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# Oral health and treatment needs among 15-year-olds in Tehran, Iran

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***Objectives*** To study oral health status and treatment need among 15-year-olds in Tehran, Iran in relation to their parents' level of education. ***Methods*** A cross-sectional study based on the WHO criteria, was carried out in 2004 among 15-year-olds (n=506) in Tehran. Data collection was by a self-administered questionnaire and a clinical dental examination to assess dental caries, periodontal conditions and orthodontic treatment needs. ***Results*** Mean DMFT was 2.1 (95%CI=1.9, 2.4), which comprised DT=0.9, MT=0.2, and FT=1.0. The mean SiC index was 5.2 (95%CI=4.8, 5.5). Mean numbers of sextants with PI scores 0, 1, and 2 were 0.6, 2.1, and 3.3 respectively, and with CPI scores 0, 1, and 2, were 2.1, 3.5 and 0.4 respectively. Need for caries (DT>0) treatment existed in 40% of subjects, for scaling (CPI=2) in 24%, for oral hygiene instructions in 100%, and for orthodontic treatment in 26%. Subjects with caries and dental plaque were fewer among those whose parents had a high level of education ($p<0.05$). Presence of dental plaque was associated with DT>0 (OR=1.8, $p=0.01$) and CPI>0 (OR=11.2, $p<0.001$). ***Conclusion*** Poor level of oral hygiene among the present 15-year-olds calls for school-based oral health promotion activities focusing on oral self-care.

*Keywords: Adolescents, dental caries, oral health status, periodontal disease, treatment needs*

## Introduction

Adolescents comprise one-fifth of the world's population, about 85% of whom live in developing countries with a priority for global oral health (Petersen, 2003).

A decline in caries occurrence has been reported for many developed countries whereas a slow increase seems to be evident in developing countries (Petersen, 2003). For 15-year-olds, scarce data on mean DMFT range from 0.7 in India to 6.6 in Japan (WHO oral health country/area profile). In this age group periodontal status is characterized by high rates of bleeding gums and calculus (Albandar and Tinoco, 2002).

Low DMFT, but poor oral hygiene and periodontal status generally characterize oral health condition of Iranian adolescents and are typical for many developing countries (Pakshir, 2004; Petersen, 2003; WHO oral health country/area profile). Nationwide surveys in Iran indicate a mean DMFT of 2.4 for 12-year-olds and 5.0 for 15- to 19-year-olds in 1990-1992, and 1.5 for 12-year-olds in 1998 (Pakshir, 2004).

The age of 15 is important for the assessment of oral health status, because by that age permanent teeth have been exposed to the oral environment for 3-9 years, thus making the assessment of caries prevalence more meaningful than at 12 years of age (WHO, 1997). Furthermore, the assessment of periodontal disease indicators in adolescents is also important at15 years of age (WHO, 1997).

The present study aimed to describe oral health among 15-year-olds in Tehran, Iran and to relate it to their parents' socio-economical status.

## Materials and methods

There are more than 10 million inhabitants in Tehran, but the total number of 15-year- olds is unknown. The present cross-sectional study was carried out among 15-year-olds in public schools in Tehran, Iran. A multistage random sampling procedure, based on location of the schools, included selection of 17 schools from a list provided by the Head Office for Education of Tehran (HOET) to represent all public schools (n=300) for 15-year-olds. One class from each school was randomly selected. Participation was voluntary; only three girls refused clinical dental examination; the final sample comprised 506 15-year-olds (260 boys and 246 girls). The present study was approved by the Ethics Committee and the Iran Center for Dental Research at the School of Dentistry, Shaheed Beheshti University of Medical Sciences in Tehran.

Prior to data collection, a pilot study was carried out among 28, 15-year-olds in one public school for girls. Results from this pilot study highlighted the need for minor revisions in the questionnaire and clinical examination prior to their use in this study.

Data collection was carried out by one of the authors (RY) trained for clinical examination during several educational and clinical sessions under the guidance of two specialized dentists. Data collection included clinical examination based on WHO criteria, and a self-administered structured questionnaire, its framework being based on the second international collaborative study (ICSII) approach (Chen *et al*., 1997; WHO, 1997). After a short explanation of the study by one of the authors (RY) to motivate the

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subjects to participate, the questionnaire for background information was distributed to 15-year-olds for completion and returned in the class prior to the clinical dental examination. Participation was voluntary and an informed consent was acquired from all the participants.

The clinical dental examination took place during school hours in the health office of the school on a comfortable chair with a headlamp, a mouth mirror and a WHO probe. Dental status was recorded by tooth; findings on dental plaque and periodontal status were recorded separately for each of the six index teeth. Oral health status was described by indices DMFT, CPI, modified IOTN, modified plaque index (PI) and bleeding on probing (BOP).

