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Cross-Sectional Study

Comparison of Dental Caries in Autistic Children with Healthy Children

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ABSTRACT

Autism is a developmental, psycho-neurological disorder that appears at the beginning of childhood. Autism spectrum disorder is associated with an inability to social interaction and communication, limited behavioral patterns, and unusual sensory sensitivities. Considering that there are few studies related to the dental problems of autism patients and the results of the studies are contradictory, the present study was conducted to compare DMFT in 3-12-year-old children with autism and healthy children. In this case-control study, 70 children with autism and 70 healthy children with an age range of 3 to 12 years were evaluated. Gender, age, number of children, and parents' education were recorded in both groups. Finally, the DMFT of children with autism and healthy children were compared. Mann-Whitney and Chi-Square statistical tests were used to analyze the data. $P < 0.05$ was considered significant. According to the results of the study, the education level of parents, age, sex, and the number of children in the two groups did not have a significant difference ($P > 0.05$), but the DMFT indices in the group of children with autism were significantly higher than the group of healthy children ($P < 0.05$). Based on the results of the above study, the amount of DMFT index in children with autism was significantly higher than in healthy children. It is necessary to carry out preventive programs at home and in the clinic to improve the oral health of children with autism.

Keywords: Children, Dental caries, Autistic children, Healthy children

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Introduction

Autism is a type of developmental disorder characterized by abnormal speech and communication behaviors. The symptoms of this disease appear before the child is three years old. Autism affects many parts of the brain, but it is not yet clear how this happens. Autism spectrum disorder (ASD) also includes Asperger's syndrome (AS) and pervasive developmental disorder (PDD_NOS), which have milder symptoms and signs [1-3]. Autism also has a strong genetic sign, which is of course very complex and is caused by an inter-gene conflict (a group of genes) or sometimes a gene mutation. In rare cases, autism is strongly associated with early developmental trauma, which includes heavy metals in the atmosphere, pesticides, and childhood vaccinations, although the vaccine hypothesis has been biologically rejected and there is little evidence to support it [4, 5]. The prevalence of ASD is six per thousand and is four times more common in males than females. The number of affected people has been increasing sharply since 1980 and this can be due to the improvement in diagnosis and clinical items; But the question of whether the prevalence has also increased still needs to be researched [6, 7].

Damage in social interactions and communication, limited interests, and repetitive behaviors are considered a set of the most important features to diagnose autism spectrum disorder. One of the most important characteristics of people with autism is the

difficulty in communicating. The side effects of the drugs used by these patients, increase or decrease of saliva, inappropriate eating habits, things like bruxism and lack of attention to oral hygiene can cause an increase in caries and the occurrence of periodontal diseases in children with autism [8, 9].

Unfavorable oral health causes difficulty in eating and speaking, oral pain, sleep disorders, and reduced self-confidence, and as a result, it hurts health and quality of life [8, 9]. Considering the small number of available studies in this field and the contradictions in existing studies such as Yashoda *et al*. and Subramaniam and Gupta study, the present study was conducted to compare the caries experience in children with autism and healthy children [8, 10].

Materials and Methods

This cross-sectional study was conducted on children aged 3 to 12 with autism. According to census sampling, 70 children with autism and 70 healthy children were evaluated in this study. The investigated variables included the following: factors related to the demographic status and medical history of the children (age, birth rank of the child in the family, number of children, gender, and level of education of the parents). Autistic children from exceptional schools and healthy children from kindergartens and normal schools were randomly selected and matched in terms of age and gender. Inclusion criteria for autistic children are [11, 12]: patient diagnosed with autistic disorder, ability to follow simple commands such as "sit down, open your mouth, put your hand down", allowed to touch his face or examine his mouth, sign a consent form. Consciously by a parent or legal guardian. The presence of an underlying disorder with autism or the patient's lack of cooperation was one of the criteria for not entering the study [13].

DMFT index was used to check the number of extracted, filled, and decayed teeth in children's primary dental system (d: Decayed milk tooth, m: missing milk tooth, f: restored milk tooth (filled)).

Students using mirrors and probes in the light of the room (To reduce children’s sensitivity to the intense light of the examination equipment) performed examinations. Finally, the DMFT of children with autism and healthy children were compared.

The data was analyzed using SPSS software with version 23. Central (mean) and dispersion (standard deviation) indices were used to describe the data. Chi-square, Mann-Whitney, and t-test statistical tests were also used. A P-value less than 0.05 was considered significant.

