LIBYAN JOURNAL OF DENTISTRY

VOL 3, NO 1

MARCH 2019

www.ljduob.wordpress.com

Citation

Mansur E K M. Dental Caries Experience of Down's Syndrome Children in Ajdabiya-Libya. *Libyan Journal of Dentistry. 2019; 3(1):11-17*

Original Article

Dental Caries Experience of Down's Syndrome Children in Ajdabiya - Libya

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ABSTRACT

Aims: Assessment of the caries experience of Down's Syndrome children who are attending special needs institute in Ajdabiya City, Libya.

Methods: A descriptive cross-sectional study was used. The total eligible sample comprised 35 DS children, 17 of them males and 18 females, aged between 6 and 15 years. Participants were examined for dental caries, using the decayed, missing and filled teeth index (DMFT/ dmft) according to the WHO criteria.

Results: The caries prevalence among the study group was 97.1%. The mean DMFT /dmft scores were 5.705 ± 4.468 and 4.388 ± 3.327 in males and females respectively. There was no difference between means of males and females. In the 6-10 years age group, the mean dmft score was 5.8 ± 4.798, and in the 11-15 years age group, the mean DMFT score was 4.45 ± 3.119. There was no difference between means of both age groups. There was no significant difference between male and female in the 11-15 years age group. There was significant difference between male and female in the 6-10 years age group.

Conclusion: The caries prevalence and severity was high among the studied Down's Syndrome children.

Key words: Down's Syndrome, Children, Dental caries, DMFT/dmft, Libya.

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INTRODUCTION

Down's Syndrome (DS) is first described in 1866 by John Langdon [(1)]. DS is an autosomal disorder caused by an extra chromosome 21 and it is the commonest chromosomal abnormality in live-born infants. Until now, the etiology of this syndrome remains unknown [(2)].

There is a unique combination of facial features in DS subjects, regardless of race or ethnicity. DS is characterized by central growth deficiency with delayed mental and physical development. So, all individuals with DS are mentally impaired to some degree, ranging from mild to severe [(3)].

DS itself is not a disease, however affected individuals have greater risk in acquiring the following systemic conditions; upper respiratory tract and chest infections, Alzheimer disease, and heart defects that may require antibiotic cover for invasive dental treatment [(2)].

Common oral soft tissue manifestations of DS individuals include large and fissured tongue and cracked lips. The tongue in DS is large relative to the small size of the oral cavity [(4)]. Generalized orofacial muscles hypotonia, which contributes to poor oral seal, poor suck, poor tongue control, and difficulties with jaw stability. The angle of the mouth is pulled down with elevated upper lip, and the lower lip is thick, dry, fissured and everted, that leading to tongue protrusion, mouth breathing, drooling, chapped lower lip, and angular cheilitis [(5)]. The mucosal lining of the oral cavity is thin because of the reduction in salivary flow rate [(6)].

The facial profile in DS individual is relatively concave, because the maxilla is deficient in development and the mandible is of normal size or slightly hypoplastic. This leads to Angle Class III malocclusion

and relatively prognathic mandible to be common observations [7].

In both primary and permanent dentitions, enamel hypoplasia and hypocalcification are relatively common in DS patients. In comparing DS children to unaffected children, the severity of tooth wear was significantly greater in DS children [8]. Also, bruxism and poor oral hygiene are common oral findings in DS children [9].

Regarding the permanent dentition, DS individuals present with true generalized microdontia, with clinical crowns are frequently conical, short, and small [10], as well as, taurodontism, hypodontia, supernumerary teeth, asymmetry and delayed eruption are common [5].

The studies of prevalence of dental caries among DS individuals are not clear enough. However, a number of studies have revealed significantly low caries prevalence in DS patients when compared to non-DS individuals, while others have shown no difference in caries prevalence [11]. Scientific evidence of susceptibility to dental caries in the population with DS is limited and conflicting, making it difficult to establish firm conclusions [12]. On the other hand, Ronald et al. in 2011 stated that low prevalence of dental caries in both primary and permanent dentitions of DS individuals has been widely reported [3].

A systematic review and meta-analysis by Deps et al. in 2015 was conducted to obtain scientific evidence of the possible association between dental caries and individuals with DS, comparing to individuals without DS. It suggested that individuals with DS have fewer dental caries than individuals without DS [13].

