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Comparative Evaluation of Oral Health Status in Autistic and Normal Individuals

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Abstract
Background*: Autism spectrum disorders ((ASDs)) are characterized by serious, biologically neurodevelopmental disabilities of the brain with persistent core impairments in social communication and interaction, restricted interests, and repetitive behaviors and activities. The major dental problems for autism are caries, gingival diseases, lack of motor coordination and oral habits such as bruxism, tongue thrusting, lip biting, self-injurious behavior and pica-eating objects. This study was designed to evaluate oral health among autistic children as compared to normal children.*
Patients and methods: *A total of 70 children were included in the study who attended to Orodental Genetic and Neurorehabilitation Clinics in Medical Research Center of Excellence at the National Research Center, Cairo. The children were thirty-five autistic children (group I) and thirty-five healthy children (group II). Full history, routine dental examination, caries prevalence for primary and mixed dentition and Gingival index were recorded for all studied children.*
Results: *In the current study autistic group was significantly lower in caries index (dmft) for deciduous teeth in children with primary dentition and caries index (dft) for deciduous teeth in children with mixed dentition. there was no significant difference between the two groups in caries index (DMFT) for permanent teeth in children with mixed dentition and gingival index according to criteria of Loe and Silness.*
Conclusion: *Autistic children in primary dentition showed lower dental caries than healthy children. In mixed dentition, autistic children had lower dental caries in deciduous teeth and slightly lower dental caries in permanent teeth of autistic group in comparison with control group. Gingival status showed no difference between the two groups.*
Keywords: *Autism spectrum disorders, Dental caries, Gingival diseases, Oral hygiene, Periodontal status.*

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I. Introduction

Autism spectrum disorders (ASDs) had serious, biologically neurodevelopmental disabilities of the brain characterized by persistent core impairments in social communication and interaction, restricted interests, and repetitive behaviors and activities. Symptoms typically appear in the first 2:3 years of life. According to the autism and developmental disabilities monitoring network and the Centers for Disease Control and Prevention in 2020 CDC, 1 in 54 eight years old children is diagnosed with (ASDs). Although (ASDs) affects both sexes, it is four to five times higher in males[1, 2].

Autism is a heterogeneous disorder where patients exhibit different behavioral symptoms sensory abnormalities, sleep disturbances, anger, aggressivity, self-injury (head banging, hand biting), verbal and nonverbal communication is delayed and speaking may be absent, lack of eye contact, poor response to name, a marked regression in language skills and warrant cornea all can be recognized in some cases.[3,5]

The major dental problems for autism are caries, gingival diseases, lack of motor coordination and oral habits such as bruxism, tongue thrusting, lip biting, self-injurious behavior and pica-eating objects. Children diagnosed with (ASDs) practice self-injurious behavior SIB. [5,7] The risk of dental caries and gingivitis is

expected to be higher in these patients due to improper brushing and flossing because of the difficulties the trainers and parents encounter when they brush the children's teeth or training the children how to brush. It could also be due to a lack of necessary manual dexterity for autistic children. In general, children with autism prefer soft and sweetened foods, and they tend to pouch food inside the mouth instead of swallowing it due to poor tongue coordination, thereby increasing the susceptibility to caries is expected. Also, children diagnosed with autism spectrum disorder (ASD) are prescribed psychoactive drugs or anticonvulsants, and the presence of generalized gingivitis might be the side-effects of these medications. [8,10]

Autistic children have multiple medical and behavioral problems, making their dental treatment extremely difficult. Several studies show that autistic children demonstrate self-injurious behavior (SIB), aggression, odd responses to sensory stimuli, unusual food likes or dislikes. They also have abnormalities of mood and excessive fear, causing injuries to their head, neck or mouth.[11, 12] So, this study aimed to evaluate oral health status among autistic children as compared to normal children.

II. Patients And Methods

This study was conducted on 70 children who attended to Orodental Genetic and Neurorehabilitation Clinics in Medical Research Center of Excellence at the National Research Center, Cairo. All children were divided into thirty-five autistic children (group I) and thirty-five healthy children (group II).

