PERIODONTAL HEALTH STATUS AND TREATMENT NEEDS IN IRANIAN ADOLESCENT POPULATION

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Background: Use of the community periodontal index of treatment needs (CPITN) provides a picture of the public health requirements in the periodontal field, which is essential for national oral health policy-making and specific interventions.

Objective: To determine periodontal status and treatment needs by CPITN index in the Iranian adolescents.

Methods: The study population consisted of 1,319 subjects aged 15 – 19 years, selected through a multistage cluster stratified random sampling from 13 different provinces of Iran. Six calibrated qualified examiners, using flat dental mirrors and CPITN probes conducted clinical examinations according to the World Health Organization (WHO) standards. The severity and prevalence of the periodontal diseases, as well as its frequency distribution were evaluated and reported according to gender; residency place; frequency of dental brushing; plaque index; number of family members; mean of decayed, missed, and filled teeth index (DMF); and CPITN. This study was performed during 1999 and 2000.

Results: In this study, only 14.5% of subjects demonstrated a healthy periodontal status, with a mean healthy sextant of 2.6. Bleeding was noted in 33.7% of subjects and calculus had the highest score (48.7%). Shallow and deep pockets were found in 3.9% and 0.5% of the population studied, respectively. Periodontal status in men was worse than women \((P < 0.005)\). In urban areas it was better than the rural areas \((P < 0.0001)\). The highest rate of calculus and bleeding were observed in subjects with high plaque index and low frequency of dental brushing \((P < 0.005)\). A statistically significant \((P < 0.005)\) relationship was also observed between CPITN scores and the number of family members. A positive correlation was found between the periodontal status and treatment needs with the DMF index \((P < 0.02)\).

Conclusion: We found that a high percentage of adolescents need treatment (TN1, TN2, TN3, 4). If the current trend is not reversed, with increasing the age, periodontal diseases could be escalated.

Keywords: Adolescent • community periodontal index of treatment needs (CPITN) • epidemiology • Iran • periodontal status

Introduction

Use of the community periodontal index of treatment needs (CPITN) provides a picture of the public health requirements in the periodontal field, which is essential for national oral health policy-making and specific interventions. The CPITN index has developed jointly by the International Dental Federation (IDF) and World Health Organization (WHO) to evaluate periodontal status and treatment needs of population. WHO began collecting data on periodontal diseases in 1993 from more than 100 countries.\(^1\) These data are stored in the WHO Global Oral Data Bank (GODB). Nevertheless, in that database, there is no information available from Iran.

In the past years, several surveys have been conducted in our country, evaluating the
periodontal conditions in children, adolescent, and adult population. However, none of them had been based on the CPITN index. Only a few surveys have used the CPITN index in the above-mentioned population. The purpose of this study was to determine periodontal status and treatment needs by using the CPITN index and associated variables in the Iranian population aged between 15 and 19 years, selected from 13 different provinces of Iran.

**Patients and Methods**

The target population aged between 15 and 19 years, selected from rural and urban areas of 13 different provinces of Iran including Zanjan, Khoozestan, Kermanshah, Lorestan, Isfahan, Fars, Hormozgan, Guilan, Kerman, Golestan, Ardebil, and Ghazvin. This study was carried out during 1999 and 2000. By taking subjects from five regions of the country (Center, North, South, West, and East), the distribution of the selected provinces was found to be normal. Individuals were selected through a multistage stratified cluster random sampling; at first, the whole target area was stratified according to the population ratio. Each selected area was then clustered at random and the focal points of each segment emerged from all potential focal points. In the next step, all the selected area’s focal family points were chosen systematically and their addresses were found through the related health centers.

In each area, one local assistant who was familiar with the area, helped the research team to find the selected families and examine them. When the selected family was not available for on-site examination, the research team returned another time; if they were not available again, the nearest family member was chosen and entered into the study instead.

In this study, six qualified calibrated dentists, who were trained in a three-week workshop, examined the participants clinically. A predetermined questionnaire guided them during the examination.

To insure inter-examiner consistency and reliability, different examiners examined a group of participants at random. Their findings were then measured according to the percentage of agreement and Kappa statistics. Results showed a good degree of inter-examiner agreements (89.7%) and Kappa statistics ($P < 0.05$).

Clinical examinations were carried out under day light using dental flat mirrors and CPITN probes (designed by WHO/IDF), with applying a gentle probing force (20 g or lower) according to WHO criteria.

Six segments were assessed for each individual. Pockets’ depths were measured at six sites around each tooth (mesial, midline, and distal on both vestibule and lingual/palatal surfaces). The index teeth were 16, 11, 26, and 36, 31, 46. If less than two functional teeth existed, the sextant would have been classified as edentulous. Each sextant, based on which tooth showed the worst situation, was given a grade and registered according to the highest recorded at the index teeth.

