An Investigation on the Correlation between DMFT and OHI- S Indices on 12- Year- Old School Girls in Kashan

Afshar H¹, Ershadi A², Ershadi M.³

¹Assistant Professor, Dept of Paedodontics, Faculty of Dentistry, Tehran University of Medical Sciences, Tehran, Iran
²Assistant Professor, Dept of Paedodontics, Faculty of Dentistry, Kashan University of Medical Sciences, Tehran, Iran
³Dentist (Statistical Consultant MS)

Statement of Problem: DMFT and OHI- S indices are two of the most important quantitative factors, measuring tooth health and oral hygiene, respectively.
Propose: The aim of this study was to study of correlation between these indices in 12-year old school girls of Kashan.
Materials and Methods: A cross sectional study on the correlation between these indices were carried out on 242, twelve year-old school girls in Kashan and the results, have been presented in this paper.
Results: The findings were as follows:
Average and standard deviation of decayed, missed and filled teeth were (1.12, 1.5), (0.05, 0.25) and (0.28, 0.92), respectively. Average and standard deviation of DMFT was 1.45 and 1.73, respectively, with 45.5 percent of the cases being caries free (DMFT= O). OHI- S index, on the other hand, showed an average of 1.46 with a standard deviation of 0.42.
Conclusion: The result of the $\chi^2$ test, carried out on the measured data, showed no correlation between the DMFT and OHI-S indices.

Key words: OHI- S; DMFT; 12 year-old school girls

Oral diseases are one of the most prevalent diseases, endangering our health and safety (¹). Tooth has a very important role in chewing and proper digestion of the food, speech and esthetic. Neglecting oral hygiene can cause caries, toothache, and/loss of teeth which could lead to disability of chewing, and speech; orthodontic problems and TMJ disorders.
Due to importance of these problems, many efforts have been done to prevent caries in early stages (²,³). Twelve is the most crucial age regarding prevention policies, as suggested by WHO & FDI. The permanent dentition starts at this age and hence, most of the 12- year-olds have all the permanent teeth, except for the third molar.
In this study, the oral hygiene of the subjects was quantified using the simplified oral hygiene index (OHI-S), and its correlation to the mean value of the DMFT was investigated. Although many studies have been done of this...
subject in many developed countries, no valid data can be found about DMFT and OHI-S in Iran. The aim of this study was to study of correlation between these indices in 12-year-old school girls of Kashan.

Materials and Methods
The research was a cross-sectional study, carried out on 242 twelve-year-old school girls in Kashan. Kashan with a population of 198,158, according to the last pole in 1992, is situated in the dry part of Isfahan province. A series of deep wells outside the city provide the drinking water for the city, with an average fluoride equal to 0.6 PPM.

Sampling Method
Sampling was carried out using a random cluster method. In this method, a required number of junior high schools across the city were randomly chosen and then all the 12-year-old girls, studying in these schools, were subjected to examination.

Sample population size determination
The size of the sample population was calculated; using the following empirical relation, lead to a size of 130.

\[ n = \left( \frac{Z^2 \cdot PQ}{d^2} \right) \]

To increase the accuracy of the study, all the students in the selected schools, amounting to 242, were included in the sample population. The sampling process included all the 12 years girls studying at the selected schools. Only 8 of the schools in the city were included in the sampling process due to the lack of support from the related authorities. These schools, however, were so chosen across the city so that they could be representative of the Kashan school girls.

The schools database was used to determine the date birth and age of the students. Light was secured by a 100-watt power engineering electric light.

Examination indices
DMFT, is a suggested index by WHO and equals to the sum of the number of decayed, missed and filled tooth of the sample population divided by the population size.

Different criteria, such as Slack & Jackson criteria, can be used to define tooth decay. Based on this criteria, a tooth is considered decayed if, in addition to showing clinical signs such as color change, the explorer gets stock during the examination and encounters some degree of resistance when trying to get it free.

Greene & Vermilion have suggested the following method to determine the simplified oral hygiene index (OHI-S).

The six surfaces examined for the OHI-S are selected from four posterior and two anterior teeth. In the posterior portion of the dentition, the first fully erupted tooth distal to the second premolar, usually the first molar but sometimes the second molar, is examined on each side of the arch. The buccal surfaces of the selected maxillary molars and the lingual surfaces of the selected mandibular molars are inspected.

In the anterior portion of the mouth, the labial surface of the maxillary right central incisor and mandibular left central incisor are scored. To obtain the scores for debris and calculus, each of the six selected tooth surfaces are examined first for debris, then for calculus. The following criteria were applied to determine the scores for each surface examined.