Ethical consideration: Approval for this research was obtained from the Research Ethics Committee, Faculty of Dentistry, Tanta University. The purpose of the present study was explained to children and their parents. Informed consents were obtained for the study and for the laboratory investigations from the parents of children and informed ascents were obtained from the children above 8 years old if it was possible according to the guidelines on human research adopted by the Research Ethics Committee, Faculty of Dentistry, Tanta University.

Inclusion criteria: All the participants were medically free except for autistic children in the study group. The study group participants suffer from idiopathic autism disorder only, the study group diagnosis was previously done by a pediatric neurologist and the autistic level was determined according to the childhood autism rating scale CARS, only relatively cooperative children were included.

Exclusion criteria: included children with secondary autism (children with autism accompanied with other conditions including tuberous sclerosis, fragile X syndrome, phenylketonuria and congenital infections secondary to rubella and cytomegalovirus, children suffered from systemic diseases known to influence dental caries or the severity of periodontal diseases such as Down's syndrome and juvenile diabetes, children had taken antibiotics or anti-inflammatory therapy since 10 days, and children performed any dental prophylaxis in the last 6 months.

All selected patients included in this study were subjected to the following: a complete medical history and drug history and personal history regarding oral hygiene practices, all patients were examined by routine dental examination was performed to assess caries using caries indices gingival diseases by gingival index according to criteria of Loe and Silness. As the child was seated on the dental chair, routine dental examination was determined using sterilized dental mirror and sterilized periodontal probe to fulfill the examination chart for hard and soft tissues at room light and flash light.

Caries prevalence was recorded **according** to Oral health surveys with the basic method of World Health Organization **(WHO 2013).** The dmft index was used for primary teeth for children with primary dentition (3-6 years). The dmft index was represented by (d): for decayed primary teeth, (m): for missed primary teeth due to caries and (f): for filled primary teeth. For children with mixed dentition, the dft index was used for primary teeth. The dft index represented by (d): for decayed primary teeth and (f): for filled primary teeth. DMFT index was used for permanent teeth. The DMFT index was represented by (D): for decayed permanent teeth, (M): for missed permanent teeth due to caries, (F): for filled permanent teeth. Gingival index was recorded according to the criteria of Loe and Silness. Loe and Silness's gingival index described the different gingival status by numbers to facilitate measuring the full mouth gingival index of the individual so, it can be easily compared with others.

Statistical Analysis: The clinical data were recorded on a report form. These data were tabulated and analyzed using the computer program SPSS (Statistical package for social science) version 25 (Armonk, NY: IBM Corp, New York, USA, 2013). Descriptive statistics included Range (%), mean (x) and standard deviation (SD). Analytic statistics included chi-square test ($\chi 2$), Independent t-test. P value<0.05 was considered statistically significant.

III. Results

In children with primary dentition, there was a significant difference in decayed deciduous teeth (d) between the two groups as the autistic group (**0.875±1.50**) had lower decayed deciduous teeth than normal children (**2.83±2.75**). the missed deciduous teeth (m) were lower in the autistic group (**0.188±0.54**) than control

group (**0.417±0.67**). the mean of filled deciduous teeth (f) were lower in autistic group (**0.063±0.25**) than control group (**0.33±0.65**). So, the caries index (dmft) in autism was (**1.13±1.96**) significantly lower than control group (**3.58±2.75**) as shown in table 1.

Table 1: Comparison between autistic & control groups in the mean of decayed (d), missed (m), filled (f) and caries index (dmft):

dmft	Autism group		Control group		t	p-value
	Mean ±S.D	Range	Mean ±S.D	Range		
d	0.875±1.50	4	2.83±2.75	9	2.413	0.023*
m	0.188±0.54	2	0.417±0.67	2	1.000	0.326
f	0.063±0.25	1	0.33±0.65	2	1.528	0.139
dmft	1.13±1.96	6	3.58±2.75	9	2.757	0.011*

*: Statistically significant at p-value ≤ 0.05.

