

ORAL HEALTH STATUS OF VISUALLY-IMPAIRED AND SIGHTED GROUPS OF CHILDREN IN BENGHAZI: A COMPARATIVE STUDY.

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ABSTRACT:

Objectives: The aims of this study were to study the prevalence of dental trauma and DMFT index in a group of visually-impaired children and compare them with a group of sighted counterparts. Effect of oral hygiene measures on DMFT index was also investigated in both groups.

Materials and Methods: Two groups of visually-impaired and sighted children (n = 25 for each & N = 50, age range 10 – 14 years) were recruited from Jam'atAlkafeef (The Blind Institution) and Asma elementary private school in Benghazi, Libya. Statistical analysis using Chi-square test, Mann-Whitney U test and regression, were used to determine the association and differences between the two groups in terms of DMFT index and its influence by oral hygiene measures. A statistical calculation was also presented proving that the sample size in our study was sufficient.

Results: There was no significant difference between the DMFT index between the two groups (p = 0.2364); however the trauma showed a significant difference being more encountered in visually-impaired children. The sample size calculation was also found to fit exactly the number selected for the study for both groups. The oral hygiene measures practiced by children did not show any significant effect on the prevalence of DMFT scores (rs = 0.006).

Conclusion: This cross-sectional clinical survey showed a higher tendency of visually-impaired children to encounter trauma due to their limited awareness of their surroundings; therefore, they should be provided with more care and supervision. Such studies which depend mainly on statistical methods should encompass sufficient subjects; which was confirmed by special statistical formula. The similar dietary habits and food contents among children in Benghazi could explain the insignificant difference in the prevalence of DMFT among visually-impaired and sighted children.

المخلص العربي

حالة الفم الصحية لمجموعتي أطفال معاقين بصريا ومبصرين في بنغازي: دراسة مقارنة.
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الأهداف: كانت أهداف هذه الدراسة دراسة مؤشر ال DMFT في مجموعة من الأطفال المكفوفين ومقارنتها مع مجموعة من نظرائهم المبصرين. وشملت الدراسة أيضا تأثير تدابير النظافة الصحية الفموية على مؤشر DMFT في كل من المجموعتين.

المواد والطرق: تم فحص مجموعتين من الأطفال المكفوفين والمبصرين (ن = 25 لكل منهما) و 50، الفئة العمرية 10-14 سنة) حيث اختيروا من جمعية الكفيف ومدرسة أسماء الابتدائية (مدرسة خاصة) في بنغازي، ليبيا. واستخدم التحليل الإحصائي باختبار مربع كاي، وكذلك اختباري مان ويتي يو والانحدار، لتحديد كينونة العلاقات والاختلافات بين المجموعتين من حيث مؤشر DMFT وتأثيرها عن طريق اتخاذ تدابير النظافة الصحية الفموية. وتقدم هذه الدراسة أيضا حساب إحصائية تثبت أن حجم العينة في دراستنا كان كافيا.

النتائج: لم يكن هناك فرق كبير بين مؤشر DMFT بين المجموعتين (P = 0.2364)، ولكن وجد أن معدل رض الأسنان أظهر فارقا كبيرا كونها أكثر في الأطفال المكفوفين. تم إيجاد حساب حجم العينة أيضا مناسباً بالضبط لعدد المختارين للدراسة لكلا الفريقيين. لم تظهر التدابير التي يمارسها الأطفال لنظافة الفم أي تأثير كبير على قيمة مؤشر ال DMFT (rs = 0.006).

الخلاصة: أظهرت هذه الدراسة السريية المستعرضة ميلا أعلى لدى الأطفال المكفوفين لإصابتهم بروض الأسنان بسبب ضلالة إحاطتهم بما هو موجود حولهم، وبالتالي، فإنه ينبغي أن يعنوا بمزيد من الرعاية والإشراف. وينبغي أن تشمل هذه الدراسات التي تعتمد أساسا على الأساليب الإحصائية الموضوعات بصورة كافية؛ وهذا ما أكدته هذه الدراسة بصيغتها الإحصائية الخاصة. تشابه مؤشر ال DMFT بين الأطفال المكفوفين والمبصرين يمكن أن يكون نتيجة العادات الغذائية ومحتويات الأغذية المماثلة بين الأطفال في بنغازي.

