Original Research

Identification of Early Clinical Features of Autism Spectrum Disorders in Bangladeshi Children- A Cross Sectional Study

Gopen Kumar Kundu*, Sadia Sultana, Sharmina Afrin, and Ishrat Zahan Nigar

Department of Paediatric Neurology, Bangabandhu Sheikh Mujib Medical University, Bangladesh

*Corresponding author

Gopen Kumar Kundu, Chairman, Department of Paediatric Neurology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, Tel: 8801718590768.

Abstract

Background: Autism Spectrum Disorder (ASD) is a complex neurodevelopment disorders with a heterogeneous spectrum of clinical symptomatology related to social interaction and communication. Autism usually appears in children within first three years of life during maximum neuronal development of brain. Several studies showed that children diagnosed before age three had the least stable diagnoses and the most positive outcomes. They explain that early diagnosis of ASD in children and early intervention (i.e., before age three years) appear to have the greatest benefit regarding the disappearance of core symptoms. Therefore, it could be possible to minimize the severity of ASD which lead to our interest to identify the early clinical features of autism spectrum disorder in Bangladeshi children.

Aims: To evaluate the early clinical features of autism spectrum disorder before 3 years of age in Bangladeshi children.

Method: It was retrospective cross-sectional type of study which was conducted in Department of Paediatric Neurology, Bangabandhu Sheikh Mujib Medical University, Dhaka without interrupting standard care practiced of the department. The duration of the study was one year from October 2021 to September 2022. Children age 3 to 10 years who fulfilled the diagnostic criteria of autism (DSM-5) were selected and enrolled in this study. In confirmed cases of ASD, retrospectively parents of ASD children were asked regarding the early clinical features of their child in Department of Paediatric Neurology, BSMMU. Data were collected in pre-designed structured questionnaire. The study was approved by the Institutional Review Board of BAMMU. In addition, an informed written consent was signed by the parents or the legal guardians of the studied subjects. Data analysis was performed by Statistical Package for Social Science (SPSS), version-22. Results were presented as text and tables.

Results: The mean age presentation was 4.27±1.99 years ranged from 2 to 11 years. Almost three fourth 58(72.5%) of patients were male and 22(27.5%) were female and male female ratio was 2.6:1. About three fourth of patients 62(77.5%) were came from urban area of Bangladesh. About three fourth (73.8%) of babies' mode of delivery was LUCS, thirteen (16.3%) patients had perinatal asphyxia and 8(10.0%) had history of low birth weight. The mean father's age was 37.7±6.67 years ranged from 26 to 60 years. The mean mother's age was 29.92±5.82 years ranged from 20 to 45 years. Almost half (48.8%) of the father had completed graduation and above. More than one third (35.0%) of mother had completed graduation and above. The mean age of identification of early ASD features that first observed by mother was 19.9±7.8 month ranged from 12 to 48 months. Nearly three fourth 57(71.2%) of patients had speech delay in comparison to their chronological age followed by speech regression 49(61.2%) in more than half of the cases. No children were observed any social interaction (100%), eye contact (100%), response to call (100%) and joint attention (100%) during first attention of mother. Besides this, joint attention were absent in 76(95%) and stereotyped hand movement were present in 30 (37.5%) cases. ADHD 30 (37.5%) and sleep disturbance 30 (37.5%) were most common co-morbidities in the studied children.

Conclusion: The mean age of early ASD features in studied children that first observed by mother was 19.9±7.8 month. During first observation, no children had any social interaction, eye to eye contact, response to call and joint attention. Among other early clinical features speech delay were found in about three-fourth of children and speech regression in more than half and abnormal stereotyped hand movement were found in about one-third cases.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by a diverse range of clinical symptoms, primarily affecting social interaction and communication. It is defined by persistent deficits in reciprocal social interaction and communication across various contexts, coupled with the presence of restricted, repetitive, and stereotyped behaviors and interests. According to the 2014 report from the Center for Disease Control and Prevention, ASD affects one in 68 children, with a male-to-female ratio of 4:1[1]. In the year 2000, the Autism and Developmental Disabilities Monitoring Network reported a prevalence of 1 in 150 children [2]. Notably, in Bangladesh, the prevalence of ASD varies, with an overall rate of 1.55 per 1000, 0.68 per 1000 in rural areas, and a higher rate of 30 per 1000 in Dhaka city [3,4]. Autism usually appears in children within first three years of life during maximum neuronal development of brain. Despite the increasing