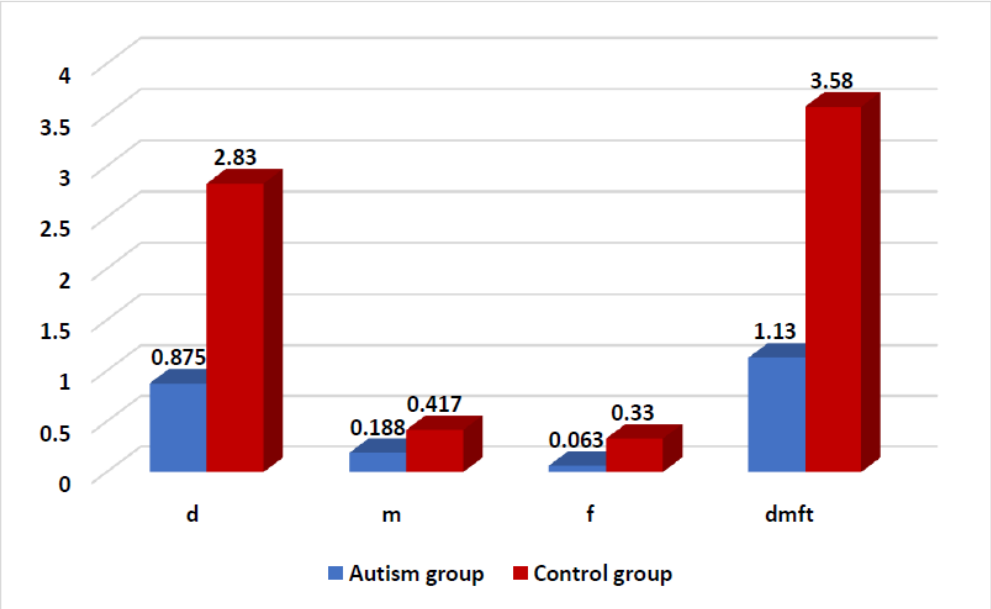

Figure 1: Comparison between autistic & control groups in the mean of decayed (d), missed (m), filled (f) and caries index (dmft).

In children with mixed dentition, autistic group (**2.95±3.49**) had lower decayed deciduous teeth (d) than control group (**4.59±2.89**). filled deciduous teeth (f) in autistic group (**0.20±0.89**) was lower than control group (**0.91±1.38**). So, the caries index (dft) in autistic group (**3.15±3.66**) was significantly lower than control group (**5.50±3.09**) as shown in table 2.

Table 2: Comparison between autistic & control groups in the mean of decayed (d), filled (f) and caries index (dft) in children with mixed dentition:

dft	Autism group		Control group		t	p-value
	Mean ±S.D	Range	Mean ±S.D	Range		
d	**2.95±3.49**	11	4.59±2.89	11	1.667	0.103
f	**0.20±0.89**	4	0.91±1.38	4	1.957	0.053
dft	**3.15±3.66**	11	5.50±3.09	13	2.253	0.030*

*: Statistically significant at p-value ≤ 0.05.

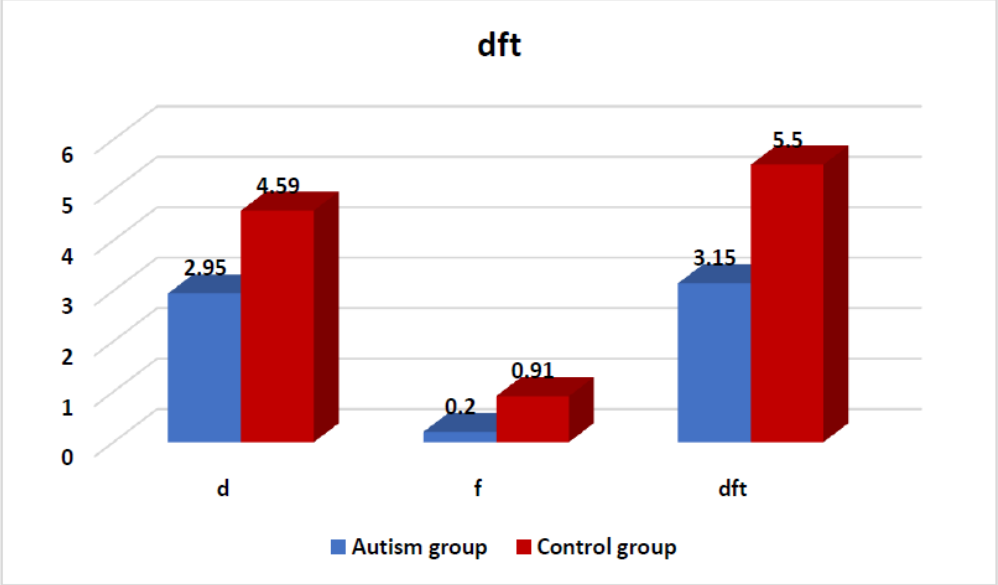

Figure 2: Comparison between autistic & control groups in the mean of decayed (d), filled (f) and caries index (dft) in children with mixed dentition.

