

Dental caries experience and periodontal health status in a sample of autism children

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Abstract

Background and Objective: Autism is a persistent neurodevelopmental condition. This study aimed to investigate carious and periodontal problems among a sample of children with autism in Erbil, Iraq.

Methods: A total of 44 autistic children aged 1-14 years (30 males and 14 females) attending Erbil, Iraq Autism Centers were enrolled in the study. The control group consisted of 44 non-autistic children chosen from different schools which represent different geographical locations in Erbil city in the period between September, 1st 2014 to January, 1st 2015 to have matched age, sex and socioeconomic status. Each patient received an assessment of caries prevalence. Other conditions assessed were oral hygiene and gingival health status. The *t*-test of significance was used to compare groups.

Results: Data analyzed for the present study comprised observations from a group of children (cases = 44) diagnosed with autism matched with healthy children (controls = 44). The autistic children had lower decayed, missing or filled teeth than unaffected children with nonsignificant differences. The mean decayed-missing-filled teeth in primary teeth (dmft) of the autistic group was 11.57 ± 11.41 while that of the controls was 15.36 ± 12.81 . The mean Decayed-Missing-Filled teeth in permanent teeth (DMFT) of the autistic group was 2.36 ± 3.86 and 2.89 ± 3.78 in the controls. With advancing age, the value of decayed, missing and filled teeth increased. Almost all of the autistic children had fair oral hygiene (1.291 ± 0.89) and had gingivitis.

Conclusion: Autistic children displayed lower dmft, DMFT scores compared to control group, fair oral hygiene level, and had gingivitis than did the unaffected control children. Hence, non-autistic children need further consideration.

Keywords: Dental caries; Periodontal problems; Autistic spectrum disorders; Children.

Introduction

Autism spectrum disorder (ASD) is a persistent neurodevelopmental condition with early childhood onset.¹ PDD is often used similarly with the term ASD and consists of five subtypes; (1) autism disorder (AD); (2) Asperger's Disorder; (3) Rett's disorder; (4) childhood disintegrative disorder (CDD); and (5) pervasive developmental disorder-not otherwise specified (PDD-NOS). The most popular and best studied form of ASD is AD.² Autistic disorder is characterized by impairments in social interaction, communication, and restricted, repetitive

patterns of behaviour, as well as complex sensory alterations. These signs all begin before a child is three years old.³⁻⁴ Autism affects many parts of the brain; how this occurs is not understood⁵. It is a highly variable brain development disorder⁶ that first appears during infancy or childhood and generally follows a steady course without remission.⁷ Overt symptoms gradually begin after the age of six months, become established by age two or three years,⁸ and tend to continue through adulthood, although often in more muted form.^{5,9} Patients with autism spectrum disorder (ASD) are the individuals with

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special needs that demonstrate the greatest challenge for dentists, due to their complex and varied clinical manifestations.⁴ Management is of a multidisciplinary nature, the most effective strategies being based on educational pro-grams.¹⁰ The dental care of these patients poses great difficulties, and in most cases treatment is provided under general anesthe-sia.¹¹ Most education programs for dentists and hygienists provide either extremely limited or no preparation for the care of individuals with disabilities. Essentially, half of dental hygiene school programs provide minimal didactic training and no clinical experience in the care of cases with special needs.¹² In 2004, the Commission on Dental Accreditation built a new standard that dental and dental hygiene programs were required to implement beginning January 1, 2006. The new standard states that "Graduates must be competent in assessing the treatment needs of patients with special needs."¹³ The prevalence estimated to be 1-2 per 1,000 for autism and close to 6 per 1,000 for Autism Spectrum Disorder,¹⁴ with about four times as many males as females. The number of people known to have autism has increased dramatically since the 1980s, partly due to the availability of services, age at diagnosis, changes in diagnostic practice, referral patterns, and public awareness,¹⁵ though unidentified environmental risk factors cannot be ruled out.¹⁶ There are little studies describing the oral health of individuals with autism. These studies reported no statistically significant differences in the prevalence of caries, gingivitis and degree of oral hygiene in comparison with non-autistic individuals.¹⁷⁻¹⁸ Nevertheless, many investigators have found the prevalence of caries and periodontal disease to be no different compared with non-autistic individuals.⁴ In some cases, the prevalence of caries in children with ASD may even be comparatively lower.^{11,19} Information on the patterns of development of the autistic disease in the population is important

because it acts as a foundation for the planning of public oral health policies. Therefore, it was decided to conduct this study in order to find out the means of DMFT, dmft, Simplified Oral Hygiene Index (OHI-S) and gingival health status among the two study groups (autistic and non autistic) aged 1-14 years in Erbil, Iraq.

Methods

Study design: Case-control descriptive study.

