

Unmet Dental Needs and Behavior of Children with Autism Spectrum Disorder in Uttar Pradesh, India

Chawla Sakshi¹, Goswami Mousumi², Sangal Aayushi³

1. Post Graduate Student, Department of Pediatric & Preventive Dentistry, ITS Dental College, Hospital & Research Centre, Greater Noida.
2. Prof & Head Department of Pediatric & preventive dentistry, ITS Dental College, Hospital & Research Centre, Greater Noida.
3. Post Graduate Student, Department of Pediatric & Preventive Dentistry, ITS Dental College, Hospital & Research Centre, Greater Noida.

Abstract

Objective: Unmet Dental needs and behavior of children with Autism Spectrum Disorder in Uttar Pradesh, India. **Materials and Method:** 81 children with ASD attending special children school in Noida were included. WHO criteria (2013) was utilized to assess def, DMF, Dental Trauma. Oral hygiene was assessed with Plaque index and its modification for primary dentition. The expressed behavior of the child was noted using Frankl's behavior rating scale. Data obtained was subjected to statistical analysis. **Results:** Our study assessed the Dental treatment needs that were unmet based on the observed oral health status and behavior expressed by children towards dental check-up. Majority (69%) of the children required prompt dental treatment, 8% required immediate care. Only 39.74% of children were Caries free; children had fair oral hygiene as the mean plaque index (PI) was 1.74. **Conclusions:** Autistic Children under the sample had significantly more caries, fair oral hygiene and urgent treatment needs. The study highlights the prompt need of establishing measures for efficient oral hygiene practices. Such efforts will the disease the burden of comorbidly occurring oral diseases. **Keywords:** Autism, Dental caries, Oral hygiene, behavior, Dental Treatment needs.

Address for correspondence: Dr Sakshi Chawla Post Graduate Student (MDS) Department Of Pediatric & Preventive Dentistry, ITS Dental College, Hospital & Research Centre, Greater Noida Email : sakshichawla21@yahoo.co.in Phone : +91-9711120059

Date of Acceptance: 06/04/2021

Introduction

Autism Spectrum Disorder also referred as Autism was described first by Leo Kanner, a Child Psychologist in the year 1943. It is a lifelong and severe neurodevelopmental disorder categorized by qualitative impairments in social interaction, communication ability, with stereotyped and repetitive patterns of behavior.^[1] Peculiarities that aid in diagnosis are through medical, psychological and neurological examination with the fact that it starts very early in life (before the age of 3 years).^[2] Manifestations of

autism can be observed in the first year of life, but only 20% of the parents detect and report abnormal psychomotor development of their child.^[3,4] The data on prevalence reported by Centre for disease control and prevention (US) is 5.7 per 1000 in National Health Interview Survey and 5.5 per 1000 in National Survey of Children's health.^[5] Studies across the world reported a calculated prevalence as follows: Australia 6.25 in 1000, Canada 1 in 154, China: 1.1 in 1000, Denmark nearly 9 in 1000, Finland: 1 in 833, Iceland: 1 in 769, India 1 in 250, Japan: nearly 3 in 1000, Mexico: 2 to 6 per 1000, Philippines: 500,000 total children, Sweden: 1 in 188, US: 1 in 110.^[6,7] There exist

gender predilection where males are being affected more than females in the ratio of 4:1.^[8] Although the prevalence of autism is rising globally, there is great disparity in published data regarding its prevalence in India. Recent researches put emphasis on the environmental factor and consider them to be as important as the genetic factors which was the only hypothesized etiology so far.^[9] Studies report^[10,11] no exclusive oral manifestation in children with autism, however their oral cavity presents some particular characteristics due to the behavioral issues, limited communication, personal negligence, self-injurious habits, eating preferences, effects of medication, resistance to oral hygiene practices, and hyposensitivity to pain. It has been observed that children prefer sweet, soft and sticky food and therefore have more susceptibility to dental caries.^[9] Limitation in performing effective tooth brushing and oral hygiene measures due to weak oral musculature complicates the situation and predisposes these children to dental caries and poor oral health status.^[12,13] With no published study about the oral health status of children with autism in sample population, this study was planned and conducted to assess the unmet Dental needs based on evaluating the oral health and behavioral attitudes of children with autism spectrum disorder. This information would enable pediatric dentists to plan and provide prompt preventive and appropriate therapeutic approaches for such children.

