



Dental Caries Prevalence in Children with Down Syndrome and Autism Spectrum Disorder

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Background

- Down syndrome (DS), is a common genetic disorder (trisomy 21), with associated developmental delays in speech and language and an increased risk for co-occurring medical conditions. Children with DS have been found to have a lower risk of dental caries in primary dentition than the general population (1), which is thought possibly to be related to delayed eruption, morphologic anomalies leading to improved self-cleaning capacity, and increased salivary protective factors including increased pH, buffering capacity, and increased IgA concentrations, and reduced density of *Strep mutans*.
- Children with Autism Spectrum Disorder (ASD) have been found to have a higher risk of caries than the general population (2), which is thought to be related to challenging behaviors, oral sensitivities, and difficulty in adherence to oral hygiene routine, and cariogenic diet.
- The literature suggests that 16-18% of children with DS carry a dual diagnosis of DS and ASD (DS-ASD) (3). Having a dual diagnosis of DS-ASD may pose unique challenges for health habits and activities of daily living, including dental care, which require manual dexterity for self-brushing and flossing, and cooperation for caregiver-brushing and flossing. To date, no studies have assessed the risk for caries in DS-ASD children.
- Given the unique physiologic and behavioral profiles of this population, a better understanding of caries risk is essential for this potentially high-risk population.

Objectives

To assess the caries prevalence of children with Down syndrome, autism spectrum disorder, and dual diagnosis of Down syndrome and autism spectrum disorder.

Methods

In this single-center retrospective cohort study, electronic health records of 449 (0-18 years) patients with DS, ASD and DS-ASD who presented to the Boston Children's Hospital Dental Clinic between January 2012 and 2022 were reviewed.

Linear regression assessed for caries risk (DMFT/dmft and CRA score) among patients with DS, ASD, and DS-ASD as predictor variables. Models were adjusted for sociodemographic variables (age, sex, race and ethnicity), functional status variables (toileting, Frankl score, and use of protective stabilization), and dental habits (fluoride use and brushing).

Results

Variable	Total Sample N(%)	DS N=150	ASD N=149	DS-ASD N=150
Age (primary)				
<6 yrs	93 (23.66)	31 (21.99)	31 (26.72)	31 (22.79)
6-8 yrs	54 (13.74)	18 (12.77)	18 (15.52)	18 (13.24)
9-11 yrs	76 (19.34)	26 (18.44)	24 (20.69)	26 (19.12)
12-18 yrs	170 (43.26)	66 (46.81)	43 (37.07)	61 (44.85)
Age (permanent)				
5-11 yrs	126 (36.21)	44 (37.29)	42 (36.21)	40 (35.09)
12-18 yrs	222 (63.79)	74 (62.71)	74 (63.79)	74 (64.91)
Sex				
Male	294 (65.48)	98 (65.33)	98 (65.77)	98 (65.33)
Female	132 (155)	52 (34.67)	51 (34.23)	52 (34.67)
Race/Ethnicity				
White Non-Hispanic	226 (54.20)	70 (50)	59 (44.03)	97 (67.83)
Black Non-Hispanic	72 (17.27)	31 (22.14)	29 (21.64)	12 (8.39)
Hispanic	65 (15.59)	24 (17.14)	24 (17.91)	17 (11.89)
Other	23 (5.52)	3 (2.14)	11 (8.21)	9 (6.29)
NA	31 (7.43)	12 (8.57)	11 (8.21)	8 (5.59)
CRA				
Low	66 (14.73)	26 (17.45)	18 (12.08)	22 (14.67)
Medium	188 (41.96)	63 (42.28)	52 (34.90)	73 (48.67)
High	194 (43.30)	60 (40.27)	79 (53.02)	55 (36.67)
Toileting				
Yes	144 (55.56)	60 (56.60)	58 (68.24)	26 (19.55)
No	180 (59.6)	46 (43.40)	27 (31.76)	107 (80.45)
Protective Stabilization				
Yes	48 (10.84)	3 (2.01)	20 (13.42)	25 (17.24)
No	395 (89.16)	146 (97.99)	129 (86.58)	120 (82.76)
Frankl Score				
1	98 (21.92)	15 (10.00)	27 (18.12)	56 (37.84)
2	109 (24.38)	30 (20.00)	26 (17.45)	53 (35.81)
3	128 (28.64)	53 (35.33)	49 (32.89)	26 (17.57)
4	112 (25.06)	52 (34.67)	47 (31.54)	13 (8.78)
Fluoride				
Yes	410 (91.93)	139 (93.29)	141 (94.63)	130 (87.84)
No	36 (8.07)	10 (6.71)	8 (5.37)	18 (12.16)
dmft, mean (95% CI)	2.7 (2.3-3.1)	2.7 (2.0-3.6)	4.3 (3.4-5.1)	1.5 (1.0-1.9)
DMFT, mean (95% CI)	1.20 (0.90-1.52)	0.8 (0.4-1.1)	2.2 (1.4-3.0)	0.6 (0.3-0.9)