In children with mixed dentition, decayed (D) permanent teeth were lower in autistic group (**0.21±0.63**) than control group (**0.478±0.95**). Missing (M) permanent teeth were **0** in two groups. Filled (F) permanent teeth were lower in autistic group (**0.053±0.23**) than control group (**0.16±0.34**) so caries index (DMFT) was lower in autistic group (**0.25±0.79**) than control group (**0.64±1.17**) as shown in table 3.

Table 3: Comparison between autistic & control groups in the mean of decayed (D), missed (M), filled (F) and caries index (DMFT) in children with mixed dentition:

DMFT	Autism group		Control group		T	p-value
	Mean ±S. D	Range	Mean ±S. D	Range		
D	0.21±0.63	2	0.478±0.95	3	1.053	0.299
M	0	0	0	0	--------	---------
F	0.053±0.23	1	0.16±0.34	1	0.842	0.405
DMFT	0.25±0.79	3	0.64±1.17	4	1.238	0.223

*: Statistically significant at p-value ≤ 0.05.

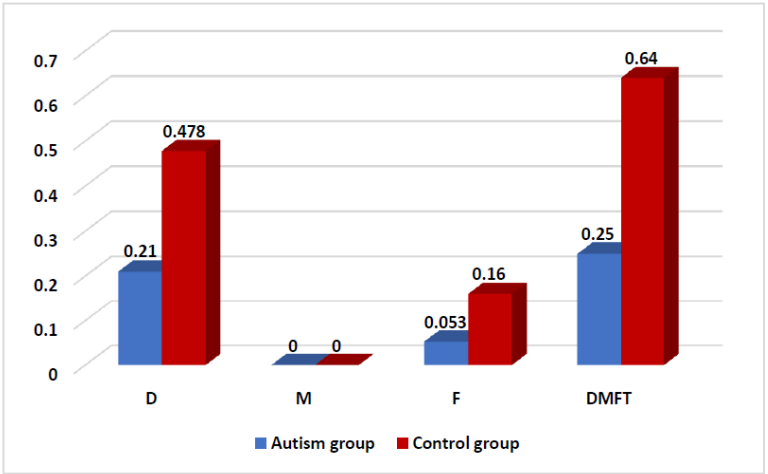

Figure 3: Comparison between autistic & control groups in the mean of decayed (D), missed (M), filled (F) and caries index (DMFT) in children with mixed dentition.

In autistic group, **21(60%)** children had normal gingiva, **3(8.6%)** children had mild gingivitis**, 11 (31.4%)** children had moderate gingivitis and there were no children with severe gingivitis. In control group, **27(77.1%)** children had normal gingiva, **4(11.4%)** children had mild gingivitis**, 4 (11.4%)** children had moderate gingivitis and there were no children with severe gingivitis. There was no significant difference in gingival index between the two groups as shown in table 4.

Table 4: Comparison in gingival index between autistic and control groups according to criteria of Loe and Silness:

grade of gingivitis	Autism group N (%)	Control group N (%)	χ^2	p-value
Normal	21(60%)	27(77.1%)	4.160	0.125
Mild	3(8.6%)	4(11.4%)		
moderate	11(31.4%)	4(11.4%)		
sever	0	0		
Total	35(100%)	35(100%)		

*: Statistically significant at p-value ≤ 0.05.