Caries diagnoses followed the WHO criteria (1997). The significant caries index (SiC) was calculated as the mean DMFT for the upper third of the subjects according to their DMFT indices (Bratthall, 2000).

The CPI scores were: 0=healthy, 1=gingival bleeding, 2=calculus to avoid the deepened sulci associated with tooth eruption as suggested by WHO (1997). In addition, a separate code was used for index teeth with both calculus and bleeding. The original PI (Silness and Löe, 1964) was modified to include these scores: 0=no plaque, 1=plaque on the gingival margin only, 2=plaque elsewhere. The maximum of the scores for the six index teeth described a subject's periodontal status (CPI), and plaque score (PI).

Modified Index of Orthodontic Treatment Need (IOTN) has two scores: 0=no need, 1=definite need for orthodontic treatment (Burden *et al.,* 2001). A score of one indicated conditions such as serious hypodontia, large and reverse overjet, supernumerary teeth, anterior and posterior cross bite, large contact point displacement, and serious lateral or posterior open bite.

A re-examination of 25 subjects was arranged yielding 96% intra-examiner consistency for caries recordings, 88% for CPI and 96% for IOTN.

The parents' level of education was obtained separately for father and mother by giving six alternatives which in the analyses were categorized into three: low (illiterate, primary or secondary school degree), medium (high school, diploma degree) and high (university degree). The students' socio-economic status (SES) was defined by the wealth status of the family (own house, rented house), the area profile of the school (official ranking order by HOET), and by the level of education attained by either parent.

Descriptive statistics included means with their 95% confidence intervals. Differences in mean values between the subgroups were evaluated by ANOVA and in frequencies by the Chi-square test. Logistic regression analyses were conducted with oral hygiene as the dependent variable. The associations were assessed by odds ratios (OR) and 95% confidence interval (95% CI). Differences with a $p<0.05$ were considered statistically significant.

## Results

For the 15-year-olds studied (n=506), the mean number for DMFT was 2.1 (95%CI 1.9, 2.4), which comprised DT=0.9, MT= 0.2, and FT=1.0. The mean SiC index was 5.2 (95% CI, 4.8, 5.5). Table 1 shows mean values for dental health indicators, separately for boys and girls, and by the level of the parents' education. No differences in these figures appeared according to the area profile of the school and the wealth status of the family.

An intact dentition (DMFT=0) was found in 40% of the 15-year-olds (44% of boys and 37% of girls; $p<0.05$). Regarding dental caries, DT=0 was found in 60% of the 15-year-olds; 17% had one, and 23%, two or more decayed teeth, 32% had one or more filled teeth (FT>0), and 9% had lost at least one permanent tooth. No gender-differences were found in these figures.

Table 2 shows the distribution of 15-year-olds by their number of DT (untreated caries) and by parents' level of education. Fewer children with untreated carious teeth were found among those children whose parents had a high level of education ($p$=0.04), a difference most obvious ($p$=0.01) among the girls.

Dental plaque (PI>0) existed on at least one index tooth of all 15-year-olds, most frequently on the lower first molars. Mean numbers of sextants with PI scores 0, 1, and 2 were 0.6, 2.1, and 3.3 respectively. PI=2 occurred in 83% of all students, and was most frequent (88%) among those students with lowly educated parents, and least frequent (77%) for those with highly educated parents ($p$=0.02).

Healthy periodontium (CPI=0) was found in 8% of the 15-year-olds, 68% had CPI=1 and 24% CPI=2. Bleeding occurred in 96% of those with calculus. Mean numbers of sextants for CPI scores 0, 1, and 2 were 2.1, 3.5, 0.4, respectively, with no differences by gender or by parents' level of education (Table 3). CPI=0 occurred for the majority of incisors (61%), for 31% of upper molars, and for 12% of the lower molars.

A definite need for orthodontic treatment was observed in 26% of the 15-year-olds. Mean numbers of DMFT (2.8 vs. 1.9, $p$=0.003), MT (0.4 vs. 0.1, $p$=0.001) and FT (1.4 vs. 0.1, $p$=0.04) were higher for those with a need for orthodontic treatment need. No relationship existed between definite orthodontic treatment need and dental plaque.

The presence of dental plaque (PI>0) was associated with the presence of decayed teeth (OR=1.8, $p$=0.01), with the presence of bleeding (OR=11.6, $p<0.001$), and with a CPI>0 (OR=11.2, $p<0.001$)**.** The result of logistic regression analysis with PI=2 as the outcome is depicted in Table 4. Poor oral hygiene was less likely among those students with highly educated parents. Other indicators of SES (area profile of the school and wealth status of the family) showed a weak and non-significant impact on oral hygiene.

## Discussion

The present study provides useful information on dental caries, periodontal status and orthodontic treatment needs among 15-year-olds in Tehran, Iran. The alarming findings of the poor level of oral hygiene and its relationship to dental and periodontal status in the 15-year-olds call for efforts to promote oral health among the adolescents.