Materials and Methods

This cross-sectional study was planned in Department of Pediatrics and Preventive Dentistry, I.T.S Dental College, Greater Noida and conducted in randomly selected three special schools of Uttar Pradesh. Schools were exclusively catering to children having Autism for seeking education and behavioral therapy. An ethical clearance was obtained from an independent ethical committee of ITS Dental College, Greater Noida (ITSDCGN/2018/001) and Permission was obtained from the Principals of selected schools. SAMPLE SELECTION: Children in the age group 2–17 years with a confirmatory diagnosis of autism in the school records were enrolled. A total of 81 children participated in the study, of which examination of 78 children could be performed.

There were 67 boys and 14 girls. Training and calibration of investigators was done in Department of Pediatrics and Preventive Dentistry, ITS Dental College, Greater Noida. Agreement for the examination amongst investigators was found to be good (Kappa values > 0.70).

Inclusion Criteria

1. Autistic children present on the day of examination were included in the study.
2. With parent's consent and assent obtained from children/Individual.

Exclusion Criteria

1. Those who were not willing to participate or unwell were excluded.
2. Children with the effects of long-term medications.

Dental Examination The oral examination was conducted by trained pediatric dentist by seating them on the school chair under daylight. Protective cross infection control measures such as disposable gloves and masks, sterile mouth mirror and CPITN probe was used for checkup. Help of teachers/caregiver were utilized for communication with the children. During examination, the 'Tell-show-feel and do' technique was employed.^[11]

For Oral Health assessment, WHO Oral Health Assessment Form (2013), modified version of original 1997 was used.^[14] Information collected through this form included general information pertaining to participant's name, date of birth, age, and gender.

Clinical assessment included

1. Recording of dentition status for caries (the deft/DMFT index), Dental trauma.
2. Plaque Index (Silness and Loe 1964) was recorded on six indexed teeth.^[15]
3. Frankel behavior Rating Scale was assessed towards dental check-up.^[16]
4. Intervention urgency / treatment needs were also mentioned according to the type of treatment required for an individual.

After the examination, children in need of dental treatment were referred to the Hospital. A copy summarizing the child's oral health and advised treatment was given to the Parents/Caregivers/Teacher.

Data Analysis

Data was entered into Microsoft Excel spreadsheet and then checked for any missing entries. It was analyzed using Statistical Package for Social Sciences (SPSS) version 21. Categorical variables were summarized as absolute & relative frequencies and continuous variables were summarized as mean and standard deviation. Normality of the continuous variables was checked by Shapiro Wilk test. Thus, inferential statistics were performed using parametric tests of significance. The level of statistical significance was set at 0.05.

Results

The sample comprised 67 boys (82.7%) and 14 girls (17.3%) diagnosed with Autism spectrum disorder with the mean age of 13.4 yrs. Our sample was distributed among gender in the ratio of 6.2:1. Investigators were able to examine oral cavity of 78 children as 3 children were noncompliant.

Dental Caries among the children with Autism Spectrum Disorder

Table 1 shows mean deft/DMFT across different age group, which describes that females in the age group (0-5yrs) had higher def of 1.66 than males (0.2). The mean caries (def & DMFT) accounts to be 1.72.

Table 1: Mean and Frequency of def/DMF across gender and age group.

Age category		Mean def			Mean DMF		
Years	Total	Male	Female	Frequency	Male	Female	Frequency
0 to 5	8	0.2	1.66	2 (25%)	0	0	0
6 to 8	10	0.43	1	6 (60%)	0	0	0
9 to 11	17	0.61	0.5	10 (59%)	0.5	0	9 (53%)
12 & above	43	0.03	0	0 (0%)	0.63	0.4	26 (60%)

The deft distribution across age group was statistically significant ($p = 0.001$) (Table 1) & DMFT distribution was also statistically significant ($p = 0.020$) across age depicting caries experience of children increased as the age progress both in primary & permanent dentition. (Table 1).

Dental Trauma among children: Trauma to dentition was noted as per to WHO criteria i.e., Number of teeth affected with traumatic injury to dentition. 2 males and 2 females (6.15%) had traumatic experience affecting their permanent

dentition (Table 2). The cases of trauma observed was independent of age-distribution of the children included in the study ($p = 0.935$).

Table 2: Children experiencing trauma in the sample studied.

