



Oral Health Status in Autism Patients Children in Iraq

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Abstract

Background: The autism spectrum disorder (ASD) has been introduced as one of the complicated developmental disabilities impairing communication and behavioral, intellectual as well as social functioning describes diverse symptoms, such as difficulties in communication skills and social interactions. The present research has been performed to assess seriousness of the dental caries in conjunction with the oral cleanliness amongst children suffering from autism in comparison with a control group according to age groups and gender.

Materials and Methods: This research involved 30 children aged 3-14 years (male, female) who suffered from autism and attended autism centers in Welfare Children Teaching Hospital in Baghdad province, Iraq, were selected for the study compared to 30 healthy children with the same age group. Plaque (PI), Decayed, missing, and filled surfaces (dmfs, DMFS), calculus (CI) as well as Gingival (GI) indices have been applied for measuring the status of oral health for these two groups. The data of our research has been analyzed by SPSS 26.

Results: The entire autism group was caries active. For primary dentition, a lower dmfs values were recorded for study in comparison with the controls, differences have been not significant in dmfs, while for permanent dentition, a higher DMFS values were recorded for study in comparison with the control group with statistically significant concerning DMFS ($P < 0.05$). Moreover, caries experience (DS and DMFS) among both genders were higher in the study group in comparison with the controls with a significant difference in female only. Total mean value of PII in the study group has been greater than the controls with no statistically significant difference. In addition, total mean value of GI in the study group has been lower than the controls with no statistically significant difference. Furthermore, correlation coefficient between the caries experience of primary and permanent teeth with PII and GI among study and control group showed no significant correlations seen in the study and control groups, all of them were positively correlated except (ds) with (GI) in control group which was negatively correlated with no significant correlation.

Conclusion: children with ASD had higher dental caries severity regarding permanent teeth compared to normal subjects, plaque higher in autistic group than control group. Dental care planners must design preventing strategies for avoiding caries; procedures for oral care as well as educational programs for oral care and promotion for addressing diverse challenges facing the oral care in ASD.

Key Words: Autism Spectrum Disorder, Severity of Dental Caries, Oral Hygiene Status.

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Introduction

Autism is a disabled condition of variable severity that is described by obstacle in the social interactivity and communications as well as by limited or recurrent patterns of thought and

behavior which begin before the age of three and continue over a person's lifetime (WHO, 2013; Nassar et al, 2009).

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Autism is not only affecting patients but also leaves a devastating psychosocial effect on the family of the patient. Children who are diagnosed with ASDs commonly experience sleep disorders, causing difficulty for family members and caregivers because daytime behavior could be impacted by the patient's sleep patterns (Karst JS et al, 2012; Márcia C et al, 2019; Charles, J.M, 2010). Communications and behavioral issues create major challenges in presenting oral care (Batshaw, M.L et al, 2007). From the few studies regarding dental caries among patients with autism it was concluded that the prevalence and severity of this disease were higher and had weaker oral hygiene and greater periodontal diseases in those patient than in normal subjects (E.Z. Murshid, 2005; Jehan AlHumaid et al, 2020; Maurizio Bossù et al, 2020; Naidoo, M et al, 2018; Jaber, M.A, 2011). Children with autism often need extra help from parents or caregivers of children, as well as dental personnel for achieving and maintaining good health. However, there is no exception for oral health (National Institute of Dental and Craniofacial Research, 2009).

Some Iraqi study showed that dental caries severity, gingival health as well as oral hygiene decreased in the ASD group in comparison to the controls, whereas another study found that autistic cases exhibited lower DMFT scores than that of the controls, fair level of oral hygiene, and showed gingivitis in comparison to the control cases (Ali Hadi F et al, 2017; Fighan J et al, 2018). Other Investigations did not find any significant difference in pervasiveness of gingivitis, caries, and level of oral hygiene compared to the non-autistic cases (Shapira J et al, 1989; Fahlvik-Planefeldt C et al, 2001). Put differently, some reports demonstrated that the patients with ASD have been highly caries free with the less DMFT scores in comparison to the controls (Loo CY et al, 2008).