Each sextant was designated as healthy, when no treatment is required (Code 0 = TN0), or X (missing). In case of bleeding without calculus, it was recommended to improve the oral hygiene (Code 1 = TN1). If calculus but no periodontal pockets was detected, oral hygiene instructions were provided and professional cleaning was carried out, if indicated (Code 2 = TN2). Presence of 4 – 5 mm pockets (Code 3), and 6 mm or deeper (Code 4) may or may not need treatment by deep scaling. In these cases, root planning and more complex surgical procedures may be indicated.

The collected data were analyzed using the SPSS version 10.5 (SPSS Corporation, Chicago, IL).

Chi-square test and one-way analysis of variance (ANOVA) were conducted to determine the CPITN indexes in relation to gender, residency place, frequency of dental brushing, rate of dental plaque, individual’s education level, family size, and the relationship between CPITN and DMF indices.

The ethical issues of the study involved the assurance of individual’s confidentiality and autonomy for the participants. Participants were informed of the purpose and design of the study, and were assured that participation was voluntary. The ethical approval was also obtained from the Research Deputy of the Ministry of Health and Medical Education.

**Results**

The population under the study composed of 51.6% males and 48.4% females, and consisted of 49.8% urban and 50.9% rural individuals (Table 1).
Table 2 demonstrates the periodontal health status and CPITN scores. Healthy periodontal tissues only existed in 14.5% of participants. The highest score in this age group was for calculus (47.8%). The deep pockets had the lowest score in these subjects (0.5%). Only a few individuals with shallow pockets were found (3.9%) in our study. With regards to the severity of periodontal status, the mean of healthy sextants was 2.6.

Table 3 demonstrates the distribution of subjects according to the highest CPITN scores in relation to gender, resident place, frequency of dental brushing, the rate of plaque index, family size, and the relationships between CPITN and DMF indices. As shown in Table 3, a significant difference was found in the CPITN in terms of the gender \((P < 0.005)\). Healthy sextants (Code 0) were found to be more frequent in females than males \((P < 0.05)\). Periodontal status was better in urban than rural areas. A higher numbers of people with bleeding and calculus were observed among those living in rural areas \((P < 0.005)\). Also the highest mean of sextants with calculus was observed in rural areas \((P < 0.0005)\).

Table 3 also shows a positive association between CPITN scores and family size. Periodontal status worsened with increased family size \((P < 0.004)\). The lowest number of subjects with a healthy periodontal status was demonstrated in those with plaque index 3 category, who did not brush daily \((P < 0.0005)\).

There was a significant \((P < 0.02)\) positive correlation between the DMF mean and the CPITN indices (Table 4).

**Discussion**

In our study population, only 14.5% of people had a complete healthy periodontal tissues and the mean of healthy sextant was 2.6, which is far away from the goals of WHO for the year 2010. WHO set two goals for the years 2000 and 2010\(^{10-11}\). The first goal was that 100% of all people aged 15 years should have three or more mean healthy sextant by the year 2000. The second goal is that all people aged 15 years should have 5 – 6 healthy sextants mean by the year 2010\(^{11-13}\). The present study showed that periodontal status in this important age group is not suitable.

In comparison to the findings of this study, previous studies conducted in the eastern Mediterranean regions (EMR), have shown that although the periodontal status in Iran is better than Egypt, Libya, Jordan, Yemen, and Morocco, it is worse than Cyprus, Oman, Pakistan, Saudi Arabia, and Sudan and is close to the situation in Bahrain and Syria.\(^1\) The CPITN scores in our country, as compared to some European countries, are better than Russia, Tajikistan, Slovenia, United Kingdom, Yugoslavia, and Germany, but is poorer than Finland, France, and many other countries in this WHO regional area.

In previous years, several studies have been carried out in Iran, most of which but four were not based on the CPITN index. In the two studies carried out in 1988 and 1990, using CPITN,\(^{12-13}\) it was demonstrated that 80% of people aged 15 years old and 90% of those aged 12 – 15 years have healthy periodontal tissues, which are in contrast to the frequency of 14.5% observed in our study. It is hard to justify that in the past decade the periodontal status was better than now. In the two studies mentioned above, the WHO probe had not been used by the examiners. Differences in the sample population, methods of investigations, and periodontal measurement tools may be the reasons for the differences observed.

The results of the present study, however, revealed a higher healthy periodontal status (14.5%) than the results found from the studies carried out in 1996 and 1998 (5.5% and 8.9%, respectively).\(^{14-15}\) Comparison of the results showed that the periodontal treatment needs were higher in previous years than now. These differences, however, might be attributed to the same reasons (sampling, methods, and measure-
In the present study, the highest prevalence of periodontal status was related to calculus (47.8%), which is similar to the reports from other developing countries. One reason for a higher prevalence of calculus in the developing countries might be related to the poorer oral hygiene in these regions.

