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Original Research Article

The Prevalence of Oral and Dental Anomalies in Down syndrome Children in Western Region, Saudi Arabia

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ABSTRACT

Background: Down syndrome is a genetic alteration that the affected individuals carry an extra chromosome 21. These individuals have mental, physical and chronic medical conditions that require health care than normal individuals. There is a unique combination of dentofacial anomalies in Down syndrome individuals. All these factors and in addition to the lack of manual dexterity could compromise their adequate oral cleaning. Thus, these children are prone to various oral diseases that require early detection and treatment.
Objectives: The aim of the study was to determine the prevalence of some selected oral and dental anomalies in Down syndrome children in Makkah and Jeddah, Saudi Arabia.
Subjects and Methods: A sample of fifty Down syndrome (group I) Saudi children, age ranging between 4-14 years was subjected to an intraoral examination for some selected oral and dental anomalies. The control group (group II) includes fifty Saudi healthy children of both genders with matching age range. Examinations were carried-out using disposable intra- oral mirror attached to an intra-oral LED light. The findings were determined and compared to healthy children using the appropriate statistical descriptive analysis.
Results: All Down syndrome children had one or more of oral and dental anomalies Macroglossia (94%) was the most prevalent anomaly, followed by narrow palatal vault (76%) and fissured tongue (74%).
Conclusion: Down syndrome children had generally a higher prevalence of oral anomalies and dental anomalies compared to normal children. Early identification of these clinical conditions allows dental treatment to be adequately planned before being executed.
Keywords: Down syndrome, dental, oral, anomalies, western region.

INTRODUCTION

Down syndrome, or (trisomy 21), is a common chromosomal abnormality, is a genetic disorder in which the affected individuals carry an extra chromosome 21, Down syndrome itself, is not a disease. However, affected individuals have greater risk in acquiring many systemic conditions; moreover, it is the most common genetic cause of mental disability. There are no known environmental or behavioral or factors that cause Down syndrome. [1]

Down syndrome is frequently seen with mental retardation in conjunction with other medical condition. [2] Phenotypically, all individuals with Down syndrome have common dysmorphic features and a wide range of congenital anomalies that may affect almost any body system. [3]

Maternal age is strongly associated with the prevalence of chromosomal anomalies especially Down syndrome. [4] The rate of children with Down syndrome in some Arab countries exceeds from 12 to 17 per 10 000 typical for industrialized countries. [5] In Saudi Arabia, the prevalence of Down syndrome has been reported to be 18 per 10 000 live births. The rising proportion of older mothers is likely to have contributed to the high trend in the prevalence of this anomaly in Saudi children. [6]

There is a unique combination of facial features in Down syndrome subjects, regardless of race or ethnicity. The under-development or hypoplasia of mid-facial region was the primary skeletal abnormality affecting the orofacial structures in Down syndrome. It was associated with poor development of paranasal air sinuses, giving rise to the appearance of sloping forehead and a flat face. [7]

As many as one third or most of these patients may have congenitally missing teeth; one or both maxillary lateral incisors are most frequent. The morphology of the teeth may also be affected. They are smaller than normal, peg shaped and tend to be rounded or bulbous. Fissural patterns may be varied and tend to be shallower. The incisors may be of a simpler form with under development of the lateral mamelons. Some retardation of eruption occurs; wrinkled occlusal surfaces of molars are believed to occur during tooth development. [8]

Down syndrome children are at risk of having oral and dental anomalies that could lead to other problems related to oral hygiene due to difficulties in achieving optimal dental care. The literature is scarce on the oral hygiene status of Down syndrome in Makkah population.

The primary objective of this cross-sectional study is to determine the prevalence of some selected oral and dental anomalies in Down syndrome children compared to normal children in the western region (Makkah and Jeddah), Saudi Arabia.

Subjects and Methods

A cross-sectional study was conducted to evaluate the prevalence of oral and dental anomalies in Down syndrome children.

A sample of fifty Saudi children with Down syndrome (group I) aged between 4-14 years was included in this study. The sample was recruited from two centers (Al- Amal Al-Manshoud rehabilitation center) in Makkah and (Awnek center) in Jeddah. The control group (group II) included fifty Saudi healthy children of both genders with matching age range. The controls were selected from the patients who attended the Faculty of Dentistry, Umm Al Qura University hospital at Pedodontics clinics according to the following criteria.

Inclusion criteria

- Age group 4-14 years of both genders.
- Down syndrome children.
- Normal children.

Exclusion criteria

- Children with mental retardation other than Down syndrome.

