INTRODUCTION

Autism or autism spectrum disorder (ASD) is a group of neurodevelopmental disorders that may affect children at an early age. In Saudi Arabia, the reported prevalence of ASD was 18 per 10,000 live births in 2009.

In addition to self-injurious behaviors such as hitting with bare hands, banging their heads on walls and furniture, and pricking or pinching; oral habits including bruxism, tongue thrusting, lip biting, and pica (eating objects and substances such as gravel, or pens) have been reported among children with ASD. These habits may contribute to significant dental problems such as soft tissue injury, tooth loss, tooth wear, increased overjet, anterior open bite, and posterior crossbite. Furthermore, these habits are associated with skeletal and dentoalveolar deformation. The severity of deformation is related to the frequency and duration of the habit, and should be evaluated by pediatric dentists. An assessment of the prevalence of various oral habits among children with ASD and comparison non-ASD children would provide the necessary information regarding the habits in these groups and the problems associated with the oral habits. Studies investigating the prevalence of oral habits among children with ASD are relatively rare.
rare. Therefore, the aim of the present study was to
determine occurrence of oral habits among Saudi
preschool children with ASD and compare it with
healthy preschool children.

METHODS

The study protocol and consent form were
approved by the Research and Ethical Committee of
Human Studies at the College of Dentistry Research
Center (PR 0024), in King Saud University, Riyadh,
Saudi Arabia. The sample consisted of 150 SG
children (3-6 years old) and 150 age- and gender-
matched CG children. The SG was recruited from
three ASD centers randomly selected from a list
of ASD centers obtained from the Saudi Ministry
of Education. Three kindergartens were also
randomly selected from a list of kindergartens
provided by the ministry. A letter explaining the
objectives of the study and informed consent forms
were sent to the parents of the selected children
through the kindergarten principals. Parents who
agreed to participate in the study received a self-
administered questionnaire for completion.

The study was conducted over a 14-month period
between September 2014 and October 2015. The
questionnaire was derived from the oral habits
guidelines of the American Academy of Pediatric
Dentistry and was translated from English to Arabic
by a certified bilingual translator. The questionnaire
asked about the child’s gender, date of birth,
medical history, previous history of orthodontic
treatment, and previous or current oral habits. A
test-retest was performed to verify the consistency
and reliability of the questionnaire in parents of 15
SG and 15 CG children not participating in the main
study.

The data obtained from the questionnaires were
manually entered into the computer using Statistical
Package for the Social Sciences software package
(IBM, SPSS version 20, Chicago, IL, USA) and
analyzed using a significance level of P<0.05. The
statistical analyses included frequency distribution,
cross-tabulation, Fisher’s exact test, and Pearson’s
Chi-square test to compare the two groups.

RESULTS

The age of the children in each group ranged
between 3-6 years with a mean age of 4.7 ± 0.8 years
for SG and 4.4 ± 0.6 years for CG. In each group
the number of males (n=109; 73%) was significantly
(p<0.001) higher than females (n=41; 27%), the
male:female ratio was 2.7:1. Oral habits were
prevalent among 131 (87.3%) of the SG children
and 74 (49.3%) of the CG children. There were no
gender differences in both the groups, so combined
data are presented. The prevalence of oral habits for
the SG and CG children is shown in Fig.1. The most
prevalent oral habit among the SG was bruxism
(54.7%), followed by object biting (44.7%) and
mouth breathing (26.7%). Among the CG, the most
prevalent oral habits were mouth breathing (26.7%)
followed by nail biting (12%) and object biting
(4.7%). The prevalence of bruxism, object biting,
thumb sucking and tongue biting was significantly
(p<0.05) higher in the SG than the CG.

The duration (hours per day) of various oral
habits in the SG and CG is shown in Table-I. Half
of the children (50%) in the SG showed a bruxism
duration of more than one hour, while no child in
the CG showed a bruxism duration of more than
one hour. Similarly, higher number of children
in the SG showed reported object biting duration
(n=29) and tongue biting duration (n = 10) of
more than one hour daily than the CG (n=6 and 0,
respectively).