Subjects' Selection: Forty-four autistic children (30 males and 14 females) attending autism centers of Erbil city, Iraq, were selected for the study. All the children had been previously diagnosed medically as autistic patients according to the center's medical records. Approval for examining the children was obtained from the parents and respective headmaster. The inclusion criteria included the diagnosis of autism, providing consent and age between 1 and 14 years. The exclusion criteria included suffering from other systemic diseases known to influence dental caries or the severity of periodontal diseases such as Down's syndrome and diabetes, dental prophylaxes in the last six months. Accordingly and following the inclusion and exclusion criteria of JABER⁵ in 2011, 44 patients with autism were included in this study.

Comparison group selection: The healthy control group (44 subjects) was chosen from different schools which represent different geographical locations in Erbil city and was matched to the clinical group with regard to age, gender, general and dental care background and area of residence. All controls were medically fit and none was undergoing antibiotic or anti-inflammatory therapy or had undergone such therapy in the previous six months.

Examination: Examinations and oral health assessments were performed according to the basic method of the WHO for the year 1997. Each child accompanied

by his/her teacher was brought to the examination room and subjects were seated in an ordinary adjustable chair and examined under fluorescent light with the use of disposable mouth mirror and sharp dental explorer²⁰. "Tell-Show-Feel and Do" method was used with all the children. Teeth which manifest caries (DMFS/ dmfs) were diagnosed and scored according to the criteria suggested by (World Health Organization, 1987 cited by Shah et al., 2016).²¹ The oral hygiene status was estimated by using the Simplified Oral Hygiene Index (OHI-S) (Simplified Debris Index and Simplified Calculus Index). The OHI-S, introduced by Greene and Vermillion in 1964 and quoted by Peter (2004),²² each of these indices is based on numerical determinations representing the amount of debris or calculus on six pre-selected tooth surfaces, i.e., buccal surfaces of the selected upper first molars, lingual surfaces of the selected lower first molars, and the labial surfaces of the upper right and the lower left central incisors are inspected and scored. In the absence of either of these anterior teeth, the central incisors (21 or 41 respectively) on the opposite side of the midline are substituted. Simplified Debris Index (DI-S) = (The buccal-scores) + (The lingual-scores) / (Total number of examined buccal and lingual surfaces). Simplified Calculus Index (CI-S) = (The buccal-scores) + (The lingual-scores) / (Total number of examined buccal and lingual surfaces). The average individual or group debris and calculus scores were combined to obtain Simplified Oral Hygiene Index, as follows: Simplified Oral Hygiene Index (OHI-S) = DI-S + CI-S. The Simplified Oral Hygiene Index values range from 0-6 and are as follows: Good (0-0.9); Fair (1.0-1.9); Poor (2.0 up to 6).²³ Gingival index described by Loe and Silness (1963) was used for diagnosis and assessment of gingival health conditions, the severity of gingival inflammation was assessed according

to Loe and Silness(1963) as Mild (0.1-1), Moderate (1.1-2), Severe (2.1-3),²⁴ and the Ramfjord teeth was examined which is the following: (16,21,24,36,41,44) for permanent and (55,61,64,75,81,84) for deciduous, the missing tooth was not substituted.²⁵

Data Analysis: The SPSS version 23 statistical package for Microsoft Windows® was used to analyze the data. The *t*-test was used to compare the means of quantitative variables between the two groups. The data were summarized and described using relative frequencies and percentages for categorical variables and means for the interval scaled variables (such as the DMFT/dmft score). Statistical significance was set at $P < 0.05$.

Results

Caries experience of deciduous teeth (dmft):

Results found that the total mean value of (dmft) in the autistic group (11.57 ± 11.41) was lower than the control (15.36 ± 12.81) ($P = 0.161$), with no significant difference between them ($P > 0.05$) as shown in Table 1. Caries experience among females in autistic groups was higher than males, with no significant difference ($P > 0.05$) for autistic group only ($P = 0.598$). There was no significant difference between males and females in both groups within each age group ($P > 0.05$) except in age group (7-9) there is significant difference ($P = 0.038$), and highly significant in both groups in age group 10 and above ($P < 0.001$) in addition the (dmft) value was increasing with advancing age in autistic group as demonstrated in Table 1.

Table 1: Caries experience (dmft: mean and standard deviation) of deciduous teeth in the autistic and control groups by gender and age groups.