Data collection tools and technique:

Before starting the study an ethical approval from Al-amal Al-manshoud rehabilitation center in Makkah and Awnek center in Jeddah were obtained to collect the sample. Informed consents from the families who notified and the researchers explained the study to the parents was collected at study beginning. All of the children were proven to be affected by the genetic abnormality based on a chromosomal analysis by a Karyotype test. This was found in the medical files or school files of each individual. Informed consent was obtained from the parents of the children in both study and control groups to participate in the study.

Down syndrome children were examined in their center (Al-Amal Al-Manshoud rehabilitation center) in Makkah and (Awnek center) in Jeddah, and healthy children were examined in the Faculty of Dentistry, Umm Al Qura University hospital. The children were seated on an ordinary chair in upright position and

underwent a quick and well-tolerated clinical examination.

Oral and dental anomalies in all patients were determined by clinical examination by using a dental mirror under floodlight reflector. The clinical examination was performed by two dentists who had been previously trained and calibrated.

Statistical Analysis:

The data were collected and entered using Microsoft Excel program. Data analysis was performed using the Statistical Package for the Social Sciences SPSS statistical program version 22.

Ethical consideration:

- Informed consent to inform parents about their children to participate in the study was a prerequisite for data collection.
- All information was kept confidential and was not accessed except for the purpose of the scientific research.
- Parents of the children who have oral lesion were advised to seek specialist consultation and treatment.
- Ethical consideration was observed through all the researcher steps.

RESULTS

A total of one hundred children had agreed to participate in this study and were examined. They comprised of 50 children with Down syndrome (30 males – 20 females) and 50 normal children (28 males – 22 females). Their ages ranged from 4-14 years. The mean age (SD) for DS was 8.0 (2.61) years and for normal children were 9.4 (2.33). Males outnumbered females, 60% and 56% in Down syndrome and normal children, respectively (Table 1).

All Down syndrome children had one or more of oral and dental anomalies. The oral anomalies finding include macroglossia, fissured tongue, cleft lip, narrow palatal vault, cleft palate, malocclusion (figures 1&2). The dental anomalies findings include hypoplasia, hypo calcification, microdontia, macrodontia, hypodontia, supernumerary, conic teeth, Peg lateral (figure3).

Analysis of the prevalence of the six oral and eight dental anomalies showed the group of children with Down syndrome to significantly differ from the control group of healthy children in the findings for ten anomalies (Table 2). Consequently, the oral anomalies of (macroglossia, fissured tongue, narrow palatal vault, malocclusion) and dental anomalies (hypoplasia, hypo calcification, microdontia, macrodontia, hypodontia, supernumerary, conic teeth, Peg lateral) were significantly more common in DD children (Table 2, figure 4). Other anomalies showed no significant differences.

Macroglossia was the most prevalent anomaly and there was a statistically significant difference between Down syndrome (94%) compared to normal children (0%) (p=0.000), followed by narrow palatal vault in Down syndrome (76%) compared to normal children (0%) (p=0.000) (Table2). None of the children in both groups had cleft lip or cleft palate, Down syndrome children had significantly higher prevalence of fissured tongue compared to normal children, (74%) and (0%) (p=0.000) respectively. The prevalence of malocclusion among Down syndrome children was higher (70%)) when compared to normal children (0%) (p=0.000).

There was no significant difference of macrodontia between Down syndrome (2%) compared to normal children (0%) (p=0.315) (Table 3). The prevalence of Down syndrome who had hypoplasia (38%) (p=0.000) and hypo calcification (26%) (P=0.006) was significantly higher compared to normal children (3%). Down syndrome children had significantly higher prevalence of supernumerary and conic teeth compared to normal children, (10%) and (0%) (p=0.022), respectively. The prevalence of Down syndrome who had microdontia (34%) and hypodontia (20%) was significantly higher compared to normal children (0%) (p=0.000). Down

syndrome children had significantly higher prevalence of peg lateral compared to normal children, (22%) and (0%) (0.000), respectively. These findings indicated that the mentioned oral and dental anomalies most frequently occur in children with Down syndrome.

Table 1: Demographic profiles of Down syndrome and normal children. (n=100)

	DS (n=50)		Normal (n=50)	
Profile	Mean (SD)	n (%)	Mean (SD)	n (%)
Age (year)	8.0 (2.61)		9.4 (2.33)	
Gender				
Male Female	30 (60) 20 (40)		28 (56) 22 (44)	

Table 2: The prevalence and difference of oral anomalies (macroglossia, fissured tongue, cleft lip, narrow palatal fault, cleft palate, malocclusion)

	DS children (n=50)	Normal children (n=50)	P-value
	N (%)	N (%)	
Oral anomalies			
Macroglossia	47 (94)	0 (0)	0.000
Fissured tongue	37 (74)	0 (0)	0.000
Cleft lip	0 (0)	0 (0)	Constant
Narrow palatal vault	38 (76)	0 (0)	0.000
Cleft palate	0 (0)	0 (0)	Constant
Malocclusion	35 (70)	0 (0)	0.000

Table 3: The prevalence and difference of dental anomalies (hypoplasia, hypocalcification, microdontia, macrodontia, hypodontia, Supernumerary, Conic teeth, Peg lateral).