INTRODUCTION:

The presence of physical or mental disability in the life of a child compromises his/her dental condition, let alone the general feeling of wellbeing. Impairment (or loss) of vision deprives the affected person (in this context: the child) of the ability to practice the optimum level of oral hygiene measures. As a consequence, the dental condition of visually-impaired children tends to be, from a logical perspective, inferior to their healthy counterparts. One of the effective means of teaching children how to keep their mouths clean and disease-free is through visual aids. The only means left to visually-impaired children to learn the oral hygiene practice is through hearing and touching. The World Health Organization estimates that globally about 314 million people are visually impaired, of whom 45 million are blind. Conventional methods for teaching oral hygiene involve use of visual perception. The main factor of differentiation between normal patients and visually-impaired ones is the difficulty in removing plaque. The difficulty in removing bacterial plaque being the main factor for development of caries, continual motivation to the correct oral hygiene procedures is fundamental in order to keep a good oral hygiene in visually-impaired patients. Owing to their limited motor skills, their technique in oral hygiene practice may not be properly followed; leading to development of gingivitis and dental hard disease¹. A conventional index, DMFT (Decayed, Missing and Filled Teeth) has been in use for such purposes of comparing the carious activity of children². Its score reflects the prevalence of teeth affected by caries (i.e., decayed), or lost due to caries (i.e., missing) and restored with dental material (i.e., filled). Although few similar studies have been conducted in other countries, the present work represents the first survey for this purpose from a Libyan city. The aim of study was to assess and compare dental caries experience (by means of DMFT scoring) of visually-impaired children with their sighted counterparts in certain areas of Benghazi city, Libya. A well-structured statistical formula was shown to indicate whether the number of children in our study was good enough to present significant results based on the available data.

MATERIALS AND METHODS:

This is a cross-sectional study involving two-convenience samples of children recruited from two different schools: the visually impaired child-

ren were recruited from a special school (Jam'yat Alkafeef), while the sighted children were attending an ordinary elementary school (Asma School for elementary education) in Benghazi. All children (n = 50) were in the same age range (10 - 14 years): 25 visually-impaired children (mean age 12.7 & M = 18, F = 7) and 25 normal children as controls (mean age 11.5 & M = 14, F = 11) were included in the study. The survey consisted of two main sections: the first was a questionnaire questing about demographic data, medical, dental and diet histories, home care measures. The second part of the survey was a dental examination of the child where his/her mouth was checked for the presence of carious, missing or filled teeth i.e., DMFT index, and the scoring was done according to WHO criteria³. Presence of traumatized teeth was also scored. The clinical examination was carried out using mouth mirror and explorer by two skilled dental postgraduates from the public health department. The ethical permission to conduct this work was obtained from the administrative committee headed by the dean of our faculty. Using regression analysis, the association between DMFT index and the frequency of tooth brushing was assessed in both groups of children, expressed by the coefficient of correlation (R). The difference in DMFT index and trauma between visually-impaired and sighted children was studied using Mann-Whitney U test, and chi-square test; respectively. The significance level indicated by *p* value was set at 0.05.

CALCULATION OF THE SAMPLE SIZE: RULE OF 16 (LEHR'S FORMULA).

We applied what is known as Rule of 16 as suggested by Lehr R (1992)⁴. We assumed that the power of the study is kept at 0.8 and the significance level at 0.05.

The following information was exploited:

- 1) The mean and SD of the sample of visually-impaired children ($\bar{X}(b) = 2.24$)
- 2) The mean and SD of the sample of sighted children ($\bar{X}(s) = 2.4$)
- 3) The smallest difference of clinical interest between the two means (should be about 2)
- 4) The population SD: it can be estimated as the average of SD (for visually-impaired) and SD (for sighted)
- 5) The population SD thus = $\frac{2.8+2.32}{2} = 2.5$

6) The square of standardized difference:Smallest mean difference True SD=22.5 = 0.8So, the squareof standardized difference is= 0.64 Finally, the rule of 16 states that, in this experiment, the number of children recruited 16. Thesquare ofstandardized diffeence160.64=25 children (per group)the number achieved was exactly as the number of recruited children in each group.All statistical analyses were performed using Excel (Microsoft office, 2010).

