

Caries Experience among Visually Impaired and Normal Female Students Aged 6-18 Years in Makkah, Saudi Arabia: A Comparative Study

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ABSTRACT

Objectives: The aim of this study is to assess and compare the caries experience among visually impaired and normal female students aged 6-18 years in Makkah City.

Methods: A comparative study was carried out among institutionalized visually impaired and normal female students aged 6-18 years in Makkah. Data was collected through clinical examinations, self-administered questionnaire for demographic information, and school records. The collected data was then tabulated and statistically analyzed.

Results: A total of 66 students were examined, (33 visually impaired and 33 normal). The mean dft (decayed and filled primary teeth) scores for the 6-12 years old students in the blind and normal groups were 2.65 and 2.25 respectively. While the mean DMFT (decayed, missing and filled permanent teeth) scores for the 6-12 years old students in the visually impaired and normal groups were 1.6 and 1.4 respectively. The mean DMFT scores for the 13-18 years old students in the visually impaired and normal groups were 4.30 and 3.38 respectively.

Conclusions: Although the visually impaired groups recorded higher dft and DMFT scores than the normal groups but the differences were not significant which might be related to the poor dental care of the school children population whether normal or visually impaired. Further studies on a larger population are needed for better understanding the caries prevalence among normal and visually impaired individuals.

Key Words: Visually Impaired, Normal, School students, Saudi Arabia, Dental caries experience.

INTRODUCTION

Dental caries is one of the most prevalent chronic diseases that affect teeth worldwide; all people are susceptible to this disease throughout their lifetime. In fact, caries process is much more complex, there are many modified primary and secondary factors that affect the process; ^[1] risk of dental caries includes biological, physical, environmental, behavioral, and lifestyle-related factors such as high numbers of cariogenic bacteria, low salivary flow, lack

of exposure to fluoride, poor oral hygiene, and poorness. ^[2] Oral health has a significant physiological and biological importance because it affects esthetics, communication, and quality of life; ^[3] good oral health is also important for proper mastication, digestion, speech, appearance and general health. ^[4]

Individuals with disabilities have an increased caries risk mainly due to impaired oral hygiene, poor food choices, difficulties in oral hygiene routines including use of

fluorides, and low overall understanding of healthy behavior. Although individuals with disabilities have an urgent need of effective preventive measures, their abilities are severely limited to accomplish such everyday measures themselves. [5] Moreover, the oral health of the disabled people is commonly being neglected due to either focusing on their disabling condition, other major disease(s) or limited access to oral health care centers; Nowak, 1976 reported, "dental treatment is the greatest unattended health need of the disabled". [6]

According to the American Health Association, the disabled child is a child who cannot fully make use of all his or her mental, physical, and social abilities (quoted). [7] People suffering from disabilities represent a real section of the community which was estimated about 500 million people with disabilities worldwide. Visual impairment was the most frequently occurring disability, followed by speech, hearing, movement and mental disabilities. [8] Many individuals become visually impaired due to some congenital causes, through complications arising from systemic diseases or various diseases of the eye such as cataract and glaucoma. The overall incidence of visual impairment in children was about 1 in 3000, 46% of these children were born visually impaired, and an additional 38% lost their sight before the age of 1 year (quoted). [9] Blindness is defined by WHO as having a "visual acuity of <math><3/60\text{ m}</math> or corresponding visual field loss in the better eye with the best possible correction "Meaning that while a blind person could see three meters, the non-visually impaired person could see 60 meters."

Shyama et al., 2001 [10] and Al-Qahtani & Wyne, 2004 [11] assessing the caries experience and oral hygiene of visually and hearing disabled children and young adults and they found that caries experience among the disabled population was clearly higher than the normal population. Moreover, in 2013 Solanki et al., and in India Jain et al., assess and

compare the oral health status and the treatment needs of the institutionalized hearing-impaired and visually impaired children and young adults, and they conclude that both visually impaired and deaf children have poor oral health and dental care. [9, 12] Prashanth et al., 2011 examined 85 visually impaired children in Bangalore, to assess the oral health knowledge, practice, oral hygiene status, and dental caries prevalence; and they stated, "a little extra care by the parent or caretaker regarding oral hygiene can give drastic results in reduction of dental caries". [13] Liu et al., 2019 assessed the oral health status of visually impaired schoolchildren in northeast China and they exhibited a high prevalence of dental caries, poor periodontal health, and severe malocclusion in this group of children. [14] Various studies on the oral health status of the normal population have been carried out in the past; however, very little information is available on the dental health of the handicapped population and in particular, the institutionalized visually impaired children and young individuals in the city of holly Makkah. Therefore, this study aimed to assess and compare the caries experience and prevalence among visually impaired and normal female students aged 6-18 years in Makkah city, Saudi Arabia.