The pattern of oral habits (while asleep, awake
or both) for the SG and CG children are shown
in Table-II, A majority in the SG reported bruxism
while awake (69.5%). Similarly, majority of the
children in the SG reported object biting while
awake (97%). Whereas all of the CG children with
bruxism and object biting reported performing the
habits while awake.

Fig.1: The prevalence of oral habits in the SG and CG.
SG: study group, CG: control group,
TS: thumb sucking, PS: pacifier sucking,
TB: tongue biting, LB: lip biting, OB: object biting,
NB: nail biting, MB: mouth breathing, BX: bruxism.
The time length (in years) of the oral habits in the SG and CG children is shown in Table-III. A majority in the SG had bruxism for more than one year (82.9%). Similarly, majority of the children in the SG had the habits of tongue biting (100%), object biting (64.6%) and thumb sucking (64.6%) for more than two years. The time length of all the oral habits in the majority of CG children, was more than one year.

### Table-I: The duration per day of oral habits in the SG and CG.

| Oral Habit | Group | ≤ 1 hr. n (%) | > 1 - 3 hrs. n (%) | > 3 - 6 hrs. n (%) | > 6 hrs. n (%) | P value |
|------------|-------|---------------|-------------------|-------------------|---------------|---------|
| TS         | SG    | 11 (64.6)     | 2 (11.8)          | 2 (11.8)          | 2 (11.8)      | < 0.001 |
|            | CG    | 0 (0.0)       | 4 (80.0)          | 0 (0.0)           | 1 (20.0)      |         |
| PS         | SG    | 0 (0.0)       | 2 (100.0)         | 0 (0.0)           | 0 (0.0)       | < 0.001 |
|            | CG    | 0 (0.0)       | 3 (100.0)         | 0 (0.0)           | 0 (0.0)       |         |
| TB         | SG    | 2 (16.7)      | 1 (8.3)           | 8 (66.7)          | 1 (8.3)       | < 0.001 |
|            | CG    | 4 (100.0)     | 0 (0.0)           | 0 (0.0)           | 0 (0.0)       |         |
| LB         | SG    | 4 (100.0)     | 0 (0.0)           | 0 (0.0)           | 0 (0.0)       | < 0.001 |
|            | CG    | 0 (0.0)       | 0 (0.0)           | 0 (0.0)           | 0 (0.0)       |         |
| OB         | SG    | 38 (56.7)     | 27 (40.3)         | 2 (3.0)           | 0 (0.0)       | < 0.001 |
|            | CG    | 6 (10.2)      | 6 (10.2)          | 0 (0.0)           | 0 (0.0)       |         |
| NB         | SG    | 14 (93.3)     | 1 (6.7)           | 0 (0.0)           | 0 (0.0)       | < 0.001 |
|            | CG    | 2 (100.0)     | 0 (0.0)           | 0 (0.0)           | 0 (0.0)       |         |
| MB         | SG    | 1 (2.5)       | 26 (65.0)         | 3 (7.5)           | 10 (25.0)     | < 0.001 |
|            | CG    | 1 (25.0)      | 1 (25.0)          | 2 (50.0)          | 1 (25.0)      |         |
| BX         | SG    | 2 (50.0)      | 26 (65.0)         | 12 (25.0)         | 3 (7.5)       | < 0.001 |
|            | CG    | 1 (25.0)      | 26 (65.0)         | 12 (25.0)         | 0 (0.0)       |         |

SG: study group, CG: control group, TS: thumb sucking, PS: pacifier sucking, TB: tongue biting, LB: lip biting, OB: object biting, NB: nail biting, MB: mouth breathing, BX: bruxism.