Age Group	Gender	Autism Group				Control Group				P value**
		Dmft				Dmft				
		No	Mean	±SD	P value*	No	Mean	±SD	P value*	
1-3	Male	1	0	0	N/A	1	0	0	N/A	N/A
	Female	0	0	0		0	0	0		
	Total	1	0	0		1	0	0		
4-6	Male	9	12.44	14	0.244	9	13.9	11.36	0.101	0.756
	Female	7	5.43	7		7	6.29	2.06		
	Total	16	9.38	11.7		16	10.6	9.26		
7-9	Male	13	13.92	6.64	0.167	13	26.2	12.66	0.29	0.038***
	Female	5	19.4	8.73		5	19.4	9.21		
	Total	18	15.47	7.45		18	23.2	12.57		
10 & Above	Male	5	9.11	6	**** <0.001	6	3.17	5.19	**** <0.001	0.228
	Female	23	32.53	3		3	23.3	8.62		
	Total	9	16.05	9		9	9.89	11.71		
Total	Male	30	10.93	10.3	0.598	29	16.7	14.29	0.341	0.161
	Female	14	12.93	13.8		15	12.7	9.17		
	Total	44	11.57	11.4		44	15.4	12.81		

*This P value is to compare males with females.

** This P value compares the total values of the two groups.

***Significant ($P < 0.05$).

****Highly significant ($P < 0.001$).

Caries experience of permanent teeth (DMFT):

The results found that the total mean of (DMFT) in autistic group (2.36 ± 3.86) was less than that in the control (2.89 ± 3.78) ($P = 0.524$), with no significant differences ($P > 0.05$). The caries experience (DMFT) among males was higher than females in

both autistic and control groups but with a non-significant difference ($P > 0.05$) as seen in Table 2. The statistical differences between males and females in all age group in relation to (DMFT) were not significant ($P > 0.05$), and the means of (DMFT) was increasing with advancing age in both groups.

Table 2: Caries experience (DMFT: means and standard deviation) of permanent teeth in the autistic and control groups by gender and age groups.

Age Group	Gender	Autism Group				Control Group				P value**
		No	Mean	±SD	P value*	No	Mean	±SD	P value*	
4-6	Male	9	0	0		9	0.44	1.01		
	Female	7	0.57	1.51	N/A	7	0	0	N/A	N/A
	Total	16	0.25	1		16	0.25	0.77		
7-9	Male	13	2.31	2.75		13	3.23	2.86		
	Female	5	1.4	1.52	0.498	5	3.4	2.7	0.909	0.177
	Total	18	2.06	2.46		18	3.28	2.74		
10 & Above	Male	7	6.29	5.41		7	7	5.4		
	Female	2	9.5	7.78	0.5	2	8.67	2.08	0.621	0.8177
	Total	9	7	5.61		9	7.56	4.48		
Total	Male	29	2.47	3.85		29	3.03	3.86		
	Female	14	2.14	4.04	0.797	14	2.87	3.76	0.897	0.524
	Total	43	2.36	3.86		43	2.89	3.78		

*This P value is to compare males with females.

**This P value compares the total values of the two groups.

Simplified oral hygiene index (OHI-S):

The results found that the mean of OHI-S in the control group compared to the autistic group (1.69 ± 0.806) and (1.291 ± 0.89) respectively and both groups showed fair oral hygiene. The males in both groups showed higher mean

values of OHI-S than females with a significant difference ($P=0.042$) as shown in Table 3. In age group 4-6 years old, there was a highly significant difference ($P < 0.001$), while in autistic group significant differences ($P = 0.044$).

Table 3: Simplified oral hygiene index (mean and standard deviation) of the autistic and control groups by gender and age groups.

Age Group	Gender	Autism Group				Control Group				P value**
		No	OHI-S		P value*	No	OHI-S		P value*	
			Mean	±SD			Mean	±SD		
1-3	Male	1	0.5	0	N/A	1	1	0	N/A	N/A
	Female	0	0	0		0	0	0		
	Total	1	0	0		1	0	0		
4-6	Male	9	0.797	0.3	0.044***	9	1.18	0.244	0.949	<0.001****
	Female	7	0.466	0.31		7	1.19	0.241		
	Total	16	0.652	0.34		16	1.18	0.234		
7-9	Male	13	1.589	0.75	0.645	13	1.64	0.693	0.72	0.896
	Female	5	1.798	1.09		5	1.78	0.779		
	Total	18	1.647	0.83		18	1.68	0.697		
10 & Above	Male	7	1.671	1.15	0.888	7	2.9	0.927	0.398	0.063
	Female	2	2.255	0.77		2	2.27	0.252		
	Total	9	1.801	1.07		9	2.69	0.808		
Total	Male	30	1.334	0.84	0.552	30	1.74	0.889	0.603	0.042***
	Female	14	1.197	1.03		14	1.6	0.632		
	Total	44	1.291	0.89		44	1.69	0.806		

*This P value is to compare males with females.

** This P value compares the total values of the two groups.

***Significant ($P < 0.05$).

****Highly significant ($P < 0.001$).

Gingival health status:

The autistic patients were affected by mild and severe gingivitis more than the control group as seen in Figure 1.