Objectives of the study:

This study was carried out to:

- Estimate the caries prevalence and experience among study population.
- Compare the caries experience among visually impaired and normal female students in different age groups.

MATERIALS AND METHODS

Study design: A cross sectional comparative study was conducted to assess and compare the caries experience of institutionalized visually impaired and normal female students in Makkah. There is one Institute in Makkah for visually impaired students (Al-Noor institute for visually impaired).The classes of Al-Noor

institute were present in 3 schools which were: 138thPrimary School, 8thIntermediate School and 50thSecondary School. The three mentioned schools contained also classes for normal students, visually impaired and normal students were selected from these three schools. Ethical approval and inform consent study approval was obtained from the Institutional Review Board-IRB # 21-15 (research ethics committee) at Faculty of Dentistry, Umm Al-qura University. Also, approval was taken from both the Directorate of Education in Makkah and the principals of each of the three schools. Participation of each student was voluntary and informed consent was obtained from their parents.

Sampling method: The sampling method, which used in this study, was the non-random (purposive sampling) method as the study target was to studying particular group with special character. A total of 33 institutionalized female visually impaired students; 20 students aged from 6 to 12 years (mixed dentition) and 13 students aged from 13 to 18 years (permanent dentition) were included in the study. Further 33 female normal students with comparable ages from the normal classes were included as controls (Table.1).

Table 1: Distribution of the students by age and visual condition

Age groups	Students' condition		Total
	Visually impaired	Normal	
From 6 to 12 years old	20	20	40
From 13 to 18 years old	13	13	26
Total	33	33	66

Inclusion and exclusion criteria: All institutionalized female visually impaired students aged 6-18 years residents of the institution were included in this study. A same number of female normal students with comparable ages from the normal classes were kept as controls. Students affected with mental retardation, physically and mentally handicapped, orthopedic defects, cerebral palsy and medically compromised were excluded from the study.

Data collection: The data were collected through clinical examinations, self-administered structured questionnaire for oral health behaviors and demographic information such as age, occupation of the father and mother, or male and female guardians and school records. Except the age variable, the all other data included in the questionnaire were not statistically analyzed as they are out of the intended objectives of this study.

Clinical examination: Clinical examination was carried out at the Institute's Medical room or classroom by two expert examiners with the aid of a mouth mirror and an explorer under adequate natural light.

The two examiners were dental students at Umm Al-Qura University, Faculty of Dentistry and one of them was the main author (Turkistani B). The two examiners were trained and calibrated with the co-author (Elmarsafy SM), a Restorative Dentistry faculty at Umm Al-Qura University, Faculty of Dentistry and this was done at Umm Al-Qura out-patient dental clinics. The two examiners were trained to the full detailed measured criteria for dental caries diagnosis and were calibrated to examine the intra- examiner variability by examine five cases twice and the difference between the two examinations for both examiners was calculated. To ensure inter- examiner consistency the two examiners were examine five cases and the difference between the two examiners were calculated. Kappa test was measured for the two tests (89 – 92), which considered adequate.

Caries was measured using DMFT index for permanent teeth and dft index for primary teeth. The method of getting around the exfoliation problem was the 'dft' index in which the missing teeth were ignored; this was the method of choice for the World Health Organization in their basic survey technique. Caries presence in the permanent dentition was measured by DMFT index while for mixed dentition was measured using a separate index for permanent teeth and another for primary teeth. The

measurements were performed according to WHO criteria as follows: ^[15] D & d: indicates the number of decayed teeth, M & m: indicates the number of missed teeth due to caries, F & f: indicates the number of filled teeth due to caries and T & t: tooth (unit of measurement).

