2002 (Centers for Disease Control and Prevention, Atlanta, US) were used for statistical analyses with $p < 0.05$ set as the significance level. Descriptive and analytical statistical tests were undertaken including the χ^2 test followed by stepwise multiple logistic regression analysis to determine the independence of the association between dental caries and other variables. The dependent variable was dental caries. It was coded as present or not present. The independent variables were area of living (high, moderate+low socio-economic status), family size (≤ 5 , > 5), education of parents (high, moderate+low), presence of grandparent at home (no, yes), parents reported oral hygiene (good, poor), child's oral hygiene as assessed during examination (good, poor), preference of check-up (yes, no), assisting/observing child toothbrushing, attending dental clinic for preventive procedures (yes, no), leaving decision of treatment to dentist (yes, no) and controlling sugar consumption (yes, no). Several models were performed including backward and forward stepwise regressions, entering/omitting variables and explaining the largest/smallest amount of variance at each step including explanatory variables in the univariate analysis with $p < 0.05$. The best fitting multivariate model for children was presented giving the most influential explanatory variables in predicting the dental health of 5 year-old Syrians. The dmft scores were analysed either as a continuous (calculating means and standard deviations) or as a categorical variable (providing proportions). In addition, one way ANOVA with Post-Hoc Bonferroni adjustment was used to compare means of dt, mt, ft and dmft scores by area of residence. Odds ratio with 95% confidence intervals were also recorded for variables investigated.

Results

Consent was collected for dental examinations of 761 children and 727 children (391 boys, 336 girls) were examined the remainder being absent from school on all three visits. Questionnaires were returned for 613 children. A full data set of caries and dental data was available for 84% of the sample. Table 1 presents the socio-demographic characteristics of the sample.

The schools were grouped into three social class areas, with 28% ($n=199$) of the children living in the higher social class area and 36% in both the moderate ($n=264$) and lower ($n=264$) areas. There were no differences in the response rate ($p=0.22$) for the dental examinations or the return of questionnaires by social class area. Most children (76%) came from poorly educated families (primary school) and their parents shared the house with grandparents (76%). About 64% of children belonged to a family of 5 or fewer persons.

Mean dt, mt, ft, dmft and oral hygiene scores are presented by socio-economic area in Table 2. Decayed teeth were observed in 61% of children, 15% had restorations and 6% had missing teeth. The mean dmft was 3.27 (sd 3.71). Children's dt scores differed according to their area of residence ($p=0.013$, $p=0.022$ following Bonferroni adjustment comparing high and moderate status areas). Their ft scores also differed by area of residence ($p=0.046$, $p=0.04$ following Bonferroni adjustment comparing moderate and low status areas). However, scores for mean dmft means ($p=0.08$, one way ANOVA), mt ($p=0.49$) and oral hygiene ($p=0.31$) were similar across areas of residence.

Table 3 presents clinical characteristics and oral hygiene habits of children and their parents. A strong association was found between the reported dental health of parents and the dental health of their children ($p < 0.001$) as 62% of children with good oral hygiene were from families where parents reported good oral hygiene behaviours and 53% of children with poor oral hygiene were from families where parents reported poor oral hygiene of their children.

Table 4 presents distribution of dental caries according to the attitude of parents and other factors such as living area, family size, sharing house with grandparents, socio-economic status and parental education. The attitude of parents was considered positive if they reported; toothbrushing at more than once a day, encouraged check-ups for primary and permanent dentition, attended a dental clinic for preventive procedures, observed or assisted children in toothbrushing, left the decision about treatment to the dentist and controlled sugar consumption. Approximately 97% of parents (554/571) reported that they encouraged their children to visit a dentist for regular oral health checkups. Only 57% of children ($n=322$) had actually attended dental clinics; 42% for pain relief and only 33% for preventive procedures ($n=107$). Some 53% considered the absence of pain as a good reason for not attending. Faced with a painful primary tooth, 21% of parents preferred to take their children to a specialized dentist rather than to a general practitioner. Most parents (81%, $n=290$) preferred to leave to the dentist the decision about treatment for a carious tooth when having but wanted baby teeth restored rather than extracted.

The χ^2 test showed that dental caries was higher among children, from the deprived area ($p=0.045$), those with poor

Table 1. Socio-demographic characteristics of the subjects investigated

| Characteristic | n | % |
|------------------------|-----|----|
| Area | 727 | |
| Area 1 (high) | | 28 |
| Area 2 (moderate) | | 36 |
| Area 3 (low) | | 36 |
| Parent education | 565 | |
| High (university) | | 22 |
| Moderate (secondary) | | 2 |
| Low (primary) | | 76 |
| Family size | 570 | |
| ≤ 5 | | 64 |
| > 5 | | 36 |
| Live with grandparents | 567 | |
| Yes | | 76 |
| No | | 24 |

