RESEARCH PAPER

Oral Health and Dental Caries Experience among Children Aged 7–15 with Autism Spectrum Disorder in Erbil, Kurdistan Region, Iraq

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ABSTRACT

Background: Due to behavioral, communication, and cooperation challenges, many children with Autism Spectrum Disorder experience difficulties maintaining adequate oral hygiene and accessing dental care. This study aimed to evaluate the oral health status and dental caries experience among children aged 7–15 years with ASD in Erbil Governorate, Kurdistan Region, Iraq.

Methods: A cross-sectional study was conducted among 150 children diagnosed with Autism Spectrum Disorder, age 7-15 years, who were receiving treatment at Helena Center Erbil, Erbil, Kurdistan Region, Iraq, from July 2023 to January 2024 using a convenience sampling method.

Data collected via parental/caregiver interviews and clinical oral examinations. The dental caries assessed experience using dmft/DMFT indices, as per the World Health Organization criteria; and evaluated oral hygiene and gingival health using the Plaque Index and the Gingival Index, respectively.

Results: Data were analyzed using IBM SPSS Statistics with $p < 0.05$ considered statistically significant. The mean age of participants was 10.24 ± 2.56 years, and 63.3% were male. Moderate caries experience was observed in 46.7% of children, while high DMFT scores were significantly more common among children aged 13–15 years ($p < 0.001$). Higher dmft scores were noted in the 7–9-year age group. Mean plaque index and gingival index scores indicated mild-to-moderate plaque accumulation and gingival inflammation. Poor tooth-brushing frequency was significantly associated with higher gingival index scores ($p < 0.001$).

Conclusion: Children with autism spectrum disorder in Erbil demonstrated considerable dental caries experience, mild-to-moderate plaque accumulation, and gingival inflammation. Caries experience increased with age, while gingival inflammation was significantly associated with poor tooth-brushing frequency. These findings highlight the need for preventive oral health programs, caregiver education, and individualized dental care strategies for children with Autism Spectrum Disorder.

Keywords: Autism spectrum disorder, Dental caries, Oral health; Pediatric dentistry, Plaque index.

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INTRODUCTION

Autism Spectrum Disorder (ASD) is a complicated neuro-developmental disorder of unknown cause, characterized by deficits in both social communication/interaction and by restricted/repetitive behaviours, activities & interests [(1)]. (ASD) presents as early as three years old & continues to have an impact throughout life [(2)]. Some of the signs and symptoms exhibited by children with autism include lack of non-verbal communication, lack of ability to verbally share interests/experiences, delayed or poorly developed language skills & rigid behaviours or routines. Due to these characteristics as well as associated disorders (i.e., intellectual disability, inability to vary daily routines, seizures, sensory deficits), children with (ASD) are at a significantly increased risk for developing oral and/or dental disease [(3)].

Children with ASD have a harder time keeping proper oral hygiene as a result of the challenges faced while trying to support regular toothbrushing, flossing, and attending dental visits due to behavioral and communication difficulties [(1)]. These difficulties are not only a result of the behaviors of the children, but other factors also such as dietary habits or beliefs about dental treatment can contribute to someone having poor oral health and the ability to be managed clinically [(4)]. Research examining the dental health of kids with (ASD) has provided mixed results. For instance, certain earlier studies from nations

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like the United States, Netherlands, Spain and Hong Kong have shown that children with (ASD) have a low number of dental visits, maintain good gum health, and have lower rates of experiencing cavities, though they tend to have poor oral hygiene [5]. Conversely, other more recent findings have found a much higher rate of kids with (ASD) experiencing dental cavities and gum disease, primarily due to inadequate oral hygiene pattern thereby increasing their need for dental treatment [6-8].

Children with (ASD) have complex needs that necessitate extra support in providing oral health care services; therefore, caregivers will also face major difficulties providing suitable oral health care services and providing adequate oral health care services will involve at times, more advanced management techniques (including the use of general anesthesia) [9]. These issues highlight the continuing need for other research to increase understanding of the oral health status of children with (ASD) and the development of proper preventive and management strategies [10].

The goal of the study was to examine the oral health state and dental caries among children diagnosed with autistic spectrum disorders living in Erbil. It added to present knowledge about the subject and aided in creating data to support healthcare delivery and planning within that community.

Patients and Methods

This cross-sectional study included 150 children aged 7–15 years diagnosed with (ASD). The study aimed to evaluate oral health status, dental caries experience, oral hygiene practices, dietary habits, cooperation level, and selected sociodemographic characteristics among children with (ASD). The The study was conducted at Helena Center, Erbil, Kurdistan Region, Iraq, from July 2023 to January 2024. As a government-operated institution, the center provides specialized services and support for children with special needs.

