AJO-DO

Prevalence of malocclusion in Canadian children with autism spectrum disorder

Catherine Fontaine-Sylvestre, Annie Roy, Jean Rizkallah, Basma Dabbagh, and Beatriz Ferraz dos Santos
Montreal, Quebec, Canada

Introduction: The purposes of this study were to determine the prevalence of malocclusion among children with autism spectrum disorder (ASD) and to describe the most common malocclusion traits in this population. **Methods:** This cross-sectional study included patients diagnosed with ASD aged between 5 and 18 years. Randomly selected healthy children with the same demographic characteristics comprised the control group. Dental charts were reviewed to obtain the children's sociodemographic characteristics and type of occlusion. Information on each child's molar occlusion classification (Angle classification), midline deviation, crossbite, open bite, overbite, overjet, and crowding were recorded. The statistical analysis used descriptive analysis, the Pearson chi-square test, and multivariate logistic regression. **Results:** Ninety-nine children comprised the ASD group, and 101 children were in the control group. Our results demonstrated a significantly higher prevalence of malocclusion in children with ASD compared with the control group ($P < 0.001$). Patients with ASD were significantly more likely to have posterior crossbite ($P = 0.03$), increased overjet ($P < 0.0001$), and severe maxillary crowding ($P < 0.01$). Furthermore, children with ASD were more likely to have malocclusion than non-ASD children, independently of their demographic characteristics (odds ratio, 2.6; 95% confidence interval, 1.46, −4.65). **Conclusions:** The prevalence of malocclusion was higher among children with ASD. Posterior crossbite, increased overjet, and severe maxillary crowding were the most common malocclusion traits in these children. (Am J Orthod Dentofacial Orthop 2017;152:38-41)

Autism spectrum disorder (ASD) is a group of neurodevelopmental disorders characterized by impairments in social interaction and communication, along with repetitive and restrictive stereotyped patterns of behavior.[1] The prevalence of ASD in Canada is 1 in 94[2], and boys are 4 to 5 times more affected than girls.[3] Numerous theories have been proposed regarding the etiology of ASD; however, the exact cause is still unknown. Genetic[4-6] and environmental factors, such as intrauterine viral infections or exposure to teratogenic drugs,[7] have been suggested as possible etiologies for this condition.

A number of studies have stressed the oral health conditions of patients with ASD. It has been reported that these patients tend to have unhealthier periodontal conditions and poorer oral hygiene.[8-12] In terms of prevalence of dental caries, previous studies have yielded conflicting results. A greater caries experience among subjects with ASD has been reported.[12,13] Conversely, other studies have refuted this statement and reported similar caries prevalence[14,15] or lower caries prevalence and severity in patients with ASD.[11,16]

Studies assessing malocclusion in children with ASD have heretofore shown inconsistent results. Previous studies found a greater tendency among these children toward certain malocclusion traits such as anterior open bite.[17] Authors of another study observed a higher prevalence of deep overbite, increased overjet, and anterior crossbite in children with ASD when compared with a control group; however, these findings were not statistically significant.[18] Thus, there is a lack of consistency in regard to the malocclusion patterns of children with ASD. The objectives of this study were to describe the prevalence of malocclusion among children with ASD compared with a control group and to determine the most common malocclusion traits in this population.

MATERIAL AND METHODS

This cross-sectional retrospective study was carried out at the Division of Dentistry of the Montreal Children's Hospital in Canada. The study received approval

from the ethics committee of the McGill University Health Centre in Montreal. All patients with a medical diagnosis of ASD aged between 5 to 18 years who attended the Division of Dentistry for a complete dental examination between January 2013 and August 2015 were included in the study group. Healthy children with the same demographic characteristics who attended the division in the same period were randomly selected for the control group.