The prevalence of bleeding was also too high (33.4%) and only a small proportion of the individuals had shallow and deep pockets, needing deep scaling and complex periodontal treatments, which is in keeping with other reports from both developing and developed countries. In spite of more frequency of calculus in the developing countries, the prevalence of pockets had no significant difference between developed and developing countries. These findings emphasize the lack of significant association between calculus and deep periodontal pocket. This point of view seems to be supported by WHO Global Oral Data Bank, which indicates a comparable prevalence of deep periodontal pockets in the industrialized and developing countries. In this study, the gender seemed to be correlated with the CPITN indices—especially with respect to calculus. In line with previous studies, females showed a significantly ($P < 0.05$) higher healthy periodontal status than males. The reason why gender affects periodontal health status may be attributed to the habit and conscious of females in doing a better oral hygiene practice.

There was a significant difference between the resident place and CPITN scores. Healthy periodontal status and the mean of healthy sextants in urban areas were better than the rural areas ($P < 0.0001$). The reason for this difference could be due to the poorer oral hygiene habits, culture, nutrition, and health beliefs.

The predominance of those with a healthy periodontal status among adolescents with a small family size is obvious ($P < 0.005$). This difference might be due to the socioeconomic factors. The rate of population growth has deleterious effects on socioeconomic development and on public and oral health. It is well-known that the lower socioeconomic strata has generally less access to dental care than the upper and middle strata. This may explain the higher frequency of healthy periodontal status in small families.

There was a significant ($P < 0.0005$) difference in the proportion of individuals with a healthy status and calculus score, based on the tooth brushing frequency and the rate of plaque index. The reason is obvious; there is a significant correlation between plaque retention, gingival inflammation, and tooth loss. Also a significant ($P < 0.02$) positive correlation was observed between the mean of DMF and CPITN scores, which is in keeping with those found by other studies. The reason for this correlation may be due to the fact that same etiological factors are responsible for periodontal diseases and caries; both diseases are started by the microbial plaque. Such correlation, however, could not be established by several researchers.

We found that a high percentage of people in this age group need treatment (TN1, TN2, TN3, TN4). If the current trend is not reversed with advancement of age, periodontal diseases would be

### Table 3. Percentage of CPITN scores by different variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score (0)</th>
<th>Score (1)</th>
<th>Score (2)</th>
<th>Score (3 and 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>34.4</td>
<td>44.1</td>
<td>3.5</td>
</tr>
<tr>
<td>Male</td>
<td>13.1</td>
<td>32.3</td>
<td>51.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Resident place</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>15.6</td>
<td>38.2</td>
<td>41.7</td>
<td>4.41</td>
</tr>
<tr>
<td>Rural</td>
<td>13.4</td>
<td>28.6</td>
<td>53.5</td>
<td>4.4</td>
</tr>
<tr>
<td>Dental brushing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>11.1</td>
<td>27.2</td>
<td>58.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Once</td>
<td>18.4</td>
<td>38.5</td>
<td>37.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Twice or more</td>
<td>20.4</td>
<td>38.8</td>
<td>36.7</td>
<td>4.1</td>
</tr>
<tr>
<td>Plaque index</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>61.1</td>
<td>11.1</td>
<td>27.8</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>31</td>
<td>27.7</td>
<td>37.7</td>
<td>3.6</td>
</tr>
<tr>
<td>2</td>
<td>13.3</td>
<td>41.6</td>
<td>41.1</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>6.8</td>
<td>29.7</td>
<td>58.3</td>
<td>5.2</td>
</tr>
<tr>
<td>Family members</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 5</td>
<td>17.9</td>
<td>37.4</td>
<td>41.3</td>
<td>3.4</td>
</tr>
<tr>
<td>6 – 7</td>
<td>14.6</td>
<td>29.7</td>
<td>47.4</td>
<td>4.1</td>
</tr>
<tr>
<td>≥ 8</td>
<td>11.7</td>
<td>29.7</td>
<td>53.2</td>
<td>5.4</td>
</tr>
</tbody>
</table>

### Table 4. Periodontal status and DMF.

<table>
<thead>
<tr>
<th>Mean of DMF</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score 0</td>
<td>3.5</td>
</tr>
<tr>
<td>Score 1</td>
<td>3.8</td>
</tr>
<tr>
<td>Score 2</td>
<td>3.5</td>
</tr>
<tr>
<td>Score 3</td>
<td>5.1</td>
</tr>
<tr>
<td>Score 4</td>
<td>4.8</td>
</tr>
<tr>
<td>Total</td>
<td>3.7</td>
</tr>
</tbody>
</table>
increased enormously.

Fortunately, with good organization of PHC systems throughout Iran, the implementation of preventive programs would be possible for oral health-care services. We hope by establishing oral care programs and monitoring PHC systems, the goals of WHO for the year 2010 can be achieved.

Acknowledgment

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