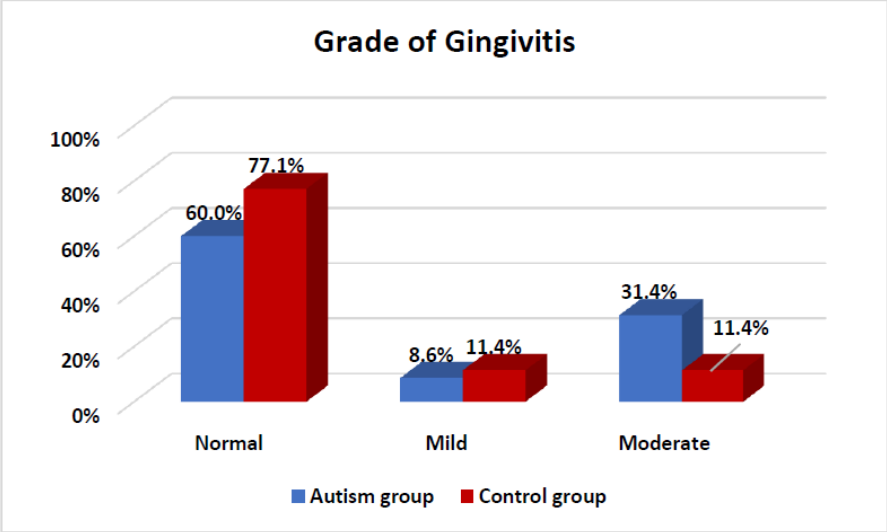

Figure 4: Comparison in gingival index between autistic and control groups according to criteria of Loe and Silness.

The gingival index in autistic group was (**0.179±0.25**) for children in primary dentition and (**0.587±0.49**) for children in mixed dentition so the gingival index in autistic group was (**0.400±0.44**). The gingival index in the control group was (**0.254±0.26**) for children in primary dentition and (**0.753±0.33**) for children in mixed dentition so the gingival index in control group was (**0.582±0.39**). There was no significant difference in gingival index between the two groups. Although the gingival index in the autistic group was lower than the control group as shown in table 5.

Table 5: Comparison in the mean of gingival index between autistic and control groups according to type of dentition:

Gingival index	Autism group		Control group		t	p-value
	Mean ±S.D	**Range**	**Mean ±S.D**	**Range**		
Primary	0.179±0.25	0.85	0.254±0.26	0.90	0.772	0.447
Mixed	0.587±0.49	1.68	0.753±0.33	1.35	1.307	0.199
Total	0.400±0.44	1.68	0.582±0.39	1.52	1.815	0.079

*: Statistically significant at p-value ≤ 0.05.

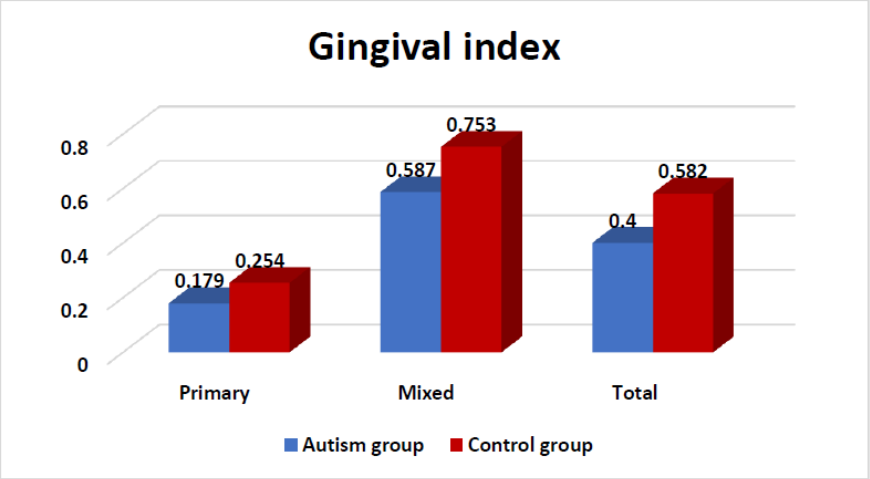

Figure 5: Comparison in the mean of gingival index between autistic and control groups according to type of dentition.

IV. Discussion

In the present study, autistic children in primary dentition were lower in caries index (dmft). In mixed dentition, autistic children were lower in caries index (dft) for deciduous teeth and were slightly lower in caries index (DMFT) for permanent teeth. Several studies come in agreement with our results as **Morales-Chávez et al. [13], Fakroon et al. [15], Jubouri et al. [16], Bassoukou et al. [17] and Vajawa. [18]**. Unchanging menu and lower cariogenic diets at meals, lower frequency of snacking and sweets between meals and lower intake of carbohydrates may all have contributed in the lower caries index in autistic children that was recorded [19.] The lower caries index in autistic group may be also, due to a protective factor in salivary properties and composition as abnormal salivary flow or high salivary phosphate levels which may play an important role in salivary buffering action and in remineralization process that may offset all other cariogenic risk factors [13, 20] Also, this may be due to the good supervision by the parents and caregivers in the daily life activities like tooth brushing and lack in between snacking. [16]

On the other hand, these results disagreed with **El Khatib et al. [7]** who found no significant difference in caries indices neither in primary nor in permanent dentition between autistic children and healthy ones. As there was no relation between autism and caries prevalence.