### Table-II: The pattern of oral habits in the SG and CG.

| Oral Habit | Group | While asleep n (%) | While awake n (%) | Both n (%) | P value |
|------------|-------|--------------------|------------------|------------|---------|
| TS         | SG    | 2 (11.8)           | 11 (64.6)        | 4 (23.6)   | < 0.001 |
|            | CG    | 0 (0.0)            | 0 (0.0)          | 5 (100.0)  |         |
| PS         | SG    | 0 (0.0)            | 0 (0.0)          | 2 (100.0)  | 0.480   |
|            | CG    | 2 (66.7)           | 0 (0.0)          | 1 (33.3)   |         |
| TB         | SG    | 1 (8.3)            | 1 (8.3)          | 10 (83.4)  | < 0.001 |
|            | CG    | 3 (75.0)           | 1 (25.0)         | 0 (0.0)    |         |
| LB         | SG    | 1 (25.0)           | 0 (0.0)          | 3 (75.0)   | < 0.001 |
|            | CG    | 0 (0.0)            | 0 (0.0)          | 0 (0.0)    |         |
| OB         | SG    | 65 (97.0)          | 2 (3.0)          | 67 (100.0) | < 0.001 |
|            | CG    | 0 (0.0)            | 7 (100.0)        | 0 (0.0)    |         |
| NB         | SG    | 15 (100.0)         | 0 (0.0)          | 15 (100.0) | < 0.001 |
|            | CG    | 0 (0.0)            | 18 (100.0)       | 0 (0.0)    |         |
| MB         | SG    | 25 (62.5)          | 3 (7.5)          | 12 (30.0)  | < 0.001 |
|            | CG    | 8 (20.0)           | 2 (5.0)          | 30 (75.0)  |         |
| BX         | SG    | 9 (11.0)           | 57 (69.5)        | 16 (19.5)  | < 0.001 |
|            | CG    | 0 (0.0)            | 3 (100.0)        | 0 (0.0)    |         |

SG: study group, CG: control group, TS: thumb sucking, PS: pacifier sucking, TB: tongue biting, LB: lip biting, OB: object biting, NB: nail biting, MB: mouth breathing, BX: bruxism.
DISCUSSION

The present study has provided important baseline information on the occurrence of oral habits in a group of Saudi preschool children with ASD. Development of dental occlusion is strongly influenced by environmental factors such as oral habits. Early diagnosis and successful treatment of oral habits is pivotal in the development of occlusal harmony and function. Therefore, intervention leading to oral habits cessation should be initiated as early as possible.

There are several reasons why the children with ASD receive limited oral health care including preventive care. These reasons include lack of knowledge and experience regarding ASD among dental professionals and a low priority for preventive oral health care on part of the parents. A better understanding of the behavioral effects of ASD and existing oral habits may help dental practitioners deliver preventive oral health care empathetically and appropriately.

The present study found that bruxism was the most prevalent oral habit in the SG. Furthermore, the duration and time length of bruxism were higher in the SG. Studies have reported that bruxism is a common habit among children with ASD. Bruxism in children with special healthcare needs may result in excessive wear of dentition, and temporomandibular joint (TMJ) pain. The use of splints or behavioral modification techniques to treat bruxism may be limited in children with ASD due to their poor intellectual skills and communication difficulties. Intraoral appliances, such as splints, may become an aspiration hazard for children with ASD. Therefore, pharmacological treatment has been recommended ranging from injection of botulinum toxin to the use of central nervous system medication.

In the present study, significant differences in the prevalence of bruxism, object biting, thumb sucking, and tongue biting was observed between the SG and CG. Higher prevalence of bruxism, object biting and thumb sucking habits among the SG may lead to TMJ pain and malocclusion. The resulting TMJ pain and malocclusion require specialists’ consultation and treatment, resulting in high financial expenses for parents of the children with ASD. The higher prevalence of tongue and object biting in the SG may also be attributed to the altered pain tolerance or expression that has been reported in children with ASD.

Pediatric dentists can expect to face the challenge of providing preventive dental care to an increasing number of children with ASD. A reduced oral health-related quality of life as perceived by the parents of Saudi children with ASD has been documented. This could be attributed to fact that the parents are overwhelmed by the medical and behavioral problems of their ASD children, resulting in lower priority to dental health. Therefore, the provision of preventive dental care and increasing dental health knowledge of the parents of ASD children is of vital importance.

CONCLUSIONS

The most prevalent oral habit in the SG was bruxism, whereas the most prevalent oral habit in the CG was mouth breathing. The prevalence of bruxism, object biting, thumbs sucking and tongue biting was higher in the SG than in the CG.