0- No debris or stain present
1- Soft debris covering not more than one third of the tooth surface or the presence of extrinsic stains without debris, regardless of the surface area covered
2- Soft debris covering more than one third but
not more than two thirds of the exposed tooth surface
3- Soft debris covering more than two thirds of the exposed tooth surface
The surface area covered by debris was estimated when one runs the side of a No.5 explorer over the tooth surface being examined and notes the extent of the debris.
The amount of supra gingival calculus was determined in a similar manner and scores were assigned according to the following criteria:
0- No calculus present
1- Supra gingival calculus covering not more than one third of the exposed tooth surface
2- Supra gingival calculus covering more than one third but not more than two thirds of the exposed tooth surface, or the presence of individual flecks of sub gingival calculus
3- Supra gingival calculus covering more than two thirds of the exposed tooth surface or a continuous heavy band of sub gingival calculus around the cervical portion of the tooth
After the scores for the debris and calculus were recorded, the index values were calculated. For each person, the debris scores were totaled and divided by the number of surfaces scored. A score for a group of people was obtained when the average of the individual scores was computed.

The average individual or group score was computed. The average individual or group score was known as the Simplified Debris Index (DI-S).
The same methods were used to obtain the calculus scores or the Simplified Calculus Index (CI-S). The average individual or group debris and calculus scores were combined to obtain the OHI-S (3). Questionnaires were used to set up a database, which was later analyzed using \( \chi^2 \) test.

**Results**
The main results were as follows:
The mean, and standard deviation of the decayed teeth (D), was equal to 1.12 & 1.5, respectively. The mean and standard deviation of the missing teeth (M), was equal to 0.05 & 0.25 while the same value for fillings was 0.28 & 0.92, respectively.
DMFT index had a mean value of 1.45 with a standard deviation of 1.73 while 45.5 percent of the population was classified as caries free. Finally, OHI-S showed a mean value of 1.46 and standard deviation of 0.42.
Analysis of the above index along with the \( \chi^2 \) test showed no correlation between DMFT and OHI-S.
Table I shows the frequency distribution of the DMFT and OHI-S for the sample population.

**Table I:** Frequency distribution of 12-year-old school girls regarding DMFT & OHI-S indexes

<table>
<thead>
<tr>
<th>DMFT</th>
<th>OHI-S</th>
<th>0-0.99</th>
<th>Case</th>
<th>Percent</th>
<th>1-1.99</th>
<th>Case</th>
<th>Percent</th>
<th>2-2.99</th>
<th>Case</th>
<th>Percent</th>
<th>Total</th>
<th>Case</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>17.9</td>
<td>82</td>
<td>46.1</td>
<td>14</td>
<td>38.9</td>
<td>110</td>
<td>45.5</td>
<td>110</td>
<td>45.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>10.7</td>
<td>20</td>
<td>11.2</td>
<td>7</td>
<td>19.4</td>
<td>30</td>
<td>12.4</td>
<td>30</td>
<td>12.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>17.9</td>
<td>17</td>
<td>9.6</td>
<td>4</td>
<td>11.1</td>
<td>26</td>
<td>10.7</td>
<td>26</td>
<td>10.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>3.6</td>
<td>20</td>
<td>11.2</td>
<td>5</td>
<td>13.9</td>
<td>26</td>
<td>10.7</td>
<td>26</td>
<td>10.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 and more</td>
<td>0</td>
<td>0.0</td>
<td>10</td>
<td>5.6</td>
<td>2</td>
<td>5.6</td>
<td>12</td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td></td>
<td>178</td>
<td>100</td>
<td>36</td>
<td>100</td>
<td>242</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean: 1.07, 1.46, 1.72, 1.45
SD: 1.28, 1.78, 1.77, 1.73
Discussion

Three levels of oral hygiene based on OHI-S index can be defined as high, intermediate and low level with $0 = \text{OHI-S} = 0.99$, $1 = \text{OHI-S} = 1.99$, and $2 = \text{OHI-S} = 2.99$ respectively. The oral hygiene of school girls in Kashan, can be classified as intermediate, based on the OHI-S value.

The DMFT index showed, however, higher level of oral hygiene for the school girls in Kashan according to the standards set by WHO and FDI for year 2000. It should be noted that the highest level of tooth health relates to the zero value of DMFT. Table I shows mean value of an increasing, though low rate, trend for DMFT with the OHI-S index. DMFT of $1.72 \pm 0.21$ for those classified as low hygiene hardly violates the WHO standards.