Ethical approval was obtained from the Ethics and Scientific Committee of the Research Ethics Board at the Kurdistan Higher Council of Medical Specialties (Approval No. 1222; approved on 26 June 2023). Written informed consent was obtained from the parents or legal guardians of all participants prior to data collection. Confidentiality and anonymity of all collected data were strictly maintained throughout the study.

Study Design and Setting

Participants and Sampling

Children aged 7–15 years who had been previously diagnosed with (ASD) Level 1 or Level 2 according to the criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders were eligible for inclusion in this study. All diagnoses had been established by qualified specialists at the Psychiatric Center of Erbil prior to study enrollment. Relevant medical histories and diagnostic records were accessible to the researchers through a secure and confidential database.

Participants were included only if they met the predefined eligibility criteria, which required the absence of other chronic systemic medical conditions, no history of long-term medication use, and the ability to cooperate sufficiently during oral clinical examinations. Children whose parents or legal guardians did not provide informed consent were excluded from the study.

A convenience sampling method was employed for participant recruitment. Invitation letters accompanied by informed consent forms were distributed to the parents or caregivers of eligible children. Children whose parents returned signed consent forms and fulfilled all inclusion criteria were subsequently enrolled in the study.

Data Collection and Questionnaire

A structured proforma was utilized for data collection from all participants. The data collection process comprised two principal sections. The parent/caregiver interview form was adapted from previously published studies that evaluated oral hygiene practices and oral health behaviors among children with (ASD) and their families [5,9].

Section I: Parent/Caregiver Interview

This section was completed through face-to-face interviews with parents or caregivers and included information regarding the child's gender, parental educational level, the child's level of cooperation during oral examination, toothbrushing frequency and routine, use of fluoride-containing products, and frequency of sugar consumption.

Section II: Clinical Oral Examination

Clinical oral examinations were performed to evaluate dental caries experience, plaque accumulation, and gingival inflammation among the participants. Dental caries was assessed according to the criteria established by the World Health Organization. Caries experience in the primary and permanent dentitions was recorded using the dmft (decayed, missing, and filled primary teeth) and DMFT (decayed, missing, and filled permanent teeth) indices, respectively. Oral examinations were conducted using standardized visual and tactile methods under appropriate illumination. Teeth were examined systematically, beginning from the upper right quadrant to the upper left quadrant, followed by the lower right and lower left quadrants to ensure consistency in data collection.

Oral hygiene status was assessed using the Plaque Index (PI) described by Sigurd P. Löe and John Silness (1964), while gingival health was evaluated using the Gingival Index (GI) developed by Harald Löe and John Silness (1963). Four surfaces of the selected anterior maxillary and mandibular teeth were examined for each participant using a periodontal probe. Gingival bleeding upon probing was carefully recorded, and (GI) scores ranging from 0 to 3 were assigned according to the severity of gingival inflammation. Composite scores for each participant were calculated based on the cumulative (PI) and (GI) values.

Prior to the main study, a pilot study was conducted to evaluate the clarity, reliability, and feasibility of both the questionnaire and clinical examination procedures. Following completion of the clinical assessment, individualized reports detailing each child's oral health status, dental treatment needs, and recommendations for improving oral hygiene practices were provided to parents and caregivers.

Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 27). The Shapiro-Wilk test was conducted to test for the normality of the data. Accordingly, non-parametric tests were used when applicable. The Chi-square test of association was used to compare proportions. When the expected count of more than 20% of the cells of the table was less than 5, Fisher's exact test was used. The Mann-Whitney test was performed to compare the mean ranks of the (PI) and (GI) of two groups, and the Kruskal-Walli's test was used to compare the mean ranks of (PI) and (GI) of three groups. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

There was a total of 150 children in this study. The average age (± standard deviation) of the children was 10.24 years (± 2.56), the median age was 10 years, and the ages of the children ranged from 7 to 15 years with the majority (42.7%) being between the ages of 10 and 12 years old. The sample had approximately two-thirds (63.3%) males. For fathers, 47.3% had completed college and 10% had completed graduate school. Among the mothers in the sample, 38% had graduated from college, and only 3.3% of the mothers had no formal education; additionally, 6.7% of the mothers had graduated from graduate school. (Table 1).

Table 1. Socio-demographic characteristics of the children and their parents.