Table 2. Dental caries and oral hygiene according to the socio-economic classification of each child's school

| Dental Health | Socio-economic status of the area | | | | p value |
|------------------------------|-----------------------------------|-------------|-------------|-------------|---------|
| | High | Moderate | Low | All Areas | |
| Dental caries - mean (sd) | | | | | |
| dmft | 3.64 (3.86) | 2.89 (3.42) | 3.37 (3.84) | 3.27 (3.71) | 0.083* |
| dt | 3.16 (3.43) | 2.32 (2.91) | 2.99 (3.57) | 2.80 (3.32) | 0.013* |
| mt | 0.09 (0.45) | 0.06 (0.32) | 0.11 (0.68) | 0.09 (0.51) | 0.490* |
| ft | 0.38 (1.15) | 0.50 (1.27) | 0.25 (0.91) | 0.38 (1.12) | 0.046* |
| Oral Hygiene - n (%) in area | | | | | |
| Good (1) | 98 (30) | 127 (38) | 110 (32) | 335 | 0.31** |
| Moderate (2) | 76 (27) | 93 (33) | 110 (40) | 279 | |
| Poor (3) | 25 (22) | 44 (39) | 44 (39) | 113 | |
| n (% of all areas) | 199 (28) | 264 (36) | 264 (36) | 727 (100) | |

* one way ANOVA, F-ratio test statistic for dmft, dt, mt and ft is: 2.49,4.36, 0.70 and 3.08 respectively.

** χ^2 test of significance

Table 3. Clinical characteristics and oral hygiene habits of children and their parents

| | n | % |
|--|-----|----|
| Child's oral health assessed during examination ^a | 727 | |
| Good | | 46 |
| Moderate | | 38 |
| Poor | | 16 |
| Child health reported by parents | 571 | |
| Good | | 43 |
| Moderate | | 42 |
| Bad | | 6 |
| Don't know | | 9 |
| Child's toothbrushing reported by parents | 570 | |
| 0-1 time each day | | 23 |
| >1 time each day | | 77 |
| Parents' self-assessed oral health ^a | 542 | |
| Good | | 39 |
| Moderate | | 57 |
| Poor | | 4 |
| Parents' self-assessed toothbrushing | 568 | |
| 0-1 time each day | | 49 |
| >1 time each day | | 51 |

^a χ^2 test: association between dental health of parents and dental health of children (p<0.001)

oral hygiene (p=0.001), not attend clinics for preventive procedures (p=0.0001), whose parents reported poor oral hygiene (p=0.005) and whose parents had never observed/assisted their toothbrushing (p=0.001).

In addition, the percentage of caries free children was related to the parents' education (71% high educational level vs 29% low educational level, p=0.025) but decreased with increasing family size (31% vs 69% in ≤ 5 person per family, p=0.045). Around 65% (134) of children whose parents reported that they controlled the frequency and/or the amount of sugar consumption were caries free (p=0.001).

In order to determine the most important variables associated with the risk of dental caries, multiple logistic regression analysis was carried out considering area of living, family size, parents' oral hygiene, child's oral hygiene, preference for check-ups, assisting/observing child's toothbrushing, attending dental clinic for preventive procedures, leaving treatment decisions to dentist and controlling sugar consumption as independent variables. The analysis showed

that child's poor oral hygiene (p<0.0001, OR=5.75, 95% CI:3.04-10.86) and not attending dental clinic to perform preventive procedures (p<0.0001, OR=5.77, 95% CI:3.07-10.82) remained significant risk factors for dental caries regardless of all variables included in the analysis.

Discussion

This study investigated potential risk factors for dental caries in 5 year-old Syrian children. Caries was clinically evident in 61% of children examined, 15% had restorations and 6% had missing teeth. The mean dmft was 3.27 (sd 3.71). The results are similar to a recent study which reported that 70% of Turkish 5 year-olds had dental caries and a mean dmft of 3.7 (Gökalp *et al.*, 2010). In the United Arab Emirates, 83% of 5 year-olds had caries had caries with a mean dmft of 5 (El-Nadeef *et al.*, 2010). An earlier study by Beiruti and van Palenstein Helderma (2004) reported that 80-90% of Syrian 5 year-olds had dental caries in 1991 and their mean dmft score was 4.6.