RESULTS:

More than a half of children were affected by dental caries in both groups; however there was no statistically significant difference in number of decayed, missed and filled teeth between visually-impaired children and their normal controls($p = 0.2364$).Chi square analysis showed a marginally significant difference between visually-impaired and sighted children in terms of

fractured teeth ($\chi^2 = 3.7 \% \& p = 0.052$). Out of all the seven fractured teeth of the visually-impaired, five were in the upper left central incisors while the remaining two were in the upper right central incisors. All the fractured teeth were noticed to occur exclusively in males. The analysis of the correlation between oral care measures (represented by the frequency of tooth brushing) and DMFT score showed very weak association($R= 0.06$ in visually-impairedchildren and 0.01 in the sighted ones).As was shown in the previous section, the sample size used in this study was revealed to be matching with the number of children recruited in both samples. Although the rule of 16 is well suited for data with normal distribution, and thus a separate value for power calculation needs to be adjusted for the nonparametric test, its use in this work with such skewed data would give similar results, as suggested by a biostatistician (personal communication).

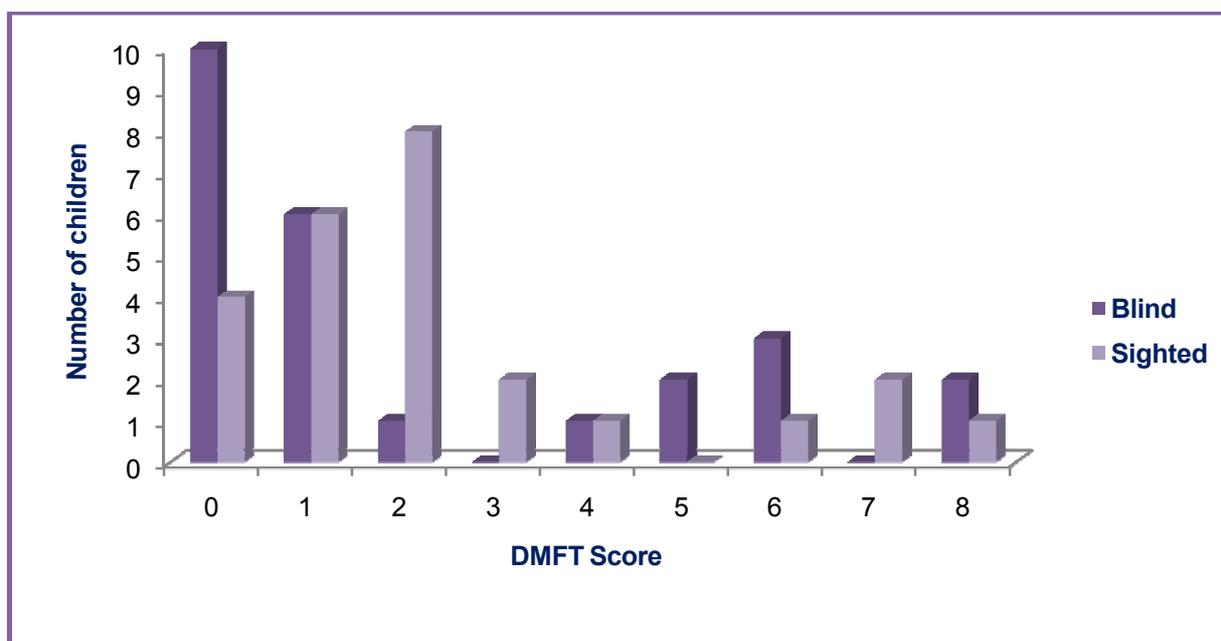


Fig. 1. illustrating the prevalence of DMFT scores in visually-impaired as well as sighted children.