	No.	%
Age (years)		
7-9	59	39.3
10-12	64	42.7
13-15	27	18.0
Mean (SD)	10.24	(2.56)
Sex		
Male	95	63.3
Female	55	36.7
Fathers' educational level		
No formal education	3	2.0
Primary	6	4.0
Secondary	25	16.7
Institute (Diploma)	30	20.0
College	71	47.3
Postgraduate degree	15	10.0
Mothers' educational level		
No formal education	5	3.3
Primary	9	6.0
Secondary	31	20.7
Institute (Diploma)	38	25.3

College	57	38.0
Postgraduate degree	10	6.7
Total	150	100.0

In 50.7 percent of children, the level of cooperation was rated positively, with a definite basis for the rating present in 3.3 percent of children. Just over one-quarter (26 percent) of children brush their teeth one time daily, and (3.3 percent) brush their teeth two or more times daily, whereas (21.3 percent) of children do not or brush their teeth infrequently. Just over one-quarter of children can brush their own teeth either (2 percent) alone or (27.3 percent) with the assistance of an adult, and (24.7 percent) need assistance from a caregiver to brush their teeth. With regard to fluoride application, (80.0 percent) of children received fluoride products, while (20.0 percent) of children received no fluoride product. Twenty-four percent (24.0 percent) of children consumed sugary food once or twice daily, and (76.0 percent) of children consumed sugary food more than twice daily. (Table 2).

Table 2. Oral hygiene and dietary habits among children with autism spectrum disorder (ASD).

	No.	%
Cooperation level		
Definitely Negative	5	3.3
Negative	64	42.7
Positive	76	50.7
Definitely positive	5	3.3
Brushing frequency		
More than once daily	5	3.3
Once daily	39	26.0
Two to three times a week	46	30.7
Once a week	28	18.7
Never or irregular	32	21.3
Tooth-brushing routine		
Alone without supervision	3	2.0
With supervision	41	27.3
With the help of caregivers	37	24.7
Only by caregivers	39	26.0
Never brush	30	20.0
Fluoride use		
Yes	120	80.0
No	30	20.0
Sugar intake		
Once or twice	36	24.0
More than twice	114	76.0

Total	150	100.0

In the age range of 13 to 15 years, caries experience was noted in many participants with over half (59.3%) having high DMFT, conversely among the age groups of 10 to 12 years and 7 to 9 years only 4.7% or 0% were reported as having high DMFT, respectively with statistical significance ($p < .001$). For primary teeth, children aged between 10-12 demonstrated the prevalence of low, moderate and high caries experience in rates of 43.8%, 15.6% and 0%, respectively, whereas children aged between 7-9 demonstrated the prevalence of low, moderate and high caries experience in rates of 20.3%, 35.6% and 37.3%, respectively. (Table 3).

Table 3. Caries status by age.

	Age (years)								
	7-9		**10-12**		**13-15**		**Total**		
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**p-value**
DMFT									< 0.001**
No caries	9	15.3%	1	1.6%	0	0.0%	10	6.7%	
Low caries experience	37	62.7%	11	17.2%	3	11.1%	51	34.0%	
Moderate caries experience	13	22.0%	49	76.6%	8	29.6%	70	46.7%	
High caries experience	0	0.0%	3	4.7%	16	59.3%	19	12.7%	
Total	59	100.0%	64	100.0%	27	100.0%	150	100.0%	
dmft									< 0.001*
No caries	4	6.8%	26	40.6%	N/A	N/A	30	24.4%	
Low caries experience	12	20.3%	28	43.8%	N/A	N/A	40	32.5%	
Moderate caries experience	21	35.6%	10	15.6%	N/A	N/A	31	25.2%	
High caries experience	22	37.3%	0	0.0%	N/A	N/A	22	17.9%	
Total	59	100.0%	64	100.0%	N/A	N/A	123	100.0%	

*Calculated by Chi-square test. **Calculated by Fisher's exact test. N/A: Not applicable because the primary teeth don't exist at this age (13-15).

No significant association was found between sex and the following: Caries experience of the permanent teeth, as assessed by DMFT ($p = 0.404$), and caries experience of the primary teeth, as assessed by dmft ($p = 0.075$). More details are presented in Table 4.

Table 4. Caries status by sex.