Results and Discussion

140 people participated in this study, including 60 girls (42.86%) and 80 boys (57.14%), with a mean and standard deviation of age of 7.04 ± 1.95 years and an age range of 3 to 12 years. The two groups were matched in terms of sex. Age, number of children in the family, education level of parents, and d, m, f, and dmft indices were compared in two groups of autism and healthy. According to **Table 1**, the groups did not differ significantly in terms of average age (P = 0.832), parents' education (mother's education (P = 0.279) and father's education (P = 0.295)) and number of children (P = 0.397).

Table 1. Comparing the demographic status of the studied children in two groups and the level of education of the parents and the number of their children.

Variable		Children with autism	Healthy children	The result of the Mann-Whitney test
Age (Years) (Mean ± SD)		7.10 ± 2.19	6.97 ± 1.69	P = 0.832 Z = 0.21
Father's education	Diploma	20 (28.6%)	22 (31.4%)	P = 0.295 Z = 1.05
	Associate degree	13 (18.6%)	2(2.9%)	
	Bachelor's degree	23 (32.9%)	26(37.1%)	
	Master's degree	14 (20%)	20(28.6%)	
Mother's education	Under diploma	2 (2.9%)	1(1.4%)	P = 0.279 Z = 1.08
	Diploma	24 (34.3%)	21(30%)	
	Associate degree	12 (17.1%)	11(15.7%)	
	Bachelor's degree	22 (31.4%)	22(31.4%)	
	Master's degree	10(14.3%)	15(21.4%)	
Number of children (Mean ± SD)		1.50 ± 0.63	1.57 ± 0.60	P = 0.397

							Z = 0.85

According to **Table 2**, the average d-index in the healthy group was significantly lower than in the autism group (P < 0.001). The average m index in the healthy group was lower than the autism group, but the difference was not significant (P = 0.885). The average f index in the healthy group was significantly higher than the autism group (P < 0.001) and the average DMFT index in the healthy group was significantly lower than the autism group (P < 0.001).

Table 2. Comparison of d, m, f, and DMFT indices between two autistic and healthy groups.

Indicator	Group	Number	Mean ± SD	Minimum	Maximum	Median	The result of the Mann-Whitney test
d	Autism	70	3.40 ± 1.84	0	7	3	P < 0.001 Z = 6.96
	Healthy	70	1.37 ± 0.76	0	3	1	
m	Autism	70	0.59 ± 0.73	0	3	0	P = 0.885 Z = 0.14
	Healthy	70	0.54 ± 0.65	0	3	0	
f	Autism	70	0.64 ± 0.83	0	4	0	P < 0.001 Z = 5.12
	Healthy	70	1.51 ± 1.07	0	4	1	
DMFT	Autism	70	4.63 ± 2.29	0	10	5	P < 0.001 Z = 3.62
	Healthy	70	3.43 ± 1.45	0	6	3.5	

In **Table 3**, the simultaneous effect of group variables (autism/healthy), age, sex, parent's education, and number of children on dmft value can be seen. According to this table, none of the variables of age, gender, mother's education, and father's education had a significant effect on DMFT value, but the type of group was effective (P<0.001).

Table 3. The effect of gender, age, mother's education, and father's education variables on DMFT index.

Variable		Regression coefficient	t statistic	95% confidence interval		P-value
				Lower limit	Upper limit	
Group	Autism	1.178	3.635	0.537	1.820	< 0.001
	Healthy	0[a]	0	0	0	0
Gender	Female	-0.181	-0.550	-0.829	0.468	0.583
	Male	0[a]	0	0	0	0
Mother's education	Non-academic	0.334	0.790	-0.502	1.170	0.431
	Academic	0[a]	0	0	0	0
Father's education	Non-academic	0.409	0.944	-0.448	1.266	0.347
	Academic	0[a]	0	0	0	0
Age		0.110	1.312	-0.056	0.277	0.192

This study was conducted to investigate the DMFT index in 3-12-year-old children with autism and compare it with healthy children. According to the findings of the present study, the average d and DMFT indices were significantly higher in the autism group than in the healthy group. In some other studies, the rate of caries experienced in children with autism was similar to the present study and was reported to be significantly higher than the control group. These studies mentioned the reason for the mentioned difference, the weaker chewing ability and the use of drugs that cause dry mouth in children with autism [14, 15].

The results of the study conducted by Bossù *et al*. to investigate the oral health of children with autism in Italy [16], like the present study, indicated a high risk of caries among children with ASD and it was found that the average DMFT index and the prevalence of caries were from unfavorable conditions. In addition, 26.79% of the participants showed symptoms of gingivitis and about 90% had plaque. According to these researchers, eating habits are one of the causes of increased incidence of caries in these children.