Low value of DMFT, in contrast to the low level of oral hygiene, could perhaps be associated with relatively high level of fluoride (0.6 PPM) in the drinking water, which in turn could increase the resistance of the inhabitants including the school girls to the teeth decay. A previous research reports the value of DMFT, caries free and OHI-S index for the 12-year old school pupils of Mashhad as $3.27 \pm 2.37$, $11.8$ and $2.14 \pm 0.70$ respectively. It is apparent that the DMFT and OHI-S index for Mashhad’s are higher than the Kashani’s while caries free are higher among Kashani’s. This research concluded the same result as reported in the present paper, indicating that no significant correlation exists between OHI-S and DMFT indices.

A similar study on the 12-year old pupils of Tehran (J. Pour Hashemi 1991) shows a value of $3.17 \pm 1.56$, $2.83 \pm 1.57$, $0.12 \pm 0.41$ and $0.57 \pm 1.32$ for the DMFT, D, M and F indices, respectively. This shows a higher value of the above indices compared to pupils of Kashan. A comparison between 12-year old school girls in Kashan and Birgand school girls and boys reveals a higher value of DMFT for Kashan school girls, compared to Birgand school boys, (1.32), but lower value compared to the Birgand school girls with a value of 2.27 and even the average DMFT ($1.76 \pm 1.82$) of the Birgand school girls. Another research carried out on 12-year old Bangladeshi pupils’ shows a value of 1.7 for DMFT index. Table II shows the value of these indices for some of the countries.

Table II: Some of the results reported in previous research across the world

<table>
<thead>
<tr>
<th>Time of study</th>
<th>Country</th>
<th>Age</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>New Zealand (14)</td>
<td>12</td>
<td>DMFT = 6.6</td>
</tr>
<tr>
<td>1970</td>
<td>England (14)</td>
<td>12</td>
<td>DMFT = 4.5-6.5</td>
</tr>
<tr>
<td>1990</td>
<td>New Zealand (14)</td>
<td>12</td>
<td>DMFT = 1.2-6.6</td>
</tr>
<tr>
<td>1990</td>
<td>England (14)</td>
<td>12</td>
<td>DMFT = 2.7-4.4</td>
</tr>
<tr>
<td>1989</td>
<td>Brazil (16)</td>
<td>12-7</td>
<td>Caries free 29%</td>
</tr>
<tr>
<td>1992</td>
<td>Brazil (16)</td>
<td>12-7</td>
<td>Caries free 40.6%</td>
</tr>
<tr>
<td>1992</td>
<td>Spain (17)</td>
<td>Adults</td>
<td>F=2.1 M=7.5 D=2.9 DMFT=12.5</td>
</tr>
<tr>
<td>1993</td>
<td>Oman (18)</td>
<td>12</td>
<td>DMFT=1.53</td>
</tr>
<tr>
<td>1996</td>
<td>Greece (19)</td>
<td>12-13</td>
<td>DMFT = 3.7 Caries free= 24.3% DMFT = 5.6</td>
</tr>
<tr>
<td>1996</td>
<td>East Europe (20)</td>
<td>12</td>
<td>DMFT = 3.1 Bulgaria</td>
</tr>
<tr>
<td>1996</td>
<td>Zimbabwe (21)</td>
<td>12</td>
<td>DMFT = 3.1 Bulgaria</td>
</tr>
<tr>
<td>1996</td>
<td>Poland (22)</td>
<td>12</td>
<td>DMFT = 5.1</td>
</tr>
<tr>
<td>1996</td>
<td>Russia (22)</td>
<td>12</td>
<td>DMFT = 3.3</td>
</tr>
<tr>
<td>1996</td>
<td>Tajikistan (22)</td>
<td>12</td>
<td>DMFT = 1.2</td>
</tr>
<tr>
<td>1996</td>
<td>Kherlisestan (22)</td>
<td>12</td>
<td>DMFT = 3.1</td>
</tr>
<tr>
<td>1996</td>
<td>Zimbabwe (21)</td>
<td>12</td>
<td>DMFT = 0.3 Caries free=19.8%</td>
</tr>
</tbody>
</table>
**Concluding remarks**

Following suggestions are based on the outcomes of this research:

1- Systematic attempts should be made to increase the common knowledge about the effect of the diet and oral hygiene on tooth health.

2- Providing the school pupils with proper dental services, that is particularly important for those pupils coming from families with average or under- average income.

3- Practicing dentists should spend some of their times with the patients to emphasize the importance of the methods used for oral and teeth disease preventions. The dentists in executive positions could emphasize the proper planning & management of the prevention policies and project control during execution of these programs.

**References:**


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