	Male		Female		Total		
	No.	**%**	**No.**	**%**	**No.**	**%**	**p-value**
DMFT							0.404*

No caries	6	6.3%	4	7.3%	10	6.7%	
Low caries experience	28	29.5%	23	41.8%	51	34.0%	
Moderate caries experience	47	49.5%	23	41.8%	70	46.7%	
High caries experience	14	14.7%	5	9.1%	19	12.7%	
Total	95	100.0%	55	100.0%	150	100.0%	
dmft							0.075*
No caries	18	23.4%	12	26.1%	30	24.4%	
Low caries experience	31	40.3%	9	19.6%	40	32.5%	
Moderate caries experience	18	23.4%	13	28.3%	31	25.2%	
High caries experience	10	13.0%	12	26.1%	22	17.9%	
Total**	77	100.0%	46	100.0%	123	100.0%	

*Calculated by Chi-square test. **Children aged 13-15 were excluded from the dmft analysis.

Results showed that the mean (±SD) of PI was 1.19 (±0.44), the median was 1.1, and the range was 0.5 to 3. The mean (±SD) of GI was 1.27 (±0.36), the median was 1.3, and the range was 0.6 to 2.5.

Age (p = 0.151) and the plaque index (PI), as well as gender (p = 0.480) and PI, were not significantly associated. Therefore, there were no statistically significant differences found among these variables. Please see Table 5 for further information about these results. Age (p = 0.595) and gingival index (GI) were not significantly correlated, nor was there a statistically significant correlation between gender (p = 0.725) and GI. More specific results are provided in Table 5.

Table 5. Plaque index and gingival index by age and sex.

		N	Mean	Median	Mean Rank	p-value
	Age (years)					
PI	7-9	59	1.20	1.10	76.67	
	10-12	64	1.239	1.100	80.39	0.151*
	13-15	27	1.067	1.000	61.35	
GI	7-9	59	1.30	1.30	78.68	
	10-12	64	1.26	1.30	75.52	0.595*
	13-15	27	1.25	1.10	68.52	
	Sex					
PI	Male	95	1.21	1.10	77.39	0.480**
	Female	55	1.16	1.10	72.24	
GI	Male	95	1.27	1.30	76.44	0.725**
	Female	55	1.28	1.30	73.88	

*Calculated by the Kruskal-Walli's test. **Calculated by the Mann-Whitney test.

No significant association was detected between the caries experience and the following: brushing frequency (p = 0.287) and sugar intake (p = 0.929). More details are presented in Table 6.

Table 6. Caries experience (DMFT) by brushing frequency and sugar intake.

	No caries	Low caries	Moderate caries	High caries	Total	
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**p-value**
Brushing frequency						0.287*
More than once daily	0 (0.0)	2 (40.0)	3 (60.0)	0 (0.0)	5 (100.0)	
Once daily	4 (10.3)	14 (35.9)	15 (38.5)	6 (15.4)	39 (100.0)	
Two to three times a week	4 (8.7)	16 (34.8)	22 (47.8)	4 (8.7)	46 (100.0)	
Once a week	1 (3.6)	14 (50.0)	11 (39.3)	2 (7.1)	28 (100.0)	
Never or irregular	1 (3.1)	5 (15.6)	19 (59.4)	7 (21.9)	32 (100.0)	
Sugar intake						0.929**
Once or twice	3 (8.3)	13 (36.1)	16 (44.4)	4 (11.1)	36 (100.0)	
More than twice	7 (6.1)	38 (33.3)	54 (47.4)	15 (13.2)	114 (100.0)	
Total	10 (6.7)	51 (34.0)	70 (46.7)	19 (12.7)	150 (100.0)	

The least mean and median GI were found among those who brush more than once daily (0.860 and 0.800, respectively), and among those who brush once daily (1.151 and 1.100, respectively). The highest mean and median Gingival Index scores were found among children who never brushed or brushed irregularly (1.544 and 1.500, respectively; $p < 0.001$). More details are presented in Table 7.

Table 7. Gingival status (GI) by brushing frequency

	Mean	Median	Mean rank	p-value
Brushing frequency				< 0.001*
More than once daily	0.860	0.800	22.60	
Once daily	1.151	1.100	60.90	
Two to three times a week	1.274	1.300	76.62	
Once a week	1.218	1.100	67.30	
Never or irregular	1.544	1.500	107.13	

*Calculated by the Kruskal-Wallis test.

DISCUSSION

The present cross-sectional study evaluated the oral health status, dental caries experience, plaque accumulation, and gingival health among children aged 7–15 years with (ASD) in Erbil, Kurdistan Region, Iraq. The findings demonstrated a considerable burden of dental caries together with mild-to-moderate plaque accumulation and gingival inflammation among the studied population. These observations support growing evidence that children with (ASD) represent a vulnerable group with increased oral health challenges and unmet preventive dental needs [1,6,7,10].

