EFFECT OF VISUAL IMPAIRMENT EDUCATION ON THE IMPROVEMENT OF ORAL HYGIENE AND REDUCTION OF PERIODONTITIS PREVALENCE

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Abstract

Background: The present investigation is motivated by the fact that the incidence of visual impairment is increasing all over the world. Blind people may encounter specific problems in plaque control, leading to a higher risk of periodontal disorders.

Objectives: To evidence the effect of alternative senses, other than sight, for controlling plaque formation and reducing periodontal indices in blind people.

Methods: 51 subjects (with ages between 15-45 years), both totally blind or with reduced sight were included in the study. They were instructed to brush their teeth by the M. Stilman method. The two important periodontal indices, Plaque Index (PLI), and Papillary Bleeding Index (PBI) were calculated both before and after the training session.

Results: Blind individuals successfully learned the method of brushing by using their tactile sense, which significantly improved their oral hygiene in terms of PLI and PBI.

Conclusions: Blind people are prone to properly control their oral hygiene, thus preventing possible periodontal problems and recording normal PLI and PBI values.

Keywords: plaque index (PLI), papillary bleeding index (PBI), plaque control, blindness

1. INTRODUCTION

According to World Health Organization, 285 million people are visually impaired worldwide: 39 million blind ones and 246 million with low sight [1], namely that less than 1% of world population is blind. It is estimated that about 80-90% of this population lives in developing countries [1, 2]. Among them, approximately 64% are women, who bear a more severe burden of blindness and visual impairment [3].

Any type of visual impairment may impact oral health, because of the physical, social and informational barriers related to impairment [4]. Considering the more extended occurrence of dental plaque in individuals with visual impairments, they are more exposed to oral diseases, compared to normal people. [5,6] Comparison of the periodontal status and oral hygiene of blind children [7,8], teenagers [5,9] and elderly people [10, 11] with those of normal individuals has revealed that the oral health of the sighted groups is more promising than of the blind ones. According to the Disability Discrimination Act 1995 (HMSO, 1995) [12], all barriers to dental care for this group of individuals must be eliminated, to ensure equal access. Worth mentioning is the fact that health examination is not complete without oral health assessment. However, oral health care for individuals with any type of visual disability differs as to their physical access to surgeries, to information as well as to the associated disabilities or medical conditions that affect dental care. Dental and oral hygiene advice for blind or visually impaired people include good verbal instruction and tactile aids to improve the tooth brushing methods [7, 8]. It has been observed that oral hygiene instruction may have a positive impact on oral health, periodontal status, while improving self-esteem [10, 11]. Maintainance of oral health and hygiene is essential for a high quality of one’s personal and social life.

Periodontitis is an inflammatory disease of bacterial origin diagnosed almost exclusively through clinical parameters, PLI and PBI included [13]. The periodontal disease may be associated with several systemic diseases and conditions, including myocardial infarction, adverse pregnancy outcomes, diabetes mellitus, and respiratory disease. This type of disorder is normally treated by simple oral hygiene.
practices, professional mechanical debridement, antimicrobial therapy and periodontal surgery. However, more extensive investigations are needed for understanding the value of periodontal interventions in the prevention of systemic diseases [14]. Therefore, prevention and control of periodontitis is especially important, especially in the case of people with disabilities – blindness included. The Plaque Index Loe-Silness (PLI) [15] measures the plaque depth adjacent to the gum rather than the whole surface of the plaque covering the teeth. With this index, the distofacial, facial, mesiofacial and lingual surfaces are inspected as to the presence and severity of plaque. The most important advantage of this type of index is that it can also consider the crown and the under gingival restorations.

On the other hand, the Papillary Bleeding Index (PBI) indicates the severity of papillary inflammation. Unlike PLI, it does not require a long measurement time. PBI is a reliable index to follow the success of periodontal treatment. It can also encourage the patient to continued care for oral hygiene and health.

Considering that visual impairment is increasing all over the world and the possible difficulties blind people may encounter when using their alternative senses, other than vision, the aim of this study was firstly to investigate the effect of a special care instruction and training for improving oral hygiene and periodontal incidence by the PLI and PBI indices. Secondly, the authors aimed at developing a practical instruction procedure and at offering dentists and blind people’s assistants useful recommendations for an improved oral hygiene status. The instructions are based on the use of their hand and touching sense instead of sight to properly brush their teeth and prevent plaque formation.