Zhang *et al*. conducted another study that is consistent with the results of the present study [17]. Although, based on the results, no significant difference was

observed between children with ASD and the control group for DMFT and DMFT in the world, the subgroup analysis showed that the DMFT index in children with ASD was significantly higher than the control group in Asia. This means that in general, children with autism had worse dental health status than healthy children in Asia. Of course, it is important to mention that the researchers of this study acknowledged that due to limited studies, caution is necessary for direct analysis and conclusions.

Hariyani *et al.* published a study titled "Factors Affecting the Severity of Dental Caries among Indonesian Children with Autism Disorder [18]." The findings of this study are similar to the results of the present study and indicate that the prevalence of caries among autistic children in Surabaya city is high. In addition, researchers have linked caries severity to brushing and snacking behaviors. The authors acknowledged that caries in children with autism should be addressed and that research is needed to modify daily activities to help them engage in healthier oral hygiene behaviors.

Based on the results of the study published by Mirtala *et al*.; 68% of children with autism need help to brush their teeth [19]. Another finding of this research is that 94.3% of people with autism had oral habits, of which teeth grinding and mouth breathing were the most frequent. Naturally, the persistent dryness of the oral environment due to oral breathing is one of the causes of the increase in caries experience among children with ASD compared to healthy children, which is consistent with the present study.

The findings of this study show that the average oral health index was significantly higher in children with autism. Another thing that was stated in this study was that functional limitations could hurt the oral health of children and adolescents. On the other hand, in some other studies that compared the level of decay experience in children with autism and healthy children, no significant difference was found between the two groups [14, 20, 21].

The rate of caries experienced in children with autism in some articles was significantly lower than the control group [22, 23]. These studies have stated that the rate of caries is lower in children with autism due to the careful supervision of parents and schoolteachers on children's nutrition and oral hygiene. In a study conducted by Shapira *et al*. the cause of lower caries in children with autism is a diet with less caries-inducing power, meals that are more regular, and fewer sweets [24]. In another study conducted by Subramaniam and Gupta, the oral health condition of children with autism was evaluated [10]. According to the results obtained from this study, the caries experience in children with autism was less compared to the global standards, while a lot of caries and plaque were found in these patients.

The high sensitivity of children with autism to sound and light is one of the factors that cause these children to be afraid of attending dental centers. On the other hand, the high costs of dentistry under anesthesia cause the parents of these children to postpone the treatment. The results of a study conducted by Lai *et al*. indicated that the child's behavior, costs, and lack of insurance are among the most important obstacles to meeting the treatment needs of children with autism [25].

Since the DMFT status in this study was significantly higher in the group with autism compared to healthy children, it seems that the need to provide oral and dental health services in children with autism is greater than in healthy children. As a result, the provision of services including insurance can have a significant effect on improving the oral and dental health of children with autism. In the present study, the ratio of boys to girls was higher in the group of children with autism, which results are consistent with the study of Al-Maweri *et al*. and his colleagues in Yemen, and Pani *et al*. in Saudi Arabia [26, 27]. The reason for the higher prevalence of autism in boys is the high level of fetal testosterone, which affects the chromosomes.

In the present study, to evaluate the socio-economic status of families, the level of education of parents was investigated, and the results indicated that there was no significant difference. Considering this issue, it can be concluded that more than academic education, the families of children with autism need to receive more information and awareness about the proper way to feed children and the methods of interaction with them to visit the dentist on time. According to the results of the study, it is necessary to carry out preventive programs at home and in the clinic to improve the oral health of children with autism, and in developing countries, financial support and medical services are not provided in the field of oral and dental health. Short-term, medium-term, and long-term planning should be done for the comprehensive treatment of children with autism spectrum disorders, and it is important to pay special attention to the parents of these children. Because the performance of these parents is disturbed and many costs are imposed on the society [28, 29].

One of the limitations of this study is the lack of information about children's diet and daily brushing schedules at home. In the present study, the schools of children with autism did not consider any special arrangements for feeding and snacking of these

children, and the regulation of the diet was entirely the responsibility of the parents. In addition, parents' complete lack of knowledge about how to properly feed children with autism can be effective in the high rate of caries experienced by these children.

Conclusion

The results of the data analysis indicate that the average d and DMFT indices in the healthy group were significantly lower than in the autism group. Although the average m index in the healthy group was lower than in the autism group, the difference was not significant. The average f index in the healthy group was significantly higher than in the autism group.

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