Table 1: Demographics and Clinical Findings of Children with Down Syndrome, Autism and a Dual Diagnosis of Down Syndrome-Autism

dmft total	Mean Ratio	95%CI	P-value
Study group			
DS-ASD	1.59	1.31-1.94	<0.01
DS	2.13	1.75-2.59	<0.01
ASD			
Age			
<5 yrs	1.40	1.09-1.79	<0.01
6-8 yrs	1.58	1.24-2.02	<0.01
9-11 yrs	1.41	1.12-1.77	<0.01
12-18 yrs			
Sex			
Male	0.84	0.72-0.98	0.02
Female			
Race/Ethnicity			
White Non-Hispanic	0.75	0.63-0.91	<0.01
Black Non-Hispanic	0.85	0.70-1.02	0.08
Hispanic	1.43	1.14-1.78	<0.01
Asian	0.73	0.56-0.95	0.02
Other			
CRA			
Low	2.00	1.40-2.86	<0.01
Medium	6.68	4.76-9.37	<0.01
High			
Toileting	*	*	*
Yes			
No			
Protective Stabilization			
No	0.72	0.53-0.97	0.03
Yes			
Frankl Score			
1	0.99	0.80-1.24	0.96
2	1.07	0.86-1.34	0.53
3	1.32	1.04-1.68	0.02
4			
Fluoride			
No	1.47	1.02-2.12	0.04
Yes			

Table 2: Adjusted Caries Risk in Primary Teeth for Children with DS, ASD, & DS-ASD

*Toileting was not added to this regression due to insufficient data in patient charts

DMFT total	Mean Ratio	95%CI	P-value
Study group			
DS-ASD	2.93	2.06-4.17	<0.01
DS	7.44	5.49-10.08	<0.01
ASD			
Age			
5-11 yrs	5.93	4.29-8.20	<0.01
12-18 yrs			
Sex			
Male	1.56	1.28-1.89	<0.01
Female			
Race/Ethnicity			
White Non-Hispanic	0.91	0.68-1.22	0.53
Black Non-Hispanic	1.34	1.03-1.75	0.03
Hispanic	1.06	0.68-1.65	0.79
Asian	0.37	0.18-0.74	<0.01
Other			
CRA			
Low	†	†	†
Medium			
High			
Toileting	*	*	*
Yes			
No			
Protective Stabilization			
No	0.48	0.34-0.68	<0.01
Yes			
Frankl Score			
1	0.41	0.30-0.55	<0.01
2	0.24	0.17-0.32	<0.01
3	0.17	0.13-0.24	<0.01
4			
Fluoride			
No	0.53	0.34-0.83	<0.01
Yes			

Table 3: Adjusted Caries Risk in Permanent Teeth for Children with DS, ASD, & DS-ASD

† CRA was not included due to small sample size in the first group (low)
*Toileting was not included due to limited data in patient charts

Conclusions

- Children with a dual diagnosis of DS-ASD had the lowest risk of dental caries in their primary and permanent dentition (DMFT and dmft score) compared to children with DS or children with ASD
- The increased caries risk in children with ASD may be due to behavior challenges which may delay dental exams and establishing a dental home
- The lower caries risk in children with Down syndrome (DS or DS-ASD) may be in part due to this population being closely followed by a team of medical specialists and being more likely to be referred to a pediatric dentist to establish a dental home at a younger age, due to younger age at diagnosis.
- Further research is needed to better understand the mechanisms underlying a lower caries risk for children with a dual diagnosis of DS-ASD.

References