It is worth noting that the scientific production of the Middle East and North Africa is low in general [14]. Regarding Libya, the scientific production is extremely low [15, 16]. A baseline data regarding dental caries experience of DS patients is important to establish an adequate dental care program in these individuals. Therefore, really relevant program in oral health could not be developed without the knowledge of disease levels and trends in populations. In view of that, this study was planned and conducted to assess the caries experience of Down's syndrome children who are attending a special needs institute in Ajdabiya City, Libya.

MATERIALS AND METHODS

This descriptive cross-sectional study, conducted in May 2018 in Ajdabiya city, Libya. Ajdabiya is a town in and capital of the Al Wahat District in northeastern Libya. There is only one a day institution for individuals with special needs in Ajdapia. Thus, All children with DS who attend the institution were invited to participate in the present study. At the time this study was carried out, there were 39 children with DS attending the institution.

The inclusion criteria implemented were cytogenetic diagnosis of DS, adequate cooperation , and informed consent from the legal representatives of DS individuals. The exclusion criteria were detrimental systemic diseases, compound disability, and uncooperation. Four (4) out of thirty nine (39) individuals with DS attending the institution were excluded because of uncooperation. The total eligible sample comprised 35 DS individuals, 17 of them males and 18 females, aged between 6 and 15 years.

The ethical approval of this study was obtained from the College of Dentistry Research Center, University of Benghazi. As well as, the permission to conduct the study was gained from the Director of the rehabilitation center for special needs in Ajdapia. After that informed consent was obtained from the legal representatives of DS individuals to participate in the study. The medical records of the participants had earlier been reviewed with the help of the health care providers of the center, and the relevant information was extracted.

The clinical examination of all participants was conducted by one examiner ,who is a dentist, aided by a dental assistant. The assistant was responsible for verifying the correct completion of forms ,and filling in the clinical records after observation of the oral cavities of the subjects . Participants were examined for dental caries, using the decayed, missing and filled teeth (DMFT/ dmft) according to the WHO Oral Health Survey Basic Methods [17].

In order to reduce the risk of cross infection a disposable diagnostic kit was used for each subject , as well the examiner used disposable masks and gloves. The examination was carried out in the Institution. Each subject was examined while seated on a portable chair by a disposable mouth mirror and an explorer was sparingly used on doubtful surfaces. In case of doubt, the tooth was marked as sound. No radiographs were taken. A lightweight portable examination light was used. The findings of the DMFT / dmft index, in addition to the demographic information concerning the subject's age and gender, were recorded in a specially prepared form.

For a descriptive analysis of the sample, appropriate summary statistics were applied. The variables are continuous, so they were described using proportions, mean and standard deviation. Findings were compared across age groups (6-10 years, and 11-15 years) and gender. Independent samples t-test where appropriate at

p (<0.05) level of significance. The analysis was performed using the statistical analysis program SPSS (Statistical Package for Social Sciences), version 20.

RESULTS

A total of 35 Down syndrome patients included in this study, 17 of them are males (48.6%) and 18 are females (51.4 %). Their ages ranged from 6-15 years, and the mean age for all sample were 11.028 ± 2.945 years, with 11.13 ± 2.85, and 10.94 ± 3.11 for males and females respectively. With 15 individuals (42.9%) aged 6-10 years, and 20 ones (57.1%) aged 11-15 years. Table 1 summarizes the age and gender characterization of the sample.

The number of caries free participants was 1 (2.9 %), indicating that the caries prevalence in the study group was 97.1% (Table 2).

As for the (D/d) component, it was found that 32 individuals (91.4 %) have had dental caries in one tooth or more. While the number of participants who have had at least one missing tooth or more due to dental caries was 14 representing 40% of the overall sample. When looking to the number of filled teeth representing the (F/f) component here, it was found that the number of individuals who have had at least one restored tooth or more (filled tooth) was only 4, representing 11.4% of the whole sample (Table 2). The decay component was observed to be the major constituent of the DMFT and dmft scores .

The mean decayed, missing and filled teeth DMFT/dmft scores were 5.705 ± 4.468 and 4.388 ± 3.327 in males and females respectively (Table 3). Even though the mean caries scores were slightly high among the males, the difference was not statistically significant.

The subjects were further divided into two age groups; 6-10 years and 11-15 years. The mean dmft score in 6-10 years-olds was 5.800 ± 4.798, and in the 11-15 years old, the mean DMFT was 4.450 ± 3.119. There was no difference between means of both age groups (Tables 4).

Regarding the 6-10 years age group, the mean dmft for males was 9.000 ± 5.163 and that for females was 3.000 ± 2.000. There was significant difference between males and females in this age group (Table 5).