	DS children (n=50)	Normal children (n=50)	P-value
	N (%)	N (%)	
Dental anomalies			
Hypoplasia	19 (38)	3 (6)	0.000
Hypo calcification	13 (26)	3 (6)	0.006
Microdontia	17 (34)	0 (0)	0.000
Macrodontia	1 (2)	0 (0)	0.315
Hypodontia	10 (20)	0 (0)	0.001
Supernumerary	5 (10)	0 (0)	0.022
Conic teeth	5 (10)	0 (0)	0.022
Peg lateral	11 (22)	0 (0)	0.000

Table 4: summary of prevalence of Down syndrome patients with different oral and dental anomalies according to gender.

	Male (n=30)	Female (n=20)
	N (%)	N (%)
Oral anomalies		
Macroglossia	29 (96)	18 (90)
Fissured tongue	25 (83)	12 (60)
Cleft lip	0 (0)	0 (0)
Narrow palatal fault	23 (76)	15 (75)
Cleft palate	0 (0)	0 (0)
Malocclusion	19 (63)	16 (80)
Dental anomalies		
Hypoplasia	11 (36)	8 (40)
Hypo calcification	9 (30)	4 (20)
Microdontia	11 (36)	6 (30)
Macrodontia	0 (0)	1 (5)
Hypodontia	5 (16)	5 (25)
Supernumerary	1 (3)	5 (25)
Conic teeth	5 (16)	0 (0)
Peg lateral	8 (26)	3 (15)

By comparing all these anomalies between males and female in Down syndrome group showed that there were no significant differences between males and females with respect to the prevalence of all oral and dental anomalies (Table 4).

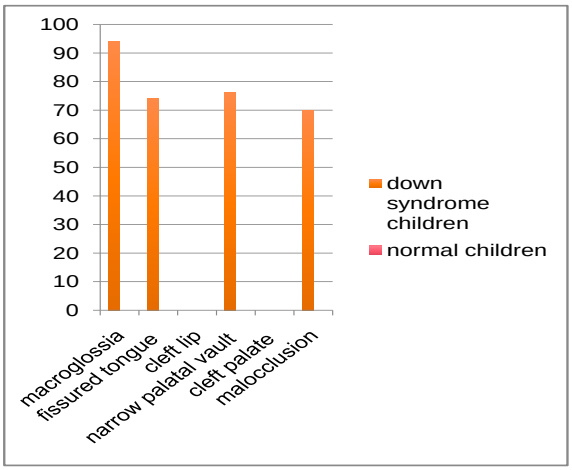

Figure (1) oral anomalies in Down syndrome children vs normal children.

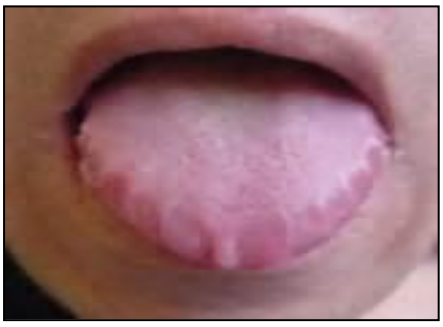

Figure (2) Macroglossia in Down syndrome child.

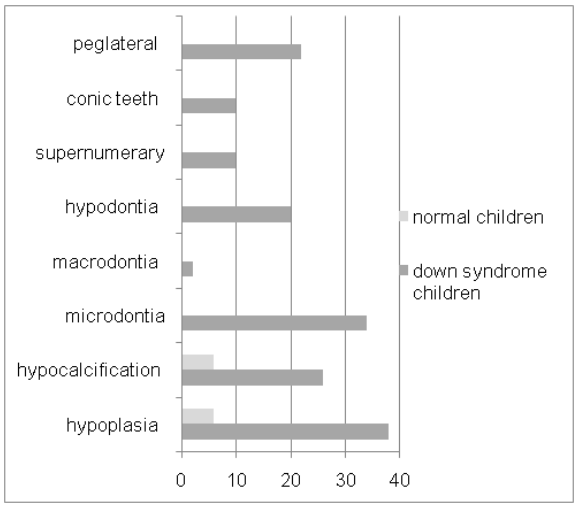

Figure (3) dental anomalies in Down syndrome children vs normal children.