global incidence of autism, the precise risk factors contributing to its onset remain unclear. In Bangladesh, pediatric neurologists are encouraged to promptly identify early ASD symptoms, particularly in children under the age of three, by employing the widely used M-CHAT (Modified Checklist for Autism in Toddlers) screening test. If clinical suspicion of ASD arises, a child neurologist performs a thorough evaluation, often utilizing specific diagnostic tools such as DSM-5 and ADOS (Autism Diagnostic Observation Schedule). This evaluation leads to a definitive diagnosis. Parents are often concerned about language and social developmental delays, which are typically noticeable during the first three years of life. In some cases, mild symptoms may become apparent later in childhood [5]. It is important to note that epilepsy and intellectual disability (ID) are often co-occurring conditions in children with ASD, and the nature of their relationship remains uncertain [6-8]. Early detection of ASD is crucial for initiating targeted interventions promptly. At present, several studies have investigated about behaviors of ASD children during infancy, informed by parents' descriptions, early home videos, screening tools and sibling studies [9]. The most common early signs involve joint attention, eye contact, orienting to verbal call, facial expression, social smile and deficit or poor quality of movements. Few studies have investigated autistic features in the neonatal period [10,11]. The age of onset of early signs of ASD varies among individuals. While the decline in social interactions can begin between 2 years and 2 years and 6 months [12]; more general alterations in sleep, feeding, and temperament may be observable during the first year in children at risk for ASD [13-16]. Onset patterns can involve language and social regression around 16-20 months [14], psychomotor delay or developmental stagnation [17]. Studies have indicated that an ASD diagnosis before the age of three tends to have less stable outcomes but more positive results [18]. Early diagnosis and intervention, ideally before the age of three, offer the best chance for ameliorating core symptoms and minimizing the severity of ASD. This study highlights the significance of identifying the early clinical features of ASD in Bangladeshi children.

MATERIALS AND METHODS

This retrospective cross-sectional study was conducted at the Department of Pediatric Neurology, Bangabandhu Sheikh Mujib Medical University, Dhaka, over a one-year period from October 2021 to September 2022. The study focused on children aged 3 to 10 years who met the diagnostic criteria for autism as per DSM-5. Children with speech delay due to conditions other than autism, such as cerebral palsy, Down syndrome, and congenital hypothyroidism, were excluded. In confirmed cases of ASD, parents of affected children were retrospectively interviewed to gather information about early clinical features and comorbidities. Additionally, these children were assessed in the Department of Pediatric Neurology at BSMMU. Data collection was conducted using a predefined structured questionnaire. The study was approved by the Institutional Review Board of BAMMU, and informed written consent was obtained from the parents or legal guardians of the participants. Data analysis was performed using the Statistical Package for Social Science (SPSS)

version-22, with results presented in both textual and tabular formats. Importantly, the study posed no social or legal risks to the participants and ensured privacy protection.

RESULTS

Table 1 shows the distribution of study population according to particulars of patients. It was observed that more than three fourth (77.5%) of patients belonged to age ≤5 years. The mean age was 4.27±1.99 years ranged from 2 to 11 years. Almost three fourth (72.5%) of patients were male and 22(27.5%0 were female. More than three fourth 62(77.5%) of patients came from urban area and 18(22.5%) from rural area. Almost three fourth 58 (72.5%) of patients belonged middle class family, 14(17.5%) lower and 8(10.0%) higher class family. Table 2 shows the distribution of study population according to birth history. It was observed that almost three fourth 59 (73.8%) of babies' mode of delivery was LUCS and 21(26.3%) were NVD delivery. Thirteen (16.3%) patients had perinatal asphyxia and 8(10.0%) had history of low birth weight. Table 3 shows the distribution of study population according to family history. It was observed that 6(7.5%) of cases had consanguinity. Sib death and sib affected not found. Table 4 shows the distribution of study population according to particulars of parents. The mean fathers age was 37.7±6.67 years ranged from 26 to 60 years. The mean mothers age was 29.92±5.82 years ranged from 20 to 45 years. Almost half (48.8%) fathers had completed graduation and above. More than one-third (35.0%) of mothers had completed graduation and

Table 1: Distribution of study population baseline characteristics (N=80)

Particulars of patients	Number of patients (n)	Percentage (%)
Age (years)		
≤5	62	77.5
>5	18	22.5
Mean±SD	4.27±1.99	
Range (Min-Max)	2-11	
Sex		
Male	58	72.5
Female	22	27.5
Residence		
Rural	18	22.5
Urban	62	77.5
Social Class		
Lower	14	17.5
Middle	58	72.5
Higher	8	10.0

Table 2: Distribution of study population according to birth history (N=80)

Birth history	Number of patients (n)	Percentage (%)
Mode of delivery		
NVD	21	26.3
LUCS	59	73.8
Perinatal asphyxia		
Present	13	16.3
Absent	67	83.7
Low birth weight		
Present	8	10
Absent	72	90.0

Table 3: Distribution of study population according to family history (N=80)

Family history	Number of patients (n)	Percentage (%)
Consanguinity		
Present	6	7.5
Absent	74	92.5
Sib death		
Present	0	0.0
Absent	80	100.0
Sib affected		
Present	0	0.0
Absent	80	100.0

Table 4: Distribution of study population according to particulars of parents (N=80)

Particulars of parents	Number of patients (n)	Percentage (%)
Age of fathers (years)		
Mean±SD	37.7±6.67	
Range (Min-Max)	26-60	
Age of mothers (years)		
Mean±SD	29.92±5.82	
Range (Min-Max)	20-45	
Education of the father		
Illiterate	9	11.2
Primary	11	13.8
SSC and above	21	26.2
Graduate and above	39	48.8
Education of the mother		
Illiterate	5	6.3
Primary	20	25.0
SSC and above	27	33.7
Graduate and above	28	35.0
Family income of parents per month		
TK (<10,000)	13	16.3
TK (10,000-<25,000)	21	26.3
TK (25,000-50,000)	30	37.4
TK (>50,000)	16	20.0