The current study also, disagreed with **Al-Maweri et al. [21], Jaber et al. [22], Bhandary et al. [23] and Vishnu Rekha et al. [24]** who found caries index was higher among autistic children. They suggested that, the autism caries prevalence was higher because autistic children preferred soft and sweetened foods and they tended to pouch food inside their mouth instead of swallowing it due to the poor tongue coordination, thereby increasing the susceptibility to caries. Moreover, the high dental caries risk was due to difficulties in brushing and flossing. Also, xerostomia causing medications such as methamphetamine and poor oral hygiene practices might play an important role in increasing caries indices.

Also, results of the current study revealed that, the gingival index had no significant difference between the two groups although it was lower in autistic children. This agreed with **Jubouri et al. [16]** who suggested that, the lower gingival disease might be due to the good supervision by the parents and caregivers in the daily life activities like tooth brushing and lack in between snacking. [16]

On the other hand, the results disagreed with **Al-Maweri et al. [21], Jaber [22] and Vajawat & Deepika [18]** as they found that autistic children had gingivitis and had poor oral hygiene. These might be due to irregular brushing because of the difficulties for the trainers and the parents to encounter when they brushed the children's teeth and poor hand coordination for the child himself to brush. Furthermore, the gingival diseases might be due to poor dental awareness, a dental education lack. Another possible explanation of the presence of generalized gingivitis might be the side effects of medications used to control the manifestations of autism such as psychoactive drugs or anticonvulsants, with the most common drug classes being antidepressants, stimulants, and antipsychotics.

In this study, the lower caries prevalence and gingival diseases in the autistic group may be due to the good observations and instructions was given to the parents and children in the orodental genetic clinic to increase the awareness about adequate oral hygiene measures. According to the neurorehabilitation clinic, autistic children weren't given any antipsychotic or anti convulsions medication except in severe hyperactive and epileptic autistic children. This also helps in autism lower caries and gingival indices as these medication's side effects increase caries prevalence and gingival diseases.

The limitations of the present study:

The main limitation for the current study is that the available data about the prevalence of dental diseases and access to dental care among autistic children in Egypt was inadequate. However, we could not elaborate on the reason for lower caries prevelance in autism. Thus, future studies should be directed toward the reasoning of this along with a larger sample size and long-term follow-up.

V. Conclusion

The present study suggests that autistic children have lower caries compared to controls. Autistic children require special dental management to maintain a good oral health status by maintaining efficient oral hygiene. Attempts should be made by general dentists and pedodontics to teach oral hygiene methods to these children and their care giver by constant repetition and patience, as autistic individuals can develop skills over a period of time and lead to a more productive and independent life. So, we recommended that early diagnosis of autism and pediatric psychiatrist consultation for rehabilitation programmers is mandatory which makes a big difference in the proper treatment, reducing the severity of the symptoms and so, improving the children's quality of life.

References

[1]. Keil K and Lein P. DNA methylation: a mechanism linking environmental chemical exposures to risk of autism spectrum disorders? Environmental epigenetics. 2016;2(1):1-15.

[2]. Maenner M., Shaw K and Baio J. Prevalence of autism spectrum disorder among children aged 8 years autism and developmental disabilities monitoring network, 11 sites, United States, 2016. MMWR Surveillance Summaries. 2020;69(4):1-12.

[3]. Friedlander A., Yagiela J., Paterno V and Mahler M. The neuropathology, medical management and dental implications of autism. The Journal of the American Dental Association. 2006;137(11):1517-1527.

[4]. Tzischinsky O., Meiri G., Manelis L., Bar-Sinai A., Flusser H., Michaelovski A., et al. Sleep disturbances are associated with specific sensory sensitivities in children with autism. Molecular Autism. 2018;9(1):9-22.