Table1. The frequency of tooth brushing in visually-impaired and sighted children

| | No brushing | Once/day | Twice/day | Thrice/day |
|-------------------|-------------|----------|-----------|------------|
| visually-impaired | 1 | 2 | 13 | 9 |
| Sighted | 3 | 9 | 12 | 1 |

Table2. The prevalence of trauma in both samples.

| Sample | visually-impaired children | Sighted children |
|-------------------------------------|----------------------------|------------------|
| Trauma | 7 | 1 |
| No trauma | 18 | 24 |
| χ^2 value = 3.72 & $p = 0.052$ | | |

DISCUSSION:

The score of DMFT has been very useful in assessing dental caries associated with feeding habits. In one study, it has been shown, using DMFT index, that a prolonged use of nocturnal milk feeding especially if the milk is sweetened, represent a major risk factor for developing dental caries in the growing child⁵. The caries prevalence of children suffering from asthma was also studied using DMFT and no significant difference was found compared with healthy children⁶. In our study, we focused on three dental variables; namely: DMFT index, trauma and oral hygiene measures represented by tooth brushing. First, we tried to seek if the prevalence of DMFT differs between visually-impaired and sighted children. Second, we checked the difference in the prevalence of trauma among the two groups; and lastly, we sought to determine if the oral hygiene measures could have any influence on the DMFT scores. As to the first aim, we did not find any significant differences between the two samples in the scored DMFT between the visually-impaired and sighted children. This could be due to the similar patterns of habits related to oral hygiene, i.e., frequency of tooth brushing and sugar consumption, which were found to be followed by both groups of children. This might be coined with other studies which did not show a higher DMFT index in visually-impaired children. For example, Jain et al, found that children with hearing impairment had higher DMFT scores than their visually-impaired counterparts⁷. The only important difference was found in the prevalence of dental trauma (represented by fracture of upper anterior teeth) between the visually-impaired and the sighted children, being more common in the former. The prevalence of teeth fracture due to trauma can be influenced by the condition of the existing dentition and lip coverage. Children with more overjet size, for example, were found to have more dental injuries compared to children with normal occlusion of their anterior teeth⁸. The same holds true for children with inadequate lip coverage. In our study, we did not consider the dental occlusion of our samples; but we plan avert this limitation by undertaking a broader study in the future where other related factors (including gender and socioeconomic status) will be taken into account. Some studies conducted their surveys on more than two samples; Alsharheed et al., assessed the difference in sustaining dental injuries among visually-impaired, hearing-impaired and normal children and found that children with hearing disability had the highest score

of dental trauma⁹. The tendency of visually-impaired children to encounter dental trauma is obviously due to their limited visual sensation of their surroundings, causing them to fall on their faces and fracture their tooth/teeth. In addition, the sudden nature of their fall, besides their psychological and physical development, may impede the necessary reflex reaction to absorb the falling shock by hands; which would be done by a person with normal visual ability. In other words, they still lack the fully mature motor reactions of their body muscles¹⁰. Another possible reason for their being prone to dental trauma is the sudden hit of a hard shield e.g., wall when they are running or even walking rapidly. It was also interesting to find a predominance of males in suffering from dental trauma; however our statistical analysis showed a weak significance due to the obvious difference in the number of males versus females in the visually-impaired sample. Our results are consistent with the findings of Bhat et al, who stated that visually-impaired children suffered more dental trauma in the upper anterior teeth than sighted children¹¹ in this work, we did not find any significant association between the frequency of tooth brushing and DMFT scores. This disparity could be due to the exaggeration of children in their replies to the questions of the researchers or the fact the etiology of dental hard diseases is multifactorial and may not be eliminated entirely by following a good oral hygiene program. Despite the tendency of visually impaired children to develop dental diseases due to their limited efficiency in conducting their tooth brushing habits, they can still be taught, through careful verbal and tactile instructions, how to improve the conductance of healthy protocol in their daily life¹². Cohen et al., described a unique toothbrush made of valcran strip which is worn on the fingertip and then the child cleans his/her teeth using his finger¹³. They have shown that such a device was very successful in reducing the prevalence of oral hard tissue diseases compared to children using ordinary toothbrushes. Despite their success, these devices need meticulous oral hygiene instructions and guidance so that they can be used efficiently. In conclusion, this is a preliminary study which has tried to shed light on the dental data of an example of medically compromised group of children, and compare it with a normal group so that the size and impact of dental maladies could be treated, if not prevented.

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