The predominance of male participants observed in the present study is consistent with the well-established epidemiological pattern of ASD. Narula et al. [11] similarly reported a male predominance of 61.2% among children with ASD, while Loomes et al. [12], in a large systematic review and meta-analysis, estimated the global male-to-female ratio to be approximately 3:1."

The higher prevalence of (ASD) among males has been attributed to multiple neurobiological and genetic mechanisms, including sex-linked genetic susceptibility, hormonal influences during neurodevelopment, and possible underdiagnosis of ASD in females due to differing behavioral phenotypes [12]. The present study also demonstrated that a substantial proportion of parents possessed college-level education, particularly fathers (47.3%) and mothers (38%). Despite the relatively acceptable educational background of caregivers, oral health outcomes among children remained suboptimal. This suggests that parental educational level alone may not sufficiently overcome the unique behavioral, sensory, and communication difficulties associated with (ASD) that negatively influence oral hygiene maintenance. Similar observations were reported by Zerman et al. [4,13], who emphasized that caregiver awareness alone cannot fully compensate for the practical challenges encountered during daily oral hygiene procedures in autistic children.

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Regarding oral hygiene practices, the current findings demonstrated that only 3.3% of children brushed more than once daily, whereas 21.3% either never brushed or brushed irregularly. In addition, only 2% of children were capable of brushing independently without supervision. These findings reflect the significant dependency of children with (ASD) on caregivers for oral hygiene maintenance. Behavioral resistance, impaired motor coordination, sensory hypersensitivity, communication deficits, and intolerance to oral stimulation are among the major barriers contributing to poor oral hygiene practices in (ASD) populations [4,14-16].

The dietary assessment showed that 76% of children consumed sugary foods more than twice daily. Frequent intake of fermentable carbohydrates is a recognized risk factor for dental caries because it promotes prolonged acid production by cariogenic microorganisms, resulting in enamel demineralization and caries progression. However, despite the high frequency of sugar intake observed in this study, no statistically significant association was identified between sugar consumption and DMFT scores. This finding may be explained by the multifactorial nature of dental caries, where additional factors such as fluoride exposure, salivary composition, oral clearance, caregiver-assisted oral hygiene, and previous caries history may exert stronger influences than dietary frequency alone. Similar findings were reported by Piraneh et al. [9], who also failed to identify a direct association between dietary practices and caries severity among children with (ASD).

Analysis of dental caries according to age demonstrated a highly significant association between age and caries experience in both permanent and primary dentitions. Children aged 13–15 years exhibited significantly higher permanent dentition caries experience, with 59.3% demonstrating high DMFT scores. In contrast, younger children aged 7–9 years demonstrated higher primary dentition caries severity, with 37.3% exhibiting high dmft scores. These findings are biologically plausible because DMFT scores in permanent teeth tend to increase cumulatively with age due to prolonged exposure to cariogenic challenges and the irreversible nature of untreated dental caries. Conversely, younger children commonly demonstrate greater involvement of primary teeth because of thinner enamel, inadequate oral hygiene skills, and increased exposure to cariogenic dietary habits during early childhood. Similar age-related patterns were reported by Piraneh et al. [9], who observed a statistically significant increase in DMFT scores with advancing age among Iranian children with (ASD).

The elevated prevalence of dental caries observed in the current study is in agreement with several recent systematic reviews and meta-analyses. Da Silva et al. [17] reported pooled prevalence estimates of 60.6% for dental caries among children with (ASD), while Sami et al. [6] , concluded that children with (ASD) generally exhibit poorer oral health outcomes and greater treatment needs compared with neurotypical children. Similar findings were also supported by Qiao et al. [18] and da Silva et al [18].

Similarly, Prynda et al. [7], Pi et al. [19], and da Motta et al. [20] demonstrated significantly greater caries burden and compromised oral hygiene among (ASD) populations. The high caries prevalence observed in (ASD) children may be explained by several interconnected factors. Children with (ASD) frequently exhibit restricted dietary preferences favoring soft cariogenic foods, sensory aversion to tooth brushing, reduced manual dexterity, limited cooperation during dental treatment, anxiety toward unfamiliar environments, and irregular dental attendance. Additionally, many caregivers experience considerable difficulty in maintaining consistent oral hygiene routines due to behavioral challenges associated with (ASD) [4,15,16].