Statistical Analysis: Collected data were organized and analyzed of with the Statistical Package for Social Sciences (SPSS21 for Windows 8, SPSS Inc.). Before analysis data were tested for normality and it was normally distributed. Data of DMFT and DFT variables were presented as mean and standard deviation and were analyzed by student's t test to find out the statistical significances of the comparison caries experience among the involved students according to the students' condition (visually impaired and normal) and the students' age (6-12 and 13-18 years). Chi-square test was used to statistically analyze the percentage of caries prevalence variable among the involved students according to the students' condition (visually impaired and normal).

RESULTS

Caries experience:

The total of 66 school going female students in the age group of 6-18 years with a distribution of 33 visually impaired and 33 normal students were included in this study.

Table 2: The mean of caries experience among visually impaired and normal students age 6-12 years

Caries Index	Visually impaired	Normal	t statistics	P value
	Mean±SD	Mean±SD		
d	2.4 + 2.52	1.8 + 2.30	0.7865	0.4365
f	0.25 + 0.71	0.45 + 1.27	0.6147	0.5424
dft	2.65 + 2.85	2.25 + 2.61	0.4629	0.6461
D	1.45 + 1.31	1 + 1.25	1.1114	0.2734
M	0	0	-	-
F	0.15 + 0.36	0.1 + 0.30	0.4772	0.6360
DMFT	1.6 + 1.35	1.1 + 1.25	1.2154	0.2317

Table 3: The mean of caries experience among visually impaired and normal students age 13-18 years

Caries Index	Visually impaired	Normal	t statistics	P value
	Mean±SD	Mean±SD		
D	3.54 + 4.15	3.08 + 3.32	0.3121	0.7577
M	0.23 + 0.43	0.15 + 0.37	0.5085	0.6158
F	0.54 + 1.39	0.15 + 0.55	0.9407	0.3562
DMFT	4.31 + 4.09	3.38 + 3.82	0.5992	0.5547

Tables 2 and 3 show the dental caries experience in both visually impaired and normal students aged 6-12 years and 13-18 years. The mean dft scores for the 6-12 years old students in the visually impaired and normal groups were 2.65 and 2.25 respectively, while the mean DMFT scores for the 6-12 years old students in the visually impaired and normal groups were 1.6 and 1.1 respectively. The mean DMFT scores for the 13-18 years old students in the visually impaired and normal groups were 4.30 and 3.38 respectively. Although the visually impaired groups recorded higher dft and DMFT scores than the normal groups but the differences were not significant at $p < .05$.

Statistical analysis of the caries indices components showed that in students group aged 6-12 years: the mean of the (d) component in the visually impaired group was insignificantly higher than the normal group at ($p < .05$), while the mean of the (f) component in the normal group was insignificantly higher than the visually impaired group at ($p < .05$). Moreover, the means of the (D& F) components in the visually impaired group were insignificantly higher than the normal group at ($p < .05$) and all the students aged 6-12 years in both visually impaired and normal groups had no (M) component. In students group aged 13-18 years: the means of the (D, M &F) components in the visually impaired group were higher than in the normal group; however the difference was insignificant at ($p < .05$) except for the (F) component.

Caries prevalence:

The overall prevalence of dental caries was 78.7% and 72.7% in visually impaired and normal students respectively with no significant difference between them as shown in Table 4 and Figure 1.

Table 4: caries prevalence among visually impaired and normal students

	Visually impaired	Normal	chi-square statistics	P value
Caries prevalence	78.7 %	72.7 %	0.33	0.565659

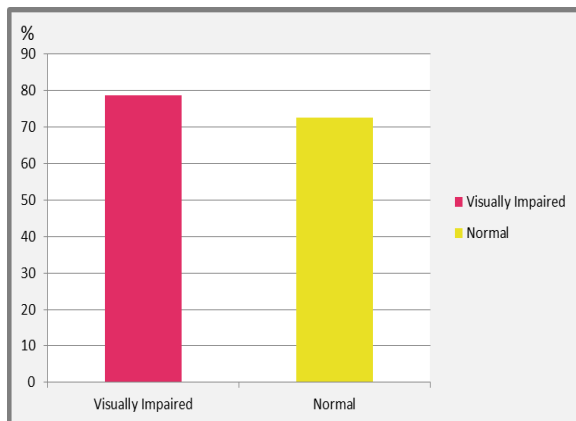


Figure 1: Histogram showing caries prevalence among visually impaired and normal students