Autistic Children (N = 78)				
Age (in years)	Total	No teeth affected	1 teeth affected	2 teeth affected
0- 5	8	8	0	0
6 – 8	10	10	0	0
9 – 11	17	16	1	0
12 and above	43	40	2	1

(WHO form 2013 accounts the number of teeth affected with trauma irrespective of the extent of trauma to individual teeth)

Oral hygiene assessment (By Plaque Index)

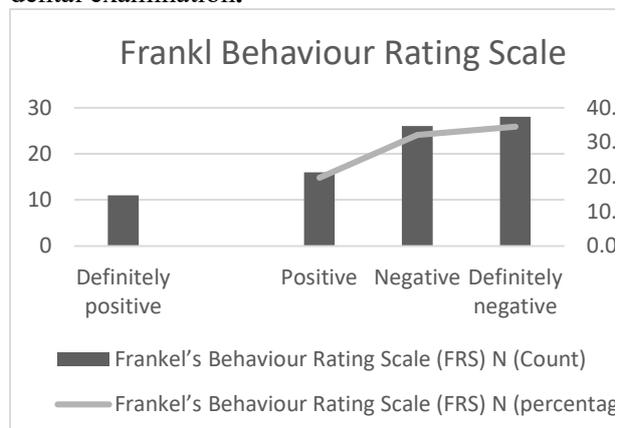
A relatively simpler technique of assessing oral hygiene is evaluating Dental Plaque. Plaque index (Silness and Loe 1964) was assessed on the six indexed teeth & their modification. No teeth were substituted. The mean Plaque score in autistic children was 1.76. Estimated Plaque score was significantly associated across age-groups formulated for the study ($p = 0.001$). Boys under the age group 12 & above had poorer plaque score as compared to the peer girls.

Table 3: Plaque score in children (N=78)

Age(in years)	Total	Good	Fair	Poor
0 – 5	8	0	6 (75%)	2 (25%)
6 – 8	10	1 (10%)	8 (80%)	1 (10%)
9 – 11	17	0	6 (36%)	11 (64%)
12 and above	43	0	11 (26%)	32 (74%)

Behaviour exhibited by children for Dental Check-up. The behaviour towards the Dental Examination was noted with Frankel's Behaviour Rating scale. However, the expressed behaviour is independent of the age distribution ($p = 0.698$).

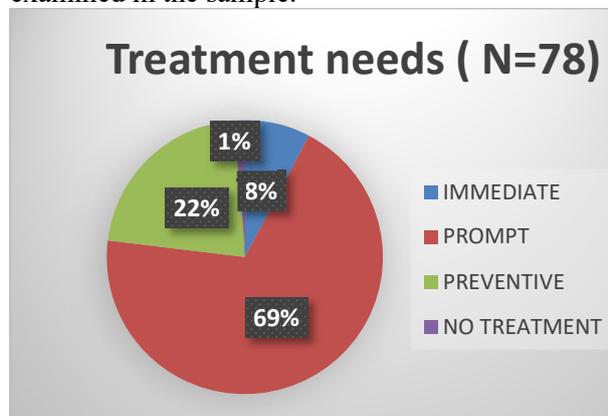
Figure 1: Frankl’s behavior rating noted for dental examination.



Majority (34.5%) of the children expressed Definitely Negative behavior towards dental checkup (Figure 1).

Treatment Needs of the children under study 69 % of the children required prompt treatment such as Prophylaxis, Restoration. 22 % of the participants required Preventive Treatment. Only 1% of the children in the study showed no treatment was required as described in the chart below.

Figure 2: Treatment needs of the children examined in the sample.



Discussion

Our study assessed the Dental treatment needs that were unmet based on the observed oral health status and behavior expressed by children towards dental check-up. Children aged 2 to 17 years were included in the study seeking therapies and education in a special school exclusively dealing with children with ASD in Noida. A relatively easy and simple method to assess child’s behavior was noted at the time of dental check-up by means of the Frankel’s