Few research has been performed concerning severity of dental caries and oral health status amongst autism cases. However, this research aimed to assess dental caries severity as well as oral health condition amongst autism children in Baghdad city. Therefore, we addressed this issue.

Material and Method

Participants included 30 children, aged (3-14) years, they have been already diagnosed with ASD, attending the autism center in Welfare Children

Teaching Hospital in Baghdad province for regular checkup and treatments. Moreover, control group included 30 healthy children matching in age and genders with the study group; selected from various schools that represented diverse geographical places in Baghdad city. Approval has been achieved from the Ministry of Health and Environment for examining autism patients and approval of the patients and their parents. In addition, clinical examinations using dental mirror and sharp dental explorer have been applied for diagnosing dental caries. Assessment and recording of caries experience were by applying DMFT and DMFS indices and (dmft, dmfs) for permanent and primary teeth based on the WHO standards (WHO, 1997). Then, oral health condition has been assessed using the plaque index (PI) of Silness and Løe (Silness J et al, 1964), as well as calculus index (CI) of Ramfjord (Ramfjord SP, 1959). Furthermore, gingival inflammation has been evaluated via the gingival Index (GI) of Løe and Silness (Løe H et al, 1963). SPSS 26 has been used for analyzing data. Descriptive measurement (mean and standard deviation) and interferential statistic involved (Student's t-test, Person's correlation coefficient,) were applied. Finally, confidence level equaled 95%.

Result

DMFS

Outputs revealed lower total mean value of (dmfs) in the study group (7.05 ± 4.26) in comparison with the controls (7.5 ± 5.06) but there has been not any significant differences between them (see Table 1). Total mean value of (ds) in (6-8) age group has been greater in the study group than the controls, which showed significant differences. Moreover, total mean value of (ms) in the study group was lower than the controls with no significant differences.



Table 1. Caries-Experience of Primary Teeth (dmfs) Amongst the Study group and Controls

| | Age Group | Gender | ds | | | ms | | | fs | | | dmfs | | |
|---------|-----------|--------|-----|-------|-------|-----|------|------|-----|------|------|------|------|-------|
| | | | No. | Mean | ±SD | No. | Mean | ±SD | No. | Mean | ±SD | No. | Mean | ±SD |
| Study | 3-5 | M | 10 | 6.7 | 4.86 | - | - | - | - | - | - | 10 | 6.7 | 4.86 |
| | | F | 4 | 5.25 | 2.99 | 1 | 4 | - | - | - | - | 4 | 6.25 | 4.79 |
| | | T | 14 | 6.29 | 4.34 | 1 | 4 | - | - | - | - | 14 | 6.57 | 4.65 |
| | 6-8 | M | 4 | 6.5 | 1.92 | 1 | 5 | - | - | - | - | 4 | 7.75 | 2.87 |
| | | F | 3 | 8.33 | 1.53 | 1 | 5 | - | - | - | - | 3 | 10 | 3 |
| | | T | 7 | 7.29* | 1.89 | 2 | 5 | 0 | - | - | - | 7 | 8.71 | 2.93 |
| | 9 & Above | M | 1 | 2 | - | - | - | - | - | - | - | 1 | 2 | - |
| | | F | - | - | - | - | - | - | - | - | - | - | - | - |
| | | T | 1 | 2 | - | - | - | - | - | - | - | 1 | 2 | - |
| | ALL | M | 15 | 6.33 | 4.17 | 1 | 5 | - | - | - | - | 15 | 6.67 | 4.34 |
| | | F | 7 | 6.57 | 2.82 | 2 | 4.5 | 0.71 | - | - | - | 7 | 7.86 | 4.3 |
| | | T | 22 | 6.41 | 3.73 | 3 | 4.67 | 0.58 | - | - | - | 22 | 7.05 | 4.26 |
| Control | 3-5 | M | 2 | 6 | 2.83 | 1 | 5 | - | - | - | - | 3 | 5.67 | 2.08 |
| | | F | 2 | 5.5 | 2.12 | - | - | - | - | - | - | 2 | 5.5 | 2.12 |
| | | T | 4 | 5.75 | 2.06 | 1 | 5 | - | - | - | - | 5 | 5.6 | 1.82 |
| | 6-8 | M | 1 | 4 | - | - | - | - | - | - | - | 2 | 3.5 | 0.71 |
| | | F | 2 | 3.5 | 3.54 | 1 | 4 | - | 1 | 2 | - | 2 | 6.5 | 2.12 |
| | | T | 3 | 3.67 | 2.52 | 1 | 4 | - | 1 | 2 | - | 4 | 5 | 2.16 |
| | 9 & Above | M | 5 | 7.4 | 4.1 | 2 | 7.5 | 3.54 | 3 | 3.67 | 2.08 | 7 | 9 | 4.24 |
| | | F | 2 | 12 | 14.14 | - | - | - | - | - | - | 2 | 12 | 14.14 |
| | | T | 7 | 8.71 | 7.04 | 2 | 7.5 | 3.54 | 3 | 3.67 | 2.08 | 9 | 6.67 | 6.34 |
| | ALL | M | 8 | 6.63 | 3.5 | 3 | 6.67 | 2.88 | 3 | 3.67 | 2.08 | 12 | 7.25 | 3.98 |
| | | F | 6 | 7 | 7.69 | 1 | 4 | - | 1 | 2 | - | 6 | 8 | 7.18 |
| | | T | 14 | 6.79 | 5.42 | 4 | 6 | 2.71 | 4 | 3.25 | 1.89 | 18 | 7.5 | 5.06 |