DISCUSSION

The present study presented the first study comparing caries experience among visually impaired and normal female students in Makkah, the two age groups had been selected to indicate caries experience and prevalence between different dentitions; mixed and permanent. The study included all the institutionalized female visually impaired students aged 6-18 years in Makkah City who satisfied the inclusion criteria and due to cultural and logistic reasons, it was not possible to include male students in our study; therefore, a similar study in male counterparts is highly recommended to exclude any gender predilections.

Dental caries is the most common oral disease that affects most people worldwide, it could be prevented by maintaining good oral hygiene and effective plaque control. Oral health may be influenced by limited awareness of the importance of oral health care, difficulties in communicating oral health services, fear of dental procedures, in addition to low manual dexterity that impaired effective plaque removal. [16,7] Individuals with disabilities may face challenges in performing daily oral hygiene practice due to low physical abilities of these individuals, which consequently make tooth brushing process more difficult for them. [7]

The present study showed that the rate of caries among the visually impaired

groups were found to be slightly higher in comparison to the normal groups for all age groups studied but the differences were not significant at $p < 0.05$; meaning that caries experience and prevalence were similar. This may refer to, the poor dental care awareness in schoolchildren population either they are normal or visually impaired. The result of this study was in accordance with the results of Prashanth et al., 2011 [13] that assessed the oral health knowledge, practice, oral hygiene status and dental caries prevalence among visually impaired children aged 8 to 13 years in Bangalore. Their study showed that 34.1% of the visually impaired children had dental caries and only 8% of them had poor oral hygiene. Similar findings came from Ahmed et al., 2009 and Liu et al., 2019 studies; [17,14] although Ahmed et al., study concluded that visual impairment is not a significant risk factor for higher prevalence of dental caries, and visually impaired individuals just require a special method to educate and motivate them to keep their oral hygiene better in order to prevent dental caries.

In contrast to the present study, many studies reported that the caries experience was significantly higher in visually impaired population than the normal population as Shyama et al., 2011 study. [10] A previous study was done in India 2013, reported a mean DMFT and dft values of 1.1/0.17 and dft 0.87/0.47 in visually impaired and normal children respectively, the children aged 6 to 15 years. [9] Another study was done also in India showed that the mean DMFT and dft for visually impaired subjects were 1.48, 0.28 respectively (aged 4 to 23 years). [12] Similar result revealed from a study 2004 in Riyadh, Saudi Arabia, which concluded that, the caries prevalence and experience in all the three studied special groups of children (visually impaired, deaf and mentally retarded) were very high. [11]

Sanjay et al., 2014 [18] assessed the dental health status among 195 hearing impaired and 115 visually impaired children in an institute aged 6 to 20 years and they

found that, the mean DMFT of visually impaired students was more as compared to hearing impaired ones as 2.16 (2.0050) and 1.80 (1.264) respectively. They also recorded that; age factor showed a significant increase in the mean DMFT scores with advancing age that coincides with the result of our study. In our study, the f component of dft scores of 6-12 years aged normal group was insignificantly higher than the visually impaired group; while the F component of DMFT scores of both 6-12 and 13-18 years aged visually impaired groups was insignificantly higher than the normal groups. This could be explained by that, the opportunity for caries exploration and obtaining treatment (filling the caries defects) could be more for the visually impaired children as at this age the visually impaired children might be given more concern from their parents.

CONCLUSIONS

Main conclusions:

Within the limitation of this study, it could be concluded that:

- The caries experience (dft and DMFT indices) among visually impaired and normal groups; aged 6-12 and 13-18 years was similar.
- The prevalence of dental caries among visually impaired and normal groups was similar.

Recommendations:

- Increasing the oral health awareness of both visually impaired and normal school children population and their parents could minimize the dental caries prevalence among them.
- Further studies are needed to identify the etiological risk factors related to increase caries prevalence among normal and visually impaired individuals

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