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REFERENCES

1. Boyd BA, Odom SL, Humphreys BP, Sam AM. Infants and toddlers with autism spectrum disorder: early identification and early intervention. J Early Interv. 2010;32(2):75-98. doi: 10.1177/1053815110362690.
2. Al-Salehi SM, Al-Hifthy EH, Ghaziuddin M. Autism in Saudi Arabia: presentation, clinical correlates and comorbidity. Transcult Psychiatry. 2009;46(2):340-347. doi: 10.1177/1363461509105823.
3. Weddell J, Sanders BK, Jones JE. Dental problems of children with special health care needs, ’Dentistry for the Child and Adolescent’ (ninth edition), McDonald RE & Avery DR (Eds), Mosby, St. Louis, MO. 2011;pp 460-486.
4. Medina AC, Sogbe R, Gómez-Rey AM, Mata M. Factitial oral lesions in an autistic paediatric patient. Int J Paediatr Dent. 2003;13(2):130-137. doi: 10.1046/j.1365-263X.2003.00440.x.
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5. Bell RA, Dean JA, McDonald RE, Avery DR. Managing the developing occlusion, ‘Dentistry for the Child and Adolescent’ (ninth edition), McDonald RE & Avery DR (Eds), Mosby, St. Louis, MO. 2011; pp 550-613.

6. American Academy of Pediatric Dentistry. Oral health policies. Guidelines on oral habits, Reference Manual. 2008;30(7):51-52.

7. Warren JJ, Bishara SE, Steinbock KL, Yonezu T, Nowak AJ. Effects of oral habits’ duration on dental characteristics in the primary dentition. J Am Dent Assoc. 2001;132(12):1685-1693. doi: 10.14219/jada.archive.2001.0121.

8. Bharathi BM, Acharya S, Bhat M. Oral health status and treatment needs of children attending special schools in South India: a comparative study. Spec Care in Dentistry. 2010;30(6):235-241. doi: 10.1111/j.1754-4505.2010.00160.x.

9. Waldman HB, Perlman SP, Wong A. Providing dental care for the patient with autism. J Calif Dent Assoc. 2008;36(9):662-670.

10. Chew LC, King NM, O’Donnell D. Autism: the aetiology, management and implications for treatment modalities from the dental perspective. Dent Update. 2006;33(2):70-72.

11. Schreck KA, Mulick JA. Parental report of sleep problems in children with autism. J Autism Dev Disord. 2000;30(2):127-135. doi: 10.1023/A:1005407622050.

12. Monroy PG, da Fonseca MA. The use of botulinum toxin-a in the treatment of severe bruxism in a patient with autism: a case report. Spec Care Dentist. 2006;26(1):37-39.

13. Muthu MS, Prathibha KM. Management of a child with autism and severe bruxism: a case report. J Indian Soc Pedod Prev Dent. 2008;26(2):82-84. doi: 10.4103/0970-4388.41623.

14. Lobbezoo F, Van Der Zaag J, Van Selms MK, Hamburger HL, Naeije M. Principles for the management of bruxism. J Oral Rehab. 2008;35(7):509-523. doi: 10.1111/j.1365-2842.2008.01853.x.

15. Loo CY, Graham RM, Hughes CV. The caries experience and behavior of dental patients with autism spectrum disorder. J Am Dent Assoc. 2008;139(11):1518-1524. doi: 10.14219/jada.archive.2008.0078.

16. Murshid EZ. Parents’ dental knowledge and oral hygiene habits in Saudi children with autism spectrum disorder. Global J of Med Research. 2014;14(2):11-18.

17. Pani SC, Mubarak SA, Ahmed YT, Alturki RY, Almahfouz SF. Parental perceptions of the oral health-related quality of life of autistic children in Saudi Arabia. Spec Care Dentist. 2013;33(1):8-12. doi: 10.1111/j.1754-4505.2012.00294.x.

18. Rada RE. Controversial issues in treating the dental patient with autism. J Am Dent Assoc. 2010;141(8):947-953. doi: 10.14219/jada.archive.2010.0308.