* significant at the level P < 0.05

DMFS

The findings revealed greater total mean of (DS, DMFS) in the study group in comparison to the controls with a significant difference only in DMFS (P >0.05). The caries experience (DS and DMFS) among both genders have been greater in the study group in comparison to the controls, which had a significant difference in female only (see Table 2). The total mean values of (DS and DMFS) in age groups (6-8) and (9 & above) have been greater in

the study group than the controls with highly significant differences in the age group (9&above). Females in age (9& above) showed higher (DS) and (DMFS) values in the study group in comparison to the controls with the greater significant differences, while males showed higher (DS and DMFS) values in the study group in comparison to the controls with the significant differences regarding DMFS only.

Table 2. DMFS in the Control and Study Group

| Group | Age Group | Gender | DS | | | MS | | | FS | | | DMFS | | |
|---------|-----------|--------|-----|-------|-------|-----|------|-----|-----|------|------|------|---------|-------|
| | | | No. | Mean | ±SD | No. | Mean | ±SD | No. | Mean | ±SD | No. | Mean | ±SD |
| Study | 3-5 | M | - | - | - | - | - | - | - | - | - | - | - | - |
| | | F | - | - | - | - | - | - | - | - | - | - | - | - |
| | | T | - | - | - | - | - | - | - | - | - | - | - | - |
| | 6-8 | M | 5 | 12 | 19.67 | 1 | 5 | - | - | - | - | 5 | 13 | 19.4 |
| | | F | 2 | 3 | 1.41 | 0 | - | - | - | - | - | 2 | 3 | 1.41 |
| | | T | 7 | 9.43 | 16.65 | 1 | 5 | - | - | - | - | 7 | 10.14 | 16.59 |
| | 9 & Above | M | 2 | 7 | 1.41 | 1 | 5 | - | - | - | - | 2 | 9.5* | 4.95 |
| | | F | 2 | 13** | 1.41 | 2 | 5 | 0 | - | - | - | 2 | 18** | 1.41 |
| | | T | 4 | 10** | 3.65 | 3 | 5 | 0 | - | - | - | 4 | 13.75** | 5.74 |
| | ALL | M | 7 | 10.57 | 16.25 | 2 | 5 | 0 | - | - | - | 7 | 12 | 16.06 |
| | | F | 4 | 8* | 5.89 | 2 | 5 | 0 | - | - | - | 4 | 10.5* | 8.74 |
| | | T | 11 | 9.64 | 13.06 | 4 | 5 | 0 | - | - | - | 11 | 11.45* | 13.35 |
| Control | 3-5 | M | - | - | - | - | - | - | - | - | - | - | - | - |
| | | F | - | - | - | - | - | - | - | - | - | - | - | - |
| | | T | - | - | - | - | - | - | - | - | - | - | - | - |
| | 6-8 | M | 3 | 2.67 | 2.08 | - | - | - | 1 | 5 | - | 4 | 3.25 | 2.06 |
| | | F | 3 | 3.33 | 2.082 | - | - | - | - | - | - | 3 | 3.33 | 2.08 |
| | | T | 6 | 3 | 1.9 | - | - | - | 1 | 5 | - | 7 | 3.29 | 1.9 |
| | 9 & Above | M | 5 | 4 | 2.35 | - | - | - | 3 | 5.33 | 0.58 | 8 | 4.5 | 1.93 |
| | | F | 5 | 3.2 | 1.3 | - | - | - | 1 | 2 | - | 6 | 3 | 1.27 |