[5]. Loo C., Graham R and Hughes C. The caries experience and behavior of dental patients with autism spectrum disorder. The Journal of the American Dental Association. 2008;139(11):1518-1524.

[6]. Al-Sehaibany F. Occurrence of oral habits among preschool children with autism spectrum disorder. Pakistan Journal of Medical Sciences 2017;33(5):1156-1160.

[7]. El Khatib A., El Tekeya M., El Tantawi M and Omar T. Oral health status and behaviors of children with autism spectrum disorder: a case–control study. International Journal of Paediatric Dentistry. 2014;24(4):314-323.

[8]. Hegde M., Hegde N., Ashok A and Shetty S. Biochemical indicators of dental caries in saliva: an in vivo study. Caries Research. 2014;48(2):170-173.

[9]. Celecová V and Celec P. Salivary markers of oxidative stress and their relation to periodontal and dental status in children. Disease Markers. 2013;34(1):9-15.

[10]. Silva P., Troiano J., Nakamune A., Pessan J and Antoniali C. Increased activity of the antioxidants systems modulate the oxidative stress in saliva of toddlers with early childhood caries. Archives of Oral Biology. 2016;70(3):62-66.

[11]. Wei D., Zhang X., Wang Y., Yang C and Chen G. Lipid peroxidation levels, total oxidant status and superoxide dismutase in serum, saliva and gingival crevicular fluid in chronic periodontitis patients before and after periodontal therapy. Australian Dental Journal. 2010;55(1):70-78.

[12]. Sharma S., Gonda X and Tarazi F. Autism Spectrum Disorder: Classification, diagnosis and therapy. Pharmacology & Therapeutics. 2018;190(2):91-104.

[13]. Morales-Chávez M., Villarroel-Dorrego M and Salas V. Salivary Factors Related to Caries in Children with Autism. Journal of Clinical Pediatric Dentistry. 2019;43(1):22-26.

[14]. Baio J., Wiggins L., Christensen D., Maenner M., Daniels J., Warren Z., et al. Prevalence of autism spectrum disorder among children aged 8 years autism and developmental disabilities monitoring network, 11 sites, United States, 2014. MMWR Surveillance Summaries. 2018;67(6):1-23.

[15]. Fakroon S., Arheiam A and Omar S. Dental caries experience and periodontal treatment needs of children with autistic spectrum disorder. European Archives of Paediatric Dentistry. 2015;16(2):205-209.

[16]. Al-Jubouri R and Rashid M. Assessment of serum and salivary oxidative stress biomarkers with evaluation of oral health status in a sample of autistic male children. Journal of baghdad college of dentistry. 2011;23(3):56-60.

[17]. Bassoukou I., Nicolau J and Dos Santos M. Saliva flow rate, buffer capacity, and pH of autistic individuals. Clinical Oral Investigations. 2009;13(1):23-27.

[18]. Vajawat M and Deepika P. Comparative evaluation of oral hygiene practices and oral health status in autistic and normal individuals. Journal of International Society of Preventive Community Dentistry 2012;2(2):58-63.

[19]. Shapira J., Mann J., Tamari I., Mester R., Knobler H., Yoeli Y., et al. Oral health status and dental needs of an autistic population of children and young adults. Special Care in Dentistry. 1989;9(2):38-41.

[20]. DeMattei R., Cuvo A and Maurizio S. Oral assessment of children with an autism spectrum disorder. American Dental Hygienists' Association. 2007;81(3):65-76.

[21]. Al-Maweri S., Halboub E., Al-Soneidar W and Al-Sufyani G. Oral lesions and dental status of autistic children in Yemen: A case–control study. Journal of International Society of Preventive & Community Dentistry. 2014;4(3):199-203.

[22]. Jaber M. Dental caries experience, oral health status and treatment needs of dental patients with autism. Journal of Applied Oral Science. 2011;19(3):212-227.

[23]. Bhandary S and Hari N. Salivary biomarker levels and oral health status of children with autistic spectrum disorders: a comparative study. European Archives of Paediatric Dentistry. 2017;18(2):91-96.

[24]. Vishnu Rekha C., Arangannal P and Shahed H. Oral health status of children with autistic disorder in Chennai. European Archives of Paediatric Dentistry. 2012;13(3):126-131