behavior rating scale. As experienced in the present study 53 out of the 78 children required prompt treatment (Fig 4). Heterogenous responses to varied expression by children renders the management therapy ineffective which yielded positive outcome in another child. Also, scarcity of literature has addressed behavior and procedural modification with regard to dental treatment for such children. The requirement of immediate/ emergency treatment though less (1%) may become a challenging task to the clinician to manage. In this study, 39.74% of autistic children were found to be free of any cavitated lesion. Mean def/DMF of 1.74 implies that children having autism had higher caries may be due to their behavioral issues and reluctance to independent brushing. The examination performed was not supplemented by radiograph to describe the extent of carious involvement. The incidence of caries was observed more in Late mixed dentition. The finding of increased prevalence of caries in this age group may be attributed to the number of permanent teeth present lately erupted. Preventive oral health programs targeted at this specific age group may benefit the child as it enhances maturation of all the newly erupted teeth. Higher caries rate in primary dentition was found in the study conducted by Lowe and Lindemann.^[17] Similar results were found in 124 Thai children where more than half of them presented with poor oral hygiene & caries ultimately increasing the treatment urgency.^[18] Desai et al. also reported that incidence of dental caries were higher in autistic children.^[19] On the contrary , Shapira et al. has discussed lower caries rate and severe periodontal problems in her sample of autistic children ^[20]. Around 6.15% autistic children suffered trauma to the permanent dentition and none of the primary teeth was affected in this sample. Most of the children suffered Ellis class I/II fracture in the maxillary anterior region. The occurrence of trauma was not related to the age distribution categorized in the present study stating that the results are of no significance statistically ($p>0.05$). Trauma was noted in 25.7 % of the participants in a study conducted by Al-Sehaibany FS as compared to the controls.^[21] However, many studies have not found higher level of dental trauma in children with ASD than in children without ASD. ^[22-24] The

low percentage of trauma experienced in this study might be due to the small sample size and the parent/special educator care provided to them at home and at school. Oral hygiene assessed by plaque score reported to be fair, with a mean score of 1.76. Statistically significant result ($p = 0.001$) were observed between age groups & plaque status of children. The presence of more plaque in children can be attributed to habit of chewing the brush instead of act of brushing, not able to spit while brushing, unable to rinse the oral cavity after meals, also the lack of interest in effective oral hygiene practices amongst parents in order to overcome other challenges. Usually Parent/Guardian helps the child while brushing as a very few children are able to brush independently without supervision. This is more frequently seen in younger age groups. The help from the family member during hygiene practices becomes a challenge in adolescent and elder children as their muscular strength increases with ages and they turn more reluctant to unwanted actions as in brushing which severely impacts their oral health. [25] Thus, intervening to teach home dental care become utmost important as the child grows to improves their overall quality of life. Gender variation amongst various behavior pattern was exhibited by the children under study. However, the expressed behavior was found to be independent of the age distribution ($P > 0.05$) explaining the fact that behavior is related to the level of brain functioning of the child that depends on the severity of autism and not merely age. Similar result was noted in study conducted in Indian sample of 106 autistic children [26]. A recently conducted meta-analysis on eight case-control studies also discussed the high caries prevalence, lower salivary pH and poor oral hygiene [27]. It was reported that great effort is required to provide oral care for children with autism as compared to their healthy adults. Thus, this special need group good dental care at the earliest. The present study is the first amongst the population. Overall, India accounts very few studies on oral hygiene needs for ASD children. Our study support & promote further researches on larger sample that would eventually prepare a pediatric dentist to manage the patient encountered in their practice. Further, we emphasize on the

need of collaborating with the specialized therapy centre/special schools to start Parent/teacher training and guidance program for earliest intervention in children with autism.

Conclusion

One of the disabilities affecting the world population at an alarming rate is autism. A Child dealing with autism faces enormous challenges to maintain oral health due to their limited ability to understand, communicate and participate in social interactions. India lacks conclusive studies in the field of Autism. The complexity of the behavior exhibited itself makes the research clinically cumbersome. This study highlights the frequent treatment needs due to fair oral hygiene, high caries experience and negative behavior. The results were more prominently observed permanent dentition as compared to primary dentition.