For countries with young populations, such as Iran with 32% of its population under the age of 15, this situation of poor dental health is even more critical. In general, schools can provide a supportive environment

and ideal settings to promote oral health (WHO, 2003). The public education in Iran lasts for 12 years; five years of primary, three years secondary and four years of high school. In Tehran, over 80% of 15-year-olds attend high school, thus offering an easy access to and high coverage for school-based activities.

On the other hand, the high migration rate from other parts of country to the capital may render the situation in Tehran, and consequently in any metropolis, more challenging. Further inconsistencies may follow the wide variation in the population's socio-economic and educational levels.

Applying the WHO criteria (WHO 1997) makes the present results comparable to those of similar studies elsewhere. The high participation rate and extremely low proportions of unanswered questions support the representativeness and precision of results.

In comparison with available data for 15-year-olds in the Middle East (WHO oral health country/area profile), the present results indicate a mean DMFT lower than those in Kuwait, Oman, Jordan, Syria, but higher than those in Djibouti, Yemen and Pakistan. However, contrary to the data for many developing countries where DT is the dominant component of DMFT, the present 15-year-olds exhibited a mean FT level similar to that of the mean DT. Regarding the rate of caries-free 15-year-olds (40%) our rate exceeds that of Denmark (31%) in 1997 (Poulsen and Scheutz, 1999) and of Finland (24%) in 2000 (Nordblad *et al*., 2004).

The SiC index (Bratthall, 2000) describes the presence of high-caries cases in the population by taking into account the extreme end of the skewed distribution of DMFT. The SiC index for the present 15-year-olds was 2.5 times the mean DMFT, a ratio in line with that of the few countries where a SiC index is available (Nishi *et al*., 2002). The present finding of a higher SiC for boys indicates the severity of their dental caries compared to that of the girls. While the global goal to reduce the SiC index to under three by the year 2015 exists for 12-year-olds (Bratthall, 2000), no such goal

**Table 1.** Dental health indicators for 15-year-old boys (n=260) and girls (n=246) in Tehran, Iran by parents' level of education

| *Parents' level of education* | *FT* | | *DT* | | *DMFT* | | *SiC* | |
|---|---|---|---|---|---|---|---|---|
| | *Mean* | *(95%CI)* | *Mean* | *(95%CI)* | *Mean* | *(95%CI)* | *Mean* | *(95%CI)* |
| Boys | 1.0 | (0.8, 1.3) | 0.9 | (0.7, 1.1) | 2.0 | (1.7, 2.4) | 5.3 | (4.8, 5.8) |
| Low | 0.7 | (0.3, 1.1) | 1.2 | (0.8, 1.6) | 2.1 | (1.5, 2.6) | 5.6 | (4.5, 6.6) |
| Medium | 1.4 | (0.9, 1.9) | 0.6 | (0.4, 0.9) | 2.1 | (1.5, 2.7) | 5.6 | (4.7, 6.5) |
| High | 0.9 | (0.5, 1.4) | 0.9 | (0.5, 1.2) | 2.0 | (1.4, 2.4) | 4.7 | (4.1, 5.4) |
| Girls | 1.1 | (0.9, 1.4) | 0.9 | (0.7, 1.1) | 2.2 | (1.9, 2.5) | 5.0 | (4.6, 5.5) |
| Low | 1.0 | (0.5, 1.5) | 1.4 | (0.9, 1.8) | 2.8 | (2.1, 3.4) | 5.2 | (4.3, 6.0) |
| Medium | 1.1 | (0.7, 1.5) | 0.9 | (0.6, 1.1) | 2.1 | (1.6, 2.5) | 4.9 | (4.3, 5.6) |
| High | 1.2 | (0.7, 1.7) | 0.6 | (0.4, 0.9) | 2.0 | (1.4, 2.6) | 5.0 | (4.1, 5.9) |

Statistical evaluation by ANOVA for differences by parents' level of education: for DT $p$=0.05 (boys), $p$=0.009 (girls), all others ns.

**Table 2.** Distribution (%) of 15-year-olds (n=506) in Tehran, Iran by number of decayed teeth (DT) and by parents' level of education, and by gender.

| *Parents' level of education (%)* | | *% of subjects by their DT* | | | |
|---|---|---|---|---|---|
| | *n* | *DT=0 %* | *DT=1 %* | *DT=2+ %* | *p-value* |
| Total | 506 | 60 | 16 | 24 | 0.04 |
| Low | 157 | 52 | 16 | 32 | |
| Medium | 186 | 63 | 17 | 20 | |
| High | 166 | 64 | 17 | 19 | |
| Boys | 260 | 62 | 16 | 22 | 0.09 |
| Low | 95 | 52 | 21 | 27 | |
| Medium | 88 | 72 | 12 | 16 | |
| High | 77 | 63 | 14 | 23 | |
| Girls | 246 | 58 | 16 | 26 | 0.01 |
| Low | 62 | 53 | 8 | 39 | |
| Medium | 98 | 56 | 20 | 24 | |
| High | 89 | 65 | 20 | 15 | |