| | | T | 10 | 3.6 | 1.84 | - | - | - | 4 | 4.5 | 1.73 | 14 | 3.86 | 1.79 |
| | ALL | M | 8 | 3.5 | 2.2 | - | - | - | 4 | 5.25 | 0.5 | 12 | 4.08 | 1.98 |
| | | F | 8 | 3.25 | 1.49 | - | - | - | 1 | 2 | - | 9 | 3.11 | 1.45 |
| | | T | 16 | 3.38 | 1.82 | - | - | - | 5 | 4.6 | 1.52 | 21 | 3.67 | 1.8 |

*significant at P < 0.05, **largely significant at P < 0.01.



Table 3 illustrates the mean values of plaque, gingival indices amongst the study group and controls by age groups and gender. The total mean value of plaque (1.1±0.58) in the study group has been greater than the controls (0.87±0.52) with no statistically significant differences. The total mean values of gingival index (0.42±0.7) in the study group have been lower than the controls

(0.44±0.58) with no statistically significant difference. Moreover, total mean value of (PII) and (GI) in age group (9 & above) has been greater in the study group than the controls with the significant differences, females in age group (9& above) showed higher (PII) value in the study group than the controls with the significant differences.

Table 3. Reports the mean value of plaque and gingival indices among study and the controls by the gender and age group

| Group | Age Group | Gender | PII | | | GI | | |
|---------|-----------|--------|-----|-------|------|-----|------|------|
| | | | No. | Mean | ±SD | No. | Mean | ±SD |
| Study | 3-5 | M | 12 | 0.94 | 0.48 | 12 | 0.18 | 0.46 |
| | | F | 4 | 0.73 | 0.29 | 4 | 0.08 | 0.17 |
| | | T | 16 | 0.89 | 0.46 | 16 | 0.16 | 0.4 |
| | 6-8 | M | 6 | 1.23 | 0.54 | 6 | 0.25 | 0.47 |
| | | F | 3 | 1.03 | 0.17 | 3 | 0.72 | 0.67 |
| | | T | 9 | 1.16 | 0.44 | 9 | 0.41 | 0.55 |
| | 9 & Above | M | 3 | 1.4 | 0.48 | 3 | 1.1 | 0.67 |
| | | F | 2 | 2.17* | 1.9 | 2 | 1.7 | 1.7 |
| | | T | 5 | 1.7* | 0.81 | 5 | 1.3* | 1.03 |
| | ALL | M | 21 | 1.1 | 0.5 | 21 | 0.33 | 0.55 |
| | | F | 9 | 1.15 | 0.77 | 9 | 0.65 | 0.96 |
| | | T | 30 | 1.1 | 0.58 | 30 | 0.42 | 0.7 |
| Control | 3-5 | M | 3 | 1.19 | 0.17 | 3 | 0.57 | 0.53 |
| | | F | 2 | 0.18 | 0.11 | 2 | 0.1 | 0.14 |
| | | T | 5 | 0.79 | 0.57 | 5 | 0.38 | 0.46 |
| | 6-8 | M | 4 | 0.76 | 0.56 | 4 | 0.1 | 0.21 |
| | | F | 3 | 1.1 | 0.81 | 3 | 0.57 | 0.58 |
| | | T | 7 | 0.9 | 0.63 | 7 | 0.3 | 0.44 |
| | 9 & Above | M | 11 | 0.91 | 0.52 | 11 | 0.49 | 0.62 |
| | | F | 7 | 0.84 | 0.46 | 7 | 0.56 | 0.76 |
| | | T | 18 | 0.89 | 0.48 | 18 | 0.52 | 0.66 |
| | ALL | M | 18 | 0.93 | 0.84 | 18 | 0.42 | 0.55 |
| | | F | 12 | 0.79 | 0.57 | 12 | 0.47 | 0.64 |
| | | T | 30 | 0.87 | 0.52 | 30 | 0.44 | 0.58 |