Concerning the 11-15 years age group, the mean DMFT for males was 3.400 ± 1.837 and that for females was 5.500 ± 3.836. There was no significant difference between males and females in this age group (Tables 6).

Table 1: Age and gender characterization of the sample.

	Variable	N=35 (%)
Gender	Male Female	17 (48.6) 18 (51.4)
Age (years)	(6-10) (11-15)	15 (42.9) 20 (57.1)

Table 2: Organized data for DMFT/dmft index evaluation.

	Variables	N (%)
Decayed Teeth	D/d 0 ≥ 1	 3 (8.6) 32 (91.4)
Missed Teeth	M/m 0 ≥1	 21 (60) 14 (40)
Filled Teeth	F/f 0 ≥ 1	 31 (88.6) 4 (11.4)
DMFT / dmft	0 ≥1	1 (2.9) 34 (97.1)

Table 3: Caries experience of down's syndrome children by gender

	Male (17) Mean ± SD	Female (18) Mean ± SD	Total (35) Mean ± SD	P-value
D (d)	3.764 ± 2.411	3.277 ± 2.468	3.415 ± 2.417	0.559
M (m)	1.176 ± 2.098	1.000 ± 2.029	1.085 ± 2.034	0.802
F (f)	0.764 ± 2.681	0.111 ± 0.323	0.428 ± 1.883	0.333
DMF / dmf (primary + permanent)	5.705 ± 4.468	4.388 ± 3.327	5.028 ± 3.921	0.328

Independent sample t- test was used to compare groups

Table 4: Caries experience of down's syndrome children by age-groups

	6-10 years (15) Mean ± SD	11-15 years (20) Mean ± SD	Total (35) Mean ± SD	P-value
D (d)	3.933 ± 2.520	3.200 ± 2.353	3.415 ± 2.417	0.382
M (m)	1.000 ± 2.203	1.150 ± 1.954	1.085 ± 2.034	0.833
F (f)	0.866 ± 2.850	0.100 ± 0.307	0.428 ± 1.883	0.239
DMF / dmf	5.800 ± 4.798	4.450 ± 3.119	5.028 ± 3.921	0.321

Independent sample t- test was used to compare groups

Table 5: Mean decayed, missing and filled teeth (dmft) scores of the (6-10) years age group

	Male (7) Mean ± SD	Female (8) Mean ± SD	Total (15) Mean ± SD	P-value
d	5.285 ± 2.360	2.750 ± 2.121	3.933 ± 2.520	0.047*
m	1.857 ± 3.078	0.250 ± 0.462	1.000 ± 2.203	0.219
f	1.857 ± 4.099	0.000 ± 0.000	0.866 ± 2.850	0.276
dmf	9.000 ± 5.163	3.000 ± 2.000	5.800 ± 4.798	0.021*

Independent sample t- test was used to compare groups
*statistically significant ($p<0.05$)

Table 6: Mean decayed, missing and filled teeth (DMFT) scores of the (11-15) years age group

	Male (10) Mean ± SD	Female (10) Mean ± SD	Total (20) Mean ± SD	P-value
D	2.700 ± 1.888	3.700 ± 2.750	3.200 ± 2.353	0.356
M	0.700 ± 0.948	1.600 ± 2.590	1.150 ± 1.954	0.316
F	0.000 ± 0.000	0.200 ± 0.421	0.100 ± 0.307	0.168
DMF	3.400 ± 1.837	5.500 ± 3.836	4.450 ± 3.119	0.136

Independent sample t- test was used to compare groups

DISCUSSION

This is the first study to investigate dental caries experience of DS children in Libya. The results indicated that the caries prevalence and severity was high among DS children in Ajdabia. These results match those reported in earlier studies which indicated that people with DS had high caries experience [11, 18]. In a study that aimed to determine prevalence of dental caries and oral hygiene status among DS patients attending rehabilitating centers in Riyadh, Saudi Arabia. It was concluded that the subjects had high caries experience, with only few having good oral hygiene [11]. Another study aimed to assess the prevalence of dental caries among DS children in the Indian city of Chennai, the percentage of caries-free DS children was found to be lower than earlier studies [18]. Oredugba, in 2008, carried out a study to determine the oral health condition and treatment needs of a group of individuals with DS in Nigeria, the participants with DS were matched for age and sex with controls who were students from two nearby schools and some members of staff of those institutions. It was found that individuals with DS have poorer oral health and more treatment needs than controls [19], as well as, these findings match the results of studies which indicated that Libyan children have shown a high caries experience [20, 21].