Discussion

Autism, autistic disorder, childhood autism, or infantile autism are different terms given to the same condition²⁶. This study is the first attempt to systematically identify the problems of dental care for individuals who were suffered from autism in the Erbil, Iraq. The mean dmft of the autistic group was 11.57 ± 11.41 while that of the controls was 15.36 ± 12.81 . The mean DMFT of the autistic group was 2.36 ± 3.86 and 2.89 ± 3.78 in the controls. This level of dental caries is considered low according to the WHO classification.²⁷ These findings are in agreement with other studies which reported lower caries prevalence in autistic children.^{4,19,28} With advancing age, the values of decayed, missing and filled teeth increased. This finding was similar to the study that conducted by JABER⁵ in 2011. This increase may be due to the effects of time on the increased number of teeth susceptible to decay such as the second permanent molars, which erupt during adolescent period.²⁹ Rajic and Dzingalasevic³⁰ (1989) reported

that a combined treatment, provided by a dental team and a pedopsychiatric team working together, resulted in a lowering prevalence of caries in autistic children group as compared to another group who did not receive any treatment. In present study non autistic group experienced more carious problem compared with the autistic group this may be due to more frequent snacking, which generates higher levels of dental caries among non autistic group and another reason missed or cancelled dental appointments in the non autistic group due to busy lifestyle or economical reasons. Addressing the prevalence of dental caries among non autistic children in Erbil, Iraq will require increased oral health promotion for parents and teachers both at the preschool stage and primary school age to enable them to implement effective preventive regimes for their children. Improving access to dental care and encouraging uptake of dental services should also form part of any health promotion strategy for autistic and non autistic children about reducing the frequency of sugary foods and drinks in the diet, use of fluoride toothpaste, and early attendance at the dentist or dental nurse for advice and care. The males in both groups showed higher mean values of

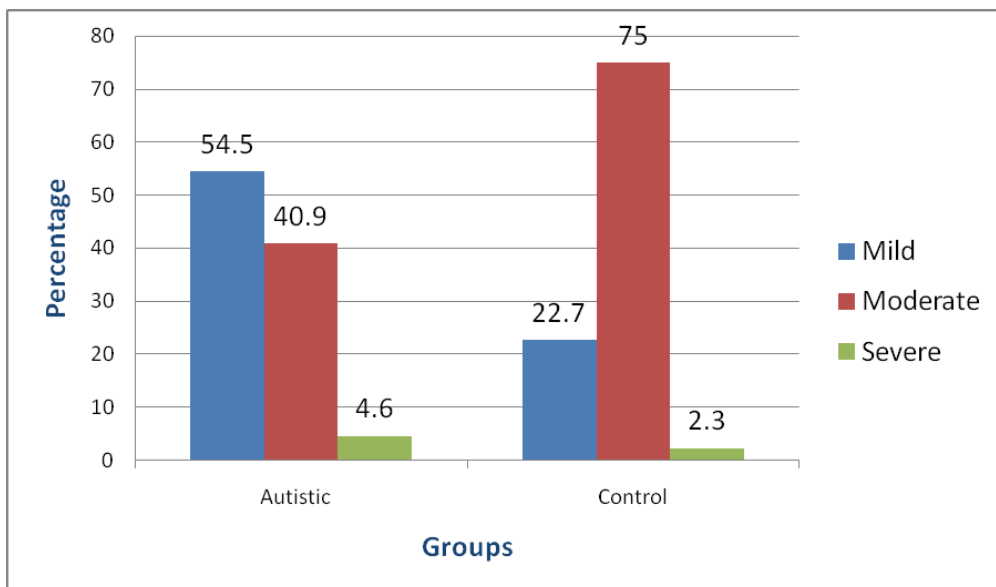


Figure 1: Severity of gingivitis in the two study groups.

OHI-S than females with a significant difference ($P = 0.042$), this may be due to the studied group showed more males than females. In present study, almost all of the autistic children had fair oral hygiene and had gingivitis. These changes could be due to lack of the necessary manual dexterity of autistic children, which result in inadequate tooth brushing. It could also be related to irregular brushing techniques because of the difficulties the trainers and the parents encountered when they brushed the children's teeth. Another possible explanation for the presence of gingivitis might be the side effects of medications used to control the autism.⁹ In this study non autistic group also experienced fair oral hygiene and gingivitis this may be due to more frequent snacking, which generates higher levels of dental plaque and gingivitis among the non autistic group. Comprehensive dental treatment under general anesthesia may be required 30 percent of the time.³¹ When dental needs are great and attempts at behavior modification are unsuccessful, general anesthesia in the operating room creates a controlled environment where care is delivered efficiently and effectively.

Conclusion

Autistic children displayed lower dmft, DMFT scores compared to control group, fair oral hygiene level, and had gingivitis than did the unaffected control children and hence non autistic children need further consideration.

Competing interests

The authors declare that they have no competing interests.

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