2. METHOD

It was quite difficult to find blind people agreeing to participate in the study. Therefore, we investigated comparatively a quite limited sample group, formed of a total number of 51 blind people (26 females and 25 males, with ages between 15-45 years), both totally-blind subjects or with very limited sight. The selected subjects had a normal health status and no disability other than blindness, no systemic or mental diseases and at least four teeth in each quadrant. The major tasks of the study were explained to all individuals, on stressing that their alternative senses (other than sight) could help them control their oral health and hygiene, and also that the results of the investigation would open the way to publish care booklets in Braille to help all blind people improve the quality of their life. Subjects with any type of systemic diseases, mental disorders and other disabilities, whichever their causes, were excluded from the study, as well as patients on medication that may affect the periodontium.

A general questionnaire regarding oral health practice, followed by a routine dental check up, as well as by the evaluation of the role of dental health and hygiene in assuring their overall health, and the frequency of visiting dentist was filled in with the assistance provided by a nurse.

The subjects were instructed to brush their teeth by the M. Stilman method, the period of study beginning only when they fully learned it. The periodontal indices, including Plaque Index (PLI), plaque depth adjacent to the gum and the Papillary Bleeding Index (PBI), i.e. severity of papillary inflammation, were first measured in this stage. The examination was performed on a simple chair, in natural daylight with a dental mirror and probe.

The care technique was explained by a nurse who trained subjects to use the other senses, especially their fingers, to get the perfect result. Prior to leaving the dental office, care was taken to make sure that the patients fully learned the instructions, namely to brush their teeth twice a day and to return after two weeks to measure their periodontal indices for the second time. On their next visit, two weeks later, a second questionnaire was given to them, to state whether they had exactly followed the given instructions. The two indices were measured again in the same manner as before. The data were analyzed by SPSS, $p$ values <0.05 being considered as significant.
3. RESULTS

The effect of blindness as a possible factor influencing oral health and hygiene was investigated. On the other hand, the ability of subjects to control it was also studied. The questionnaires were designed to provide valuable and helpful information. Figures 1 and 2 illustrate two representative samples including data extracted from the questionnaires filled in by all subjects. Figure 1 shows that 33 subjects (64.7%) were genetically blind and that 18 (35.3%) had become blind after birth.

According to Figure 2, most of the subjects had primary school (19 cases) and intermediate school (16 cases) education levels. Only 3 subjects (5.9%) attended high-school, while 5 cases (9.8%) had obtained a diploma certificate. The lowest percent belonged to illiterate individuals (2 cases, 3.9%).

The obtained results showed that only few subjects brushed their teeth more than once a day - 8 cases (15.7%). On the other hand, analysis of the brushing frequency results indicated that most of subjects (23 cases, 45.1%) did not brush their teeth on a daily basis, while 14 cases (27.5%) brushed them once a day.

The results also showed that the subjects were able to perform their normal daily requirements in different degrees. Thus, most of the blind subjects - 35 (70.6%) - were able to fulfill their daily needs easily, without other one’s help. Only one case (2%) needed help for the daily activities. On the other hand, about one third (14 cases, 27.5%) could manage their needs with difficulty, yet without any help.

Table 1 clearly indicates that a period of care instruction has resulted in shifting from a simple, not completely effective method of brushing, to a significantly complete method by using the improved Stilman’s procedure.

<table>
<thead>
<tr>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q12B-Q11B Negative Ranks</td>
<td>0a</td>
<td>0.00</td>
</tr>
<tr>
<td>Positive Ranks</td>
<td>32b</td>
<td>16.50</td>
</tr>
<tr>
<td>Ties</td>
<td>19c</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td></td>
</tr>
</tbody>
</table>

Q11 = brushing method before instruction
Q12 = brushing method after instruction
a) Q12B < Q11B
b) Q12B > Q11B
c) Q12B = Q11B
4. DISCUSSION

The instruction was mainly based on training blind subjects to use their tactile sense instead of sight to effectively prevent formation of dental plaque. The results presented in Table 2 show that mean plaque index differed considerably before and after application of care instructions to the blind individuals (mean index difference -0.8229, p= 0.000). The brushing style, time and care for brushing have been investigated on various groups of subjects [16]. The quantity of microbial plaque removed from 20 sighted people by electric brushes using the Loe stillness plaque index has been investigated in 1993 [16], the mean difference in their plaque index being -1.06, which agrees with our results. In a recent study, the effect of dental care education was investigated in a group of visually impaired adults [17], the results also supporting our findings. In 1997, the hygiene index was measured for a large group (440 volunteers) of sighted subjects before and after following a dental and oral hygiene educational program [18], a statistically significant reduction being observed in the PLI value in the end of the educational program. On the other hand, the efficiency of conventional and end-tufted toothbrushes and of two methods of plaque removal on partially-erupted occlusal surfaces have been estimated in schoolchildren [19]. Unlike the present research, there was reported that the conventional tooth brushing technique was not satisfactory compared with other tested techniques on occlusal plaque removal. Besides, the use of a conventional toothbrush with a modified technique was quite effective on the eruption of the first permanent molars, without any additional costly device.