Review of literature showed that in Libya, there is no information available regarding caries experience of DS children in specific. Recently, in 2017, a study by Ali et al. included seventy Libyan children with congenital heart disease at Benghazi Children Hospital, six of them were DS patients, in order to investigate their oral health. It was found that there has been more untreated caries, and early childhood caries was present in 7 cases among younger age group due to improper feeding pattern such as sleeping with milk bottle at night, and neglected teeth cleaning [22].

However, dental literature addressing dental caries experience among DS individuals is not in complete agreement [11]. The results of this research disagree with studies on DS patients in other countries those showed a low caries prevalence and a high number of caries free DS patients [13, 23-26]. A study that compared the prevalence of dental caries among DS individuals and their siblings, concluded that DS individuals experienced less than one third caries than their unaffected siblings [24]. Another study that compared between DS individuals and their age matched mentally disabled subjects, found that DS individuals had lower caries prevalence [25]. Moreover, in a sibling-matched, population-based, cross-sectional survey that was performed to investigate the dental caries in Portuguese children with DS. The results have shown that DS children have lower caries rates than their siblings [26]. Earlier, in 1971, Cutress conducted a study on 416 DS subjects and concluded the following; DS individuals experienced lower dental caries than normal population [23].

It is difficult to explain the results of the current study as previous studies suggested that low caries prevalence in DS individuals can be seen as a result of their oral manifestations, which include delayed eruption, reduced time of exposure to a cariogenic environment, congenitally missing teeth, microdontia, spaced dentition, and shallow fissures of the teeth [5, 7]. Over and above, the lower caries level in DS individuals is due to their, high salivary pH and bicarbonate levels, and high salivary Streptococcus mutans specific IgA concentrations [5, 7, 27-30]. Also, this reduced prevalence may be associated with the parents' greater concern about oral health care in DS children [26]. However, these evidence can be weakened by the absence of controlling the confounders [13]. As well as, when the age of teeth eruption was adjusted there were only small and no significant difference between the study groups [23].

On the other hand, high caries prevalence and severity of DS individuals can be explained as sub-optimal oral hygiene of this group has neutralized the above stated advantages, whereas poor oral hygiene was reported as one of the common oral findings in DS children [9, 31]. Oral hygiene plays an important role in the initiation and progression of dental caries, and some studies related high caries experience among DS individuals with their poor oral hygiene [11, 19]. More and above, it was reported that the dental biofilm of DS children, comparing to children without this condition, has higher cariogenic potential despite the salivary composition being similar between groups [32].

In addition, it may be the case that the present study's results are related to feeding problems and behavioral difficulties of DS children. Whereas it was found that young DS children had prolonged use of bottle, which increases the risk of developing early childhood caries [33]. Another possible reason for the present study's findings is that DS children were less likely to receive caries-preventive treatment, restorative care and more likely to have had a dental extraction than their non-DS siblings [34].

These evidences agree with the present study findings, as the number of subjects who have had at least one restored tooth or more was just 11.4%, and 40% have had at least one missing tooth or more due to dental caries. As well as, the high level of untreated caries is a cause for concern, representing a high unmet treatment need. Whereas the decay component was observed to be the major constituent of the DMFT and dmft scores as

91.4 % of participants have had dental caries in one tooth or more. These results match the findings of previous Libyan researches [20-22]. Where dental caries prevalence in 12 year-old Libyan children was high, the mean DMFT was low compared with other developing countries, but higher than the WHO goal for year 2020, as well as, the high level of untreated caries is a cause for concern, representing a high unmet treatment need [20].

The main limitation in the present study is that it included no control subjects. Nevertheless, the researcher will take this issue into consideration in future studies. Another limitation is the small number of participants in this study, where only four subjects refused examination and therefore they were excluded from participation due to their uncooperation. Also, it should be noted that majority of DS children in Libya still reside at home with no educational or vocational plan from parents or guardians as they are often stigmatized by the society. Therefore, generalization must be made carefully as this study population may not reflect the DS population in Libya.

The present study has provided baseline data regarding caries experience in Down's syndrome children of Ajdapia. It is expected that these results would help for developing oral health preventive programs, and highlighting the unmet treatment needs for this special need group in Libya.

CONCLUSION

The caries prevalence and severity were high among Down's Syndrome children in Ajdapia.There was no statistically significant difference in caries experience between male and female Down's Syndrome children. There was no statistically significant difference in caries experience between the two age groups; 6-10 years and 11-15 years Down's Syndrome children. Regarding the 6-10 years age group, there was significant difference between male and female Down's Syndrome children in caries experience .

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