* significant at the level P<0.05

The correlation coefficient of the caries experience of primary and permanent teeth with PII and GI among study and control group is seen in Table 4. Concerning primary and permanent teeth, any significant association has been seen in the study

and control groups, all of them were positively correlated except (ds) with (GI) in control group which was negatively correlated with no significant correlation.

Table 4. Correlation coefficient between the caries-experience (primary and permanent teeth) and gingival, plaque indices among study and control group.

| Groups | | ds | | dmfs | | DS | | DMFS | |
|---------|-----|--------|-------|-------|-------|-------|-------|-------|-------|
| | | r | P | r | P | r | P | r | P |
| Study | PII | 0.225 | 0.314 | 0.148 | 0.512 | 0.49 | 0.126 | 0.558 | 0.075 |
| | GI | 0.33 | 0.133 | 0.344 | 0.117 | 0.292 | 0.384 | 0.334 | 0.316 |
| Control | PII | 0.258 | 0.373 | 0.293 | 0.239 | 0.061 | 0.824 | 0.01 | 0.965 |
| | GI | -0.276 | 0.34 | 0.095 | 0.708 | 0.074 | 0.786 | 0.147 | 0.526 |



Discussion

As mentioned earlier, children with autism suffer from numerous behavioral and medical concerns that need a special medical and oral care that make dental treatment difficult. Providing dental care to the ASD children needs patience and complete knowledge of the patients' level of mental disabilities and, the dental practitioner should be caring, empathetic, and conscious of the way to communicate with these patients this help for delivering oral healthcare appropriately (Charles, J.M, 2010; Chew LC et al, 2006). Not much information is available regarding the association of dental caries in relation to oral cleanliness in autism spectrum disorder, thus the present study was designed. This study recorded an increasing in the severity of dental caries DMFS for the permanent teeth have been greater among the study group compared to the controls with the significant differences and DS in the study group higher in autistic children than control with no significant difference between them. The outputs supported earlier findings on the burden of dental caries in the permanent dentition of ASD children (Naidoo, M et al., 2018; Jaber, M.A et al, 2011). The total mean values of (DMFS) and (DS) in age groups (6-8) and (9 & above) have been greater in the study group than the controls with the highly significant differences in the age group (9&above) that can result from the presence of more permanent teeth in oral cavities with increasing the age of children. The increased in caries severity with advancing age ascribed to the impact of time on the greater numbers of teeth prone to decay like the second permanent molar, erupting in the course of the adolescent age (National Institute of Dental and Craniofacial Research,1989; Naidoo, M et al,2018; Jaber, M.A, 2011; Goncalves LTYR et al., 2016; Namal N et al., 2007). Previous reports have indicated the risk increases in patients who prefer soft, sticky, or sweet foods the children frequently experience poorer muscles' tones, poorer coordination and drooling. Due to poorer tongue coordination, autistic cases usually pouch food rather than swallowing this habit, that in combination with the desire for sweetened food results in the greater sensitivity to caries; which damage oral habits; and cause difficulties in flossing and brushing, additionally compounded by food pouching at the back of oral cavity instead of swallowing it. This condition involves in the higher spread of caries in molar region of ASD children and lack of manual dexterity irregular brushing