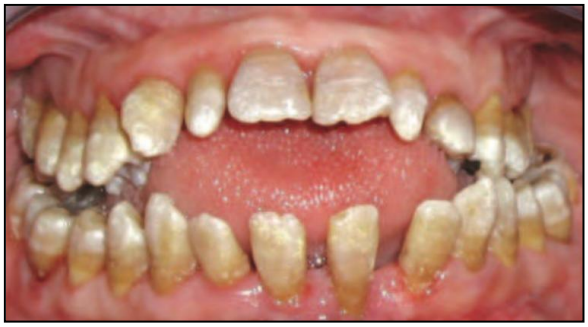

Figure (4): Large tongue, microdontia and peg shape lateral in Down syndrome child.

DISCUSSION

Down syndrome patients have characteristic orofacial features. Some of the common oral findings in these children include open bite, macroglossia, fissured lips and tongue, delayed eruption of teeth, missing and malformed teeth, microdontia, crowding, malocclusion, bruxism, poor oral hygiene and a low caries experience. [9,10]

In the present study, Down's syndrome, in particular, was chosen to be investigated as in Saudi Arabia, the prevalence of Down syndrome has been reported to be 18 per 10 000 live births. The rising proportion of older mothers is likely to have contributed to the high trend in the prevalence of this anomaly in Saudi children. [6,11]

A total of one hundred study sample comprised of 50 Down syndrome children and 50 normal children participated in this study. The mean age (SD) for the Down syndrome and non- Down syndrome children were 8.0 (2.61) and 9.4 (2.33) years, respectively. The mean age (9 years) was quite similar to the study done in Malaysia by Haliza T, 2015. [12] However, many studies had different age groups with a broad range, such as a study done by Alshwaf, 2011 (11) in Riyadh Saudi Arabia (12 to 24 years), Afify,2012 [13] in Saudi Arabia (12 to 30 years) and Leonelli, 2007 [14] in brazil (3 to 33 years), Therefore, wide variation in the subject's age leads to variability in the outcomes. The similarity of the age group, geographical area, and school environment could give more precise results in comparing variables between Down syndrome and normal children in this study.

Dental anomalies are very common, both in the primary and permanent teeth, and in the patients with Down syndrome, dental anomalies occur with an incidence five times greater than in the normal population. [15]

In this present study macroglossia was the most common oral condition observed (94%) followed by narrow palatal vault (76%), fissured tongue (74%) and malocclusion (70%). Our results are in agreement with Somani, 2011 [16] who also identified macroglossia as the most frequent occurrence among patients with Down syndrome.

Moreover, our results were in accordance with that of Al-Shawaf, 2011 [11] and Abieth B, 2015 [17] who found a high prevalence of malocclusion, fissured tongue and high arched palate in Down syndrome patients.

In this study, the prevalence of hypodontia was (26%) in Down syndrome group compared to normal children (6%). This finding was in agreement with that of Talitha, 2011 [18] who reported that (35.4%) of the cases with hypodontia and the most affected tooth is maxillary lateral incisor. Hypoplasia was also higher in Down syndrome children (38%) compared to normal (6%) children in this study. This was consistent with the study of Talitha, 2011 [18] who reported that high prevalence of hypoplasia associated with Down syndrome.

Supernumerary teeth and conic teeth were observed in our study only in (10%) of the individuals. This finding is in accordance with the results of Talitha, 2011 [18] who reported a prevalence of supernumerary teeth and conic teeth in individuals with Down syndromes.

No oral anomaly was observed in the control group that disagreed with other studies like Sabbagh, 2012 [19] who reported that the prevalence of cleft lip and/or palate in the study varied greatly from 0.3 to 2.4 per 1000 live births.

Also no dental anomaly was observed in the control group that disagreed with other studies like Osuji, 2002 [20] who revealed that 51% of the dental anomalies occurred in males, and 48.9% in females, Afify,2012 [13] who reported that the prevalence of patients who exhibited at least one dental anomaly was (45.1%) patients, Haugland, 2013 [21] who revealed a total of 141 subjects (28.2%) had at least one dental anomaly and Santosh, 2013 [22] who found that (36.7%) patients had at least one dental anomaly. These differences in the results of the four studies might be attributed to one factor which is the different sample size.

This current study provided baseline data for future research related to Down syndrome in patients of the western region. A broader age group study is needed since in this study the participants were only up to 14 years old, and this would affect the results since children with Down syndrome had delayed eruption.

CONCLUSION

Down syndrome children had generally a higher prevalence of oral anomalies and dental anomalies compared to normal children. Early identification of these clinical conditions allows dental treatment to be adequately planned before being executed.

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