Table 2. Variations in total plaque index (TPI) after dental care instructions and practice

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>TPI&lt;sub&gt;1&lt;/sub&gt;</td>
<td>26</td>
<td>0.3</td>
<td>2.4</td>
<td>1.3038</td>
</tr>
<tr>
<td></td>
<td>TPI&lt;sub&gt;2&lt;/sub&gt;</td>
<td>26</td>
<td>0.00</td>
<td>1.5</td>
<td>0.5196</td>
</tr>
<tr>
<td></td>
<td>Computed</td>
<td>26</td>
<td>-2.30</td>
<td>0.0</td>
<td>-0.7842</td>
</tr>
<tr>
<td>Male</td>
<td>TPI&lt;sub&gt;1&lt;/sub&gt;</td>
<td>25</td>
<td>0.30</td>
<td>2.6</td>
<td>1.5240</td>
</tr>
<tr>
<td></td>
<td>TPI&lt;sub&gt;2&lt;/sub&gt;</td>
<td>25</td>
<td>0.00</td>
<td>1.70</td>
<td>0.6480</td>
</tr>
<tr>
<td></td>
<td>Computed</td>
<td>25</td>
<td>-2.5Q</td>
<td>0.0</td>
<td>-0.8760</td>
</tr>
</tbody>
</table>

T-Test for equality of means, p = 0.556.

The data listed in Table 3 show that PBI is reduced after a period of care education. The mean PBI index difference was -0.827, with a p value in the range of 0.000. The results obtained are supported by a report on the efficiency of the mechanical plaque removal method [17], indicating that plaque control and PBI improvement depend on the technique used, as well as on the skills of each subject. In a review study, the effectiveness of self-performed mechanical plaque control with triclosan containing dentifrices has been reported [21]. According to this report, after 6 months of self-performed mechanical plaque control with a triclosan-containing dentifrice, a significant positive effect on the reduction of both plaque and gingivitis was observed in adults.
In the present study, most of the subjects had a medium educational level (90% had diploma, high school final grade in Iran), 4% were totally uneducated and 6% had university degrees; it was found out that the educational level had a positive effect on plaque control, even if the observed differences were not statistically significant. However, this difference is not quite reliable, due to the small sample size. On the other hand, other factors such as age, sex (Tables 3 and 4) did not considerably affect PLI and PBI, but more ample investigations are necessary, on larger-sized sample groups, for obtaining reliable results. At the level of the small three age groups, no significant difference was found – which, once again, is a not wholly reliable result.

However, a recent report evidenced the relationship between age and control of plaque [22]. The individuals included in this study were 65% inborn blind, while the rest of 35% were adventitious blind ones. The observation made was that, although not significantly different, both indices were lower in adventitious blind subjects than in the inborn ones (even if such results could be more reliable when employing larger population samples). This is a good indication on the effect of blindness on oral health status. Most of the blind subjects of both sexes (70%) stated that they could perform their daily needs individually, without help. However, no significant difference was observed in their plaque indices.

It was found out that, by carefully following the recommended care instructions, the risk of plaque formation and development was reduced. Subjects’ training, assured by skilled assistants, was mainly aimed at replacing their absent sight with the tactile sense, for dental plaque removal. Efforts were made for an optimum understanding and proper application of the recommendations from the part of each blind person.

### 5. CONCLUSIONS

According to the results of the present study, a better awareness of blind subjects for their care and health could considerably reduce the prevalence of plaque and PLI and PBI values. In this way, complicated dental treatment needs could be kept to a minimum. Based on these findings, it was concluded that the depth and severity of dental plaque in blind individuals can be reduced by a controlled and supervised educational program involving the tactile sense instead of sight. Although age, sex, level of education, personal care habits and causes of blindness acted as effective factors, statistically significant differences were observed in each case. However, the small population sample here considered prevents a reliable conclusion, all these factors needing further investigation. In conclusion, blind people could be instructed to take a more efficient care of their oral hygiene; in this respect, they may be educated properly to use their alternative senses for improving their oral health. A better oral hygiene could prevent periodontal problems, leading to normal PLI and PBI values. However, further studies are still needed to assess more effective modalities for controlling dental caries and periodontal problems in this group of handicap patients.
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References