habits causing unsuitable plaque control and elimination (National Institute of Dental and Craniofacial Research, 2009; Jaber, M.A, 2011; Goncalves LTYR et al, 2016). Investigating higher pervasiveness of dental caries amongst children with autism would need greater promotion of oral health for parents and care-providers at the pre-school and primary school age for enabling them for implementing efficient preventing methods for their children. Consultation with the families about the efficient management procedures at homes would be crucial in the overall training of autistic cases. In fact, dental health educational programs must involve information and directions on the reduction of the frequency of the cariogenic beverage and foodstuff in diets, encouragement of independence in the oral hygiene. See patients' brushing and follow up them with particular suggestions, proper oral hygiene, utilization of fluoride toothpaste, it is also important to ensure that sufficient use of preventive aids such as fluorides are being used in the office and are recommended to the patient's caregivers (National Institute of Dental and Craniofacial Research, 2009; Jaber, M.A et al, 2011). Severity of dental caries (dmfs and ds) for primary teeth decreased amongst the study group in comparison with the controls. These findings agree with other investigations that showed low spread of caries in children with autism (Ali Hadi F et al, 2017; Fighan J et al, 2018; Shapira J et al., 1989; Loo CY et al., 2008; DeMattei R et al., 2007; Orellana, L et al., 2012; Al-Rawi N et al, 2011). This finding could be related to many reasons such as special rituals or routines and distressing in case of changes in a routine, even partly and fussy eating habits, like a constant menu; therefore, they have been shown to be more regular in their behaviors at meals in comparison to the healthy cases. Hence, lack of in-between snacking, less cariogenic diet can be attributed to the decreased occurrence of caries amongst autistics (Ali Hadi F et al., 2017, Loo CY et al., 2008; Vajawat M et al., 2012). Moreover, flat occlusal surface because of bruxism as well as open proximal contact (Shapira J et al, 1989; Al-Rawi N et al, 2011). The caries experience in permanent teeth was higher in autistic male than female with no significant difference.

We showed greater total mean value of PII in the study group than the controls with no statistically significant difference. This finding may be associated with several reasons such as irregular habits of brushing due to difficulties facing parents



and trainers when brushing the children's teeth. In fact, ASD children frequently do not observe appropriate oral care procedures as a result of aversion to the existence of a tooth-brush in their mouth and lack of interest in the texture and taste of tooth-paste. In addition, less frequent brushing of teeth has been reported in them in comparison to the ones without ASD. Furthermore, this condition may result from the absence of the essential manual dexterity of autism in the course of brushing by themselves so that makes their tooth brushing ineffective (National Institute of Dental and Craniofacial Research, 1989; WHO, 1981). The current research revealed lower total mean value of GI in the study group in comparison to the controls with no statistically significant difference this finding agree with Rasheed study (Rasheed M, 2011).

In the current study, correlation coefficient between caries experience of primary and permanent teeth with PII and GI among study and control group did not show any significant correlations seen in the study and control groups, all of them were positively correlated except (ds) with (GI) in control group which was negatively correlated with no significant correlation.

Conclusion

The present study showed that all members of study group were affected by dental caries and the severity of caries-experience has been greater among the study group regarding permanent teeth than that of the controls with the statistically significant differences. Moreover, plaque index has been greater in the study than that of the controls with no statistically significant differences. Further cross-sectional and longitudinal studies are needed regarding dental caries and oral health cleanliness in addition to other dental problems regarding autistic group.

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