Table 4. Distribution of dental caries and potential affecting factors

| Factor | n | Caries present | Caries free | p value |
|--|-----|----------------|-------------|---------|
| Area | 727 | | | |
| High | | 132 (30%) | 67 (24%) | 0.04 |
| Moderate/Low | | 311 (70%) | 217 (76%) | |
| Education | 565 | | | |
| High | | 282 (79%) | 147 (71%) | 0.025 |
| Moderate/ Low | | 76 (21%) | 60 (29%) | |
| Family size | 570 | | | |
| ≤5 | | 222 (61%) | 144 (69%) | 0.045 |
| >5 | | 139 (39%) | 65 (31%) | |
| Live with grandparents | 567 | | | |
| Yes | | 266 (74%) | 165 (80%) | 0.07 |
| No | | 94 (26%) | 42 (20%) | |
| Brushing habits of parents | 568 | | | |
| 0-1 times a day | | 163 (45%) | 115 (56%) | 0.011 |
| >1 times a day | | 198 (55%) | 92 (44%) | |
| Parents' self-assessed oral health | 542 | | | |
| Good | | 115 (34%) | 95 (47%) | 0.005 |
| Moderate, Poor | | 223 (66%) | 109 (53%) | |
| Child health assessed during examination | 727 | | | |
| Good | | 102 (23%) | 233 (82%) | <0.001 |
| Moderate/poor | | 341 (77%) | 51 (18%) | |
| Encouraging check-up for primary and permanent teeth | 571 | | | |
| Yes | | 351 (96%) | 203 (97%) | 0.370 |
| No | | 12 (4%) | 5 (3%) | |
| Help or/and observe brushing of children teeth | 571 | | | |
| Yes | | 132 (36%) | 150 (72%) | 0.0001 |
| No | | 230 (64%) | 59 (28%) | |
| Attend dental clinic for preventive procedures | 322 | | | |
| Yes | | 45 (20%) | 62 (62%) | 0.0001 |
| No | | 177 (80%) | 38 (38%) | |
| Leave carious tooth treatment decision to dentist | 360 | | | |
| Yes | | 181 (78%) | 109 (86%) | 0.06 |
| No | | 52 (22%) | 18 (14%) | |
| Control quality/ and frequency of sugar consumed | 555 | | | |
| Yes | | 176 (51%) | 134 (65%) | 0.001 |
| No | | 173 (49%) | 72 (35%) | |

^a χ^2 test of significance: significant association between area of living and attendance to dental clinic for preventive procedures (p=0.018)

The results of this study support earlier findings that parental oral health-related attitudes and behavior as well as parents' oral health, influence a child's dental health (Christensen, 2004; Mattila *et al.*, 2005; Poutanen, *et al.*, 2007; Tickle *et al.*, 2003) Parents' dental hygiene habits are meaningful as they function as role models for their children (Mattila *et al.*, 2005). Christensen (2004) has also attributed this to the fact that a health-promoting family empowers the child to adopt similar behaviours. Vanagas *et al.*, (2009) reported that parental attitudes toward children's oral health were significantly associated with their own oral health behaviours.

However, half the parents said they never watched or assisted during toothbrushing and 9% did not know anything about their children's teeth. Only one previous Jordanian study has shown that most parents did not support or organize toothbrushing for their children (Al-Omiri *et al.*, 2006). The authors attributed this to lack of parental and child oral health education.

The present study has shown that most parents (97%) said they encouraged their children to visit a dentist for

regular oral health checkups. However, only 57% of children had actually attended dental clinics: 42% for pain relief and only 33% for preventive procedures. When parents were asked to state the reasons for not attending a dental clinic, 53% considered the absence of pain as a good reason for not attending. In Turkey, 36% visited because of a cavity but only 13% for a checkup (Efe *et al.*, 2007).

Tickle and colleagues (2003) have reported that about 66% of parents, in the UK, would leave the decision of treatment to the dentist, approximately 12% would want the dentist to relieve the symptoms and monitor the tooth, the same percentage of parents wanted the tooth to be filled and around 9% of parents wanted the tooth to be extracted.

UK parents from deprived backgrounds were more likely to have a preference for a treatment intervention, either an extraction or restoration, whereas parents from more affluent backgrounds were less keen on operative procedures (Tickle *et al.*, 2003). In the present study, parents from deprived areas had a greater preference for preventive procedures when compared to parents from more affluent background. Future efforts should investigate

the influence of socio-economic status and address the importance of promoting positive attitudes of parents to prevention regardless of their background.

Examination of family structure gives insights into environment factors potentially crucial for improving parental control of children's sugar consumption. In Syria, grandparents are thought more likely to offer gifts of sugary foods to their grandchildren, but in this study grandparents appeared to have less impact on caries ($p=0.07$). Most parents (63%) preferred to control children's sugar intake while some of the other parents felt they could not because of the influence of school-friends (13%), relatives at home (23%) or the influence of media advertisement (18%). There is a need to control sugar consumption among youngsters and a solution would be to control the use of sugary foods and snacks in nursery schools, thereby acting as a model for parents (Aström and Kiwanuka, 2006).

The child's daily dental health behaviors and the attendance of the family at a dental clinic seeking preventive procedures emerged in the final logistic regression analysis. The main high risk groups for dental caries were children with poor oral hygiene and not attending a dental clinic seeking preventive procedures. Similarly, Wigen and Wang (2010) noted that caries prevalence in Norwegian 5-year-olds was strongly associated with parental factors with children with non-western parents of low education being especially at risk.

In our study stepwise logistic regression analysis revealed that maternal working conditions, large family size and poor oral hygiene practices were the chief predictors for dental caries among school children. The study by Amin and Al-Abad (2008) in Saudi Arabia supports our regression analysis demonstrating the importance of child's dental health.

In this study, the attitude of parents was found to be the critical factor that influenced the oral health of their children. Parents function as role models for their children. Preventive programmes should focus on the whole family, its socio-economic status and parents' attitudes to oral hygiene and early attendance at a dental clinic. Extensive efforts over the last few years to promote oral health among Syrians remain insufficient. Therefore, the role of a family in healthcare should be promoted. These research findings should be translated into public health action programs with national programs of dental health education needed to improve oral health knowledge, behavior and attitudes of the general population.

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