The eligibility criteria of the ASD group were (1) patients with a confirmed medical diagnosis of ASD, (2) otherwise healthy children, and (3) patients in the mixed or permanent dentition. The inclusion criteria of the control group were (1) healthy children and (2) patients in the mixed or permanent dentition. All children having another disorder or syndrome than ASD and those with previous orthodontic treatment were excluded. Incomplete files with respect to the child's diagnosis and those with illegible information were also excluded.

A comprehensive review of the records of all children included in the study was completed. Their sociodemographic characteristics such as age, sex, address, zip code, and insurance status were collected. To assess the patients' malocclusions, the molar classification (Angle Class I, Class II, or Class III) was considered. Midline deviation (maxillary or mandibular, right or left, quantity in millimeters), crossbite (anterior or posterior), open bite (anterior or posterior), overbite (percentage of coverage of the mandibular incisors by the maxillary incisors), overjet, and crowding (none, minimal, moderate, severe) were also noted. Malocclusion was defined as at least one of the following characteristics: (1) crossbite, (2) open bite, (3) severe crowding, (4) midline deviation greater than 4 mm, (5) overjet less than 1 mm (decreased) or greater than 4 mm (increased), and (6) overbite 0% or less (decreased) or greater than 65% (increased).[19-21]

Statistical analysis

Data analysis was performed using the Statistical Package for Social Sciences (version 21.0 for Windows; IBM, Armonk, NY). Descriptive analysis was performed for all variables. A comparison of the presence or absence of malocclusion traits between children with and without ASD was assessed using chi-square tests. Univariate and multivariate logistic regressions were used to calculate odds ratio (OR) and 95% confidence intervals (95% CI) for the associations between sociodemographic factors and malocclusion. Statistical significance was based on probability values of 0.05 or less.

Table I. Demographic characteristics and prevalence of malocclusion of children with and without ASD (n = 200)

Variable	ASD (n = 99)	Non-ASD (n = 101)
Sex		
Male	78 (78.8)	83 (82.2)
Female	21 (21.2)	18 (17.8)
Age (y)	11.04 ± 3.71	10.96 ± 3.77
Socioeconomic status		
1 (high)	8 (11.3)	9 (12.3)
2	9 (12.7)	5 (6.8)
3	20 (28.2)	16 (21.9)
4	24 (33.8)	33 (45.2)
5 (low)	10 (14.1)	10 (13.7)
Insurance status		
RAMQ	37 (45.1)	40 (52.6)
Private insurance	16 (19.5)	19 (20.2)
Out of pocket	29 (35.4)	35 (37.2)
Malocclusion*		
No	41 (41.4)	65 (64.4)
Yes	58 (58.6)	36 (35.6)

Categorical variables presented as number (n) and percentage (%). Continuous variables presented as mean ± standard deviation. *RAMQ*, Régie de l'assurance maladie du Québec (Quebec health insurance).
*$P = 0.002$ (Pearson chi-square test).

RESULTS

A total of 200 children were included in this study. Ninety-nine children composed the ASD group, and 101 children were in the control group (non-ASD). The children's characteristics are shown in Table I. The groups did not differ in their sociodemographic data. Most participants in both groups were boys, and the median age was 11 years. A significantly higher prevalence of malocclusion was observed among children with ASD (58.6%) compared with the non-ASD group (35.6%) ($P = 0.002$).

The distribution of malocclusion traits is shown in Table II. Midline deviation (33.5%) was the most common trait in this population. Children with ASD had significantly higher prevalences of posterior crossbite ($P = 0.03$), increased overjet ($P < 0.001$), and severe maxillary crowding ($P = 0.006$). Although not significant, a slightly higher prevalence of increased overbite was observed among the non-ASD children.

Results from the unadjusted logistic regression model (Table III) show that children with ASD were 2.55 times more likely to have a malocclusion trait than non-ASD children (OR, 2.55; 95% CI, 1.44, 4.52). Similarly, after adjusting the model for confounders, children with ASD were 2.6 times more likely to have a malocclusion than non-ASD children, independently of their demographic characteristics (OR, 2.6; 95% CI, 1.46, 4.65).