Nevertheless, contradictory findings have been reported in the literature. Du et al. [21] and Jin et al. [2] reported lower caries prevalence among children with (ASD) compared with neurotypical controls. Narula et al. [10] also observed lower treatment needs and relatively better oral hygiene among (ASD) children despite poorer cooperation during dental visits. Furthermore, Bainazarova et al. [22] found no statistically significant differences in DMFT, or gingival parameters between (ASD) and non-ASD populations. Such inconsistencies among studies may be attributed to variations in study design, geographic location, socioeconomic conditions, dietary patterns, caregiver involvement, severity of (ASD) symptoms, oral hygiene practices, fluoride exposure, and accessibility to dental services. Differences in diagnostic criteria and calibration methods used for caries assessment may also contribute to the heterogeneity of findings reported across studies.

The current study demonstrated no statistically significant association between sex and dental caries experience in either permanent or primary dentitions. Similarly, (PI) and (GI) scores did not differ significantly according to age or sex. These findings suggest that oral health challenges among children with (ASD) may be influenced more strongly by behavioral and environmental factors than by demographic variables alone. Comparable findings were reported by Piraneh et al. [9], who also observed no significant gender-related differences in caries prevalence or oral hygiene parameters among children with (ASD).

The mean (PI) (1.19 ± 0.44) and (GI) (1.27 ± 0.36) observed in the present study indicated mild-to-moderate plaque accumulation and gingival inflammation. Chronic plaque accumulation is the primary etiological factor responsible for gingival inflammation, and inadequate plaque control in (ASD) children may predispose them to progressive periodontal problems over time. Difficulties with tooth brushing, limited cooperation, sensory intolerance, and caregiver-related barriers likely contributed to the observed gingival findings [7,14].

An important finding of this study was the highly significant association between brushing frequency and gingival inflammation. Children who brushed more frequently demonstrated significantly lower gingival index scores, whereas children who never brushed or brushed irregularly exhibited the highest gingival inflammation scores. This finding confirms the critical role of effective

plaque control in maintaining gingival health among (ASD) children. Regular mechanical plaque removal reduces bacterial biofilm accumulation and limits inflammatory responses within gingival tissues. Similar findings were reported by Nagda et al. [15], who emphasized the importance of supervised tooth brushing and caregiver involvement in improving oral hygiene outcomes among children with (ASD).

Interestingly, brushing frequency was not significantly associated with DMFT scores. This may reflect the cumulative and multifactorial nature of dental caries development. Unlike gingivitis, which responds relatively rapidly to changes in plaque control, dental caries progression occurs over prolonged periods and is influenced by numerous factors including fluoride exposure, salivary buffering capacity, enamel susceptibility, dietary composition, and previous caries experience. Therefore, current brushing habits may not accurately reflect long-term caries development patterns.

The findings of the present study highlight the urgent need for comprehensive preventive oral health programs specifically tailored for children with (ASD)[6,23]. Such programs should focus on caregiver education, supervised oral hygiene practices, behavioral desensitization strategies, dietary counseling, early preventive dental visits, and improved accessibility to specialized dental care services [24] . Interdisciplinary collaboration between pediatric dentists, special care dentists, psychologists, occupational therapists, and caregivers is essential to improve long-term oral health outcomes in this vulnerable population [4,6,15,25-27].

Despite the strengths of the current study, several limitations should be acknowledged. The cross-sectional design precludes establishment of causal relationships between variables. The use of convenience sampling from a single center may limit the generalizability of the findings to all (ASD) children in the Kurdistan Region or Iraq. Additionally, the absence of a control group prevented direct comparison with neurotypical children. Some variables, including dietary practices and oral hygiene behaviors, relied on caregiver-reported information and may therefore be subject to recall bias. Future multicenter longitudinal studies with larger randomized samples and control groups are recommended to further clarify the relationship between ASD-related behavioral factors and oral health outcomes. More detailed assessment of dietary patterns, salivary biomarkers, caregiver burden, and barriers to accessing dental care should also be incorporated into future studies.

CONCLUSION

Children with Autism Spectrum Disorder (ASD) aged 7–15 years in Erbil demonstrated a high burden of dental caries in both primary and permanent dentitions, along with mild-to-moderate plaque accumulation and gingival inflammation. Caries experience increased significantly with age, while poor tooth-brushing frequency was strongly associated with gingival inflammation. These findings highlight the need for early preventive oral health programs, caregiver education, supervised oral hygiene practices, and improved access to specialized dental care for children with (ASD).

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Conflict of interest

The authors declare no conflict of interest.

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