Statistical evaluation by Chi square-test for differences by parents' education

**Table 3.** Mean numbers of sextants by CPI scores for 15-year-old boys (n=260) and girls (n=246) in Tehran, Iran by parents' level of education.

| *Parents' level of education* | *CPI=0* | | *CPI=1* | | *CPI=2* | |
|---|---|---|---|---|---|---|
| | *Mean* | *(95%CI)* | *Mean* | *(95%CI)* | *Mean* | *(95%CI)* |
| Boys | 1.9 | (1.7, 2.0) | 3.7 | (3.4, 3.9) | 0.4 | (0.3, 0.6) |
| Low | 1.6 | (1.2, 1.9) | 3.7 | (3.3, 4.1) | 0.7 | (0.4, 0.9) |
| Medium | 2.0 | (1.6, 2.4) | 3.7 | (3.2, 4.0) | 0.3 | (0.2, 0.5) |
| High | 2.2 | (1.7, 2.6) | 3.5 | (3.1, 3.9) | 0.3 | (0.1, 0.5) |
| Girls | 2.3 | (2.0, 2.5) | 3.4 | (3.1, 3.6) | 0.3 | (0.2, 0.4) |
| Low | 2.4 | (1.9, 2.9) | 3.4 | (2.8, 3.8) | 0.2 | (0.1, 0.4) |
| Medium | 2.3 | (1.9, 2.7) | 3.3 | (3.0, 3.6) | 0.4 | (0.2, 0.5) |
| High | 2.1 | (1.7, 2.5) | 3.6 | (3.2, 4.0) | 0.3 | (0.2, 0.4) |

Statistical evaluation by ANOVA for differences by parents' level of education: for CPI=2: $p$=0.02 (boys), all others insignificant.

**Table 4.** Socio-economic factors as predictors of poor oral hygiene (PI=2) among 15-year-olds (n=506), by means of a logistic regression model.

| *Factors and their categories* | *Estimate of strength* | | *Odds ratio (OR) and its 95% confidence interval* | | |
|---|---|---|---|---|---|
| | *Estimate* | *s.e.* | *OR* | *95% CI* | *P-value* |
| Parents' education level | -0.18 | 0.09 | 0.8 | 0.6, 1.0 | 0.05 |
| Area profile: 1=Affluent, 2=Deprived | 0.03 | 0.02 | 1.0 | 0.9, 1.0 | 0.12 |
| Wealth status of family: 1=Own house, 2=Rented house | 0.15 | 0.24 | 1.1 | 0.7, 1.8 | 0.53 |
| Gender: 1=Boy, 2=Girl | 0.17 | 0.25 | 1.1 | 0.7, 1.9 | 0.49 |
| Constant term | 1.48 | 0.67 | | | |

Goodness of fit: p=0.81

yet exists for 15-year-olds. Based on the current trend in the mean DMFT in 12-year-olds worldwide (Petersen, 2003), the SiC index in 15-year-olds should drop under four by 2015.

The present findings of the poor level of oral hygiene and high proportion of 15-year-olds with gingival bleeding and calculus are in line with previous reports from developing countries (Albandar and Tinoco, 2002; WHO oral health country/area profile). In addition, the present results revealed strong associations between dental plaque and unhealthy gums, also in line with recent reports (Nunn, 2003). The provision of oral health education in schools, with an emphasis on proper instructions for oral hygiene practices, would certainly improve adolescents' oral hygiene, and thus reduce their long-term risk of caries and periodontal diseases (WHO, 2003).

According to the modified IOTN index, one in four 15-year-olds was in definite need of orthodontic treatment, which despite the indices used, is in line with the few previous studies available (Abdullah and Rock, 2001; Hamdan, 2001). Our findings also showed higher mean values in the DMFT, MT and FT indices for those subjects with a definite need for orthodontic treatment. In some studies, the main reason for the differences in oral health result not from malocclusion itself but from the presence of dental plaque (Griffiths and Addy, 1981; Helm and Petersen, 1989).

Our findings about the positive impact of parents' higher level of education on their children's oral health are in line with those of several studies (Van Nieuwenhuysen *et al*., 2002; Wierzbicka *et al*., 2002). In addition to parents' efforts, however, community-based activities are needed to promote oral health among adolescents.

## Conclusion

The present findings on the alarmingly poor level of oral hygiene and high occurrence of gingival bleeding among 15-year-olds indicate an urgent need to promote oral health care activities with a primary focus on oral self-care among adolescents.

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