Conflict of Interest: None declared

Source of Support: Nil

Ethical Permission: Obtained

References

1. Bertrand j, Mars a, Boyle c et al. Prevalence of autism in a united states population: the brick township, new jersey, investigation. *Pediatrics*; 2001; 108:1155-61.
2. American psychiatric association. Diagnostic and statistical manual of mental disorders. 4th edition, 2000.
3. Varela-González DM, Ruiz-García M, Vela-Amieva M, Munive-Baez I, Hernández-Antunez BG. Conceptos actuales sobre la etiología del autismo. *Acta pediatri mex*. 2011; 32(4):213-22.
4. Artigas-Pallarés J, Gabau-Vila E, Guitart-Feliubadaló M. El autismo sindrómico: i. Aspectos generales. *Rev neurol*. 2005; 40(1):143-9.
5. Centre for disease control and prevention (cdc). Mental health in the United States: parental report of diagnosed autism in children aged 4-17 years – united states, 2003-2004, *Mmwr morb mortal wkly rep*. 2006; 55(17): 481-86.
6. Posserud M, Lundervold AJ, Lie SA, Gillberg C. The prevalence of autism spectrum disorders: impact of diagnostic instrument and non-response bias. *Soc. Psychiatry psychiatric Epidemiol*. 2010; 45:319-27.

7. Wong V.C.N. Epidemiological study of autism spectrum disorder in china. *J. Child neurol.*2007; 23 :67–72.
8. Werling DM, Geschwind DH. Sex differences in autism spectrum disorders. *Curr Opin Neurol.* 2013 Apr;26(2):146-53.
9. Landrigan P. What cause autism? Exploring the environmental contribution. *Current opinion in pediatrics.*2010; 22:1-7.
10. Gandhi RP, Klein U. Autism spectrum disorders: an update on oral health management. *Journal of evidence based dental practice.*2014; 14: 115–126.
11. El Khatib AA, EL Tekeya MM, EL Tantawi MA, et al. Oral health status and behaviours of children with autism spectrum disorder: a case–control study. *International journal of pediatric dentistry.* 2014; 24(4): 314–323.
12. Lu YY, Wei IH, Huang CC; Dental health: A challenging problem for a patient with autism spectrum disorder. *General hospital psychiatry.* 2013; 35(2): 214.e1–e3.
13. Klein U, Nowak AJ. Characteristics of patients with autistic disorder (ad) presenting for dental treatment: a survey and chart review. *Special care in dentistry.*1999;19(5): 200–207.
14. World health organization. Oral health surveys: basic methods. France: world Health organization. 2013; P. 47.
15. Silness J, Loe H. Periodontal disease in pregnancy- II. Correlation between oral hygiene and periodontal condition. *Acta odontol scand.* 1964; 22:121-35.
16. Frankl SN et al.; “should the parent remain in the operatory?” *Journal of dentistry for children.*1962; 29, 150-163.
17. Lowe O, Lindemann R. Assessment of the autistic patient’s dental needs and ability to undergo dental examination. *ASDC J Dent Child.*1985; 52(1): 29–35.
18. Tharapiwattananon T. Autistic child and dental management. *CU Dent J.*1994; 17:1–10.
19. Desai M, Messer LB, Calache H. A study of the dental treatment needs of children with disabilities in Melbourne, Australia. *Aust Dent J.*2001; 46:41-50.
20. Shapira J, Mann J, Tamari I, Mester R, Knobler H, Yoeli Y, et al . Oral health status and dental needs of an autistic population of children and young adults. *Spec Care Dentist.*1989; 9:38-41.
21. Al-Sehaibany FS. Occurrence of traumatic dental injuries among preschool children with Autism Spectrum Disorder. *Pak J Med Sci.* 2018; 34(4):859-863.
22. Altun C, Guven G, Yorbik O, et al. Dental injuries in autistic patients. *Pediatric Dentistry.*2010; 32(4): 343–346.
23. Fahlvik-Planefeldt C and Herrstrom P. Dental care of autistic children within the non-specialized public dental service. *Swedish Dental Journal.*2001;25(3): 113–118.
24. Orellana LM, Silvestre FJ, Martinez-Sanchis S, et al. Oral manifestations in a group of adults with autism spectrum disorder. *Medicina Oral, Patologia Oral Y Cirugia Bucal.*2012; 17(3): 415–19.
25. Luppapornlarp S, et al. Periodontal status and orthodontic treatment need of autistic children. *World J Orthod.* 2010; 11(3):256–61.
26. Subramaniam P, Gupta M. Oral health status of autistic children in India. *J Clin Pediatr Dent.* 2011; 36:43-7.
27. Pi X, Liu C, Li Z, Guo H, Jiang H, Du M. A Meta-Analysis of Oral Health Status of Children with Autism. *J Clin Pediatr Dent.* 2020;44(1):1-7.