Table 5: Distribution of study population by Early clinical features before 3 year of age (N=80)

Clinical manifestation	Number of patients (n)	Percentage (%)
Age of first observation by mother (month)		
Mean±SD	19.9±7.8	
Range (Min-Max)	12-48	
Speech delay according to age		
Present	57	71.2
Absent	23	28.8
Speech regression during 1st observation		
Present	49	61.2
Absent	31	38.8
Stereotyped hand movement		
Present	30	37.5
Absent	50	62.5
Pointing		
Present	4	5.0
Absent	76	95.0
Social interaction		
Present	0	0.0
Absent	80	100.0
Respond to call		
Present	0	0.0
Absent	80	100.0
Eye contact		
Present	0	0.0
Absent	80	100.0
Joint attention		
Present	0	0.0
Absent	80	100.0

Table 6: Distribution of study population according to co-occurring condition (N=80)

Co-Occurring condition	Number of patients (n)	Percentage (%)
Sleep disturbance	30	37.5
ADHD	30	37.5
Bruxism	19	23.8
Constipation	17	21.3
Seizure disoders	10	12.5
Gratification syndrome	5	6.3

above. More than one-third (37.4%) of family monthly income were range 25,000-50,000 TK. Table 5 shows the distribution of study population according to early clinical features. The mean age of first observation ASD features by mother was 19.9±7.8 month, ranged from 12 to 48 month. Nearly three fourth 57(71.2%) of patients had speech delay in comparison to their chronological age followed by speech regression in more than half of the cases 49(61.2%). During her first observation, no children had any social interaction 80(100%), eye contact 80(100%), response to call 80(100%) and joint attention 80(100%). Besides this, pointing were absent in 76(95%) children and abnormal stereotyped hand movement were present in 30(37.5%) cases Table 6 shows the distribution of study population according to co-occurring condition. It was observed that more than one-third of patients had ADHD 30(37.5%) and sleep disturbance 30 (37.5%) followed by bruxism 19(23.8%), constipation 17(21.3%), Seizure disorders 10(12.5%), gratification syndrome 5(6.3%) and malabsorbtion in 3(3.8%) cases.

DISCUSSION

In our study, regarding the distribution of study population by particulars of parents, it was observed that the mean father's age was 37.7±6.67 years (ranged from 26 to 60 years). The mean mother's age was 29.92±5.82 years (ranged from 20 to 45 years). Almost half (48.8%) fathers had completed graduation and above. More than one third (35.0%) of mothers had completed graduation and above. More than one third (37.4%) of family monthly income range >50,000 TK. Lyall et al., reported that advanced parental age is one of the most consistently identified perinatal risk factors for autism spectrum disorder (ASD), a complex neurodevelopmental condition with a multifactorial etiology Though results are not uniform across studies [19,20], the literature on the whole supports increased risk of ASD with both older maternal and paternal ages independently [21]. In a large series of study, a total of 9556 children were diagnosed with an ASD. Both maternal and paternal age were associated with a greater risk of ASD in the offspring (hazard ratios ranging from 1.21 (1.10–1.34) to 1.65 (1.09–2.48) depending on combinations

of parental age categories; <35, 35–39, and 40+ years) [22]. For mothers younger than 35 years, the risk of ASD increased with increasing father's age group. For fathers younger than 35 years, the risk of ASD increased with increasing maternal age [22]. Providing 'knowledge and information' to parents/carers is referred to using many different terms, including 'parent training', 'parent education' and 'psychoeducation'. In an attempt to standardize terminology, Bears and colleagues suggested a taxonomy and proposed differentiating between 'parent support' programs where the parent is the direct beneficiary of the intervention, and 'parent-mediated interventions', which are technique-focused and parents are the agent of change, making the child the direct beneficiary [23]. In this study regarding the distribution of study population by early clinical features, it was observed that the mean age of onset (First parent's observation) was 19.9±7.8 months and ranged from 12 to 48 months. Nearly two-third (71.2%) of patients had speech delay at onset followed by speech regression 49(61.2%). Other initial presentations were absence of social interaction 80(100%), not respond to call 80(100%)), absent eye contact 80(100%), absent joint attention 80(100%), absent pointing 76(95%) and stereotyped hand movement present in 30(37.5%) children. In a study, Kamruzzaman M et al., reported that ASD affects social interaction, communication, interests and behavior [24]. It includes a wide range, "a spectrum," of symptoms, skills, and levels of disability. It affects how a person acts and interacts with others, communicates, and learns. Children with ASD might have problems talking with others, or they might not look in the eye when one talks to them. They may often seem to be in their "own world." People with ASD often have these characteristics: ongoing social problems that include difficulty communicating and interacting with others; repetitive behaviors as well as limited interests or activities; symptoms that typically are recognized in the first two years of life; symptoms that hurt the individual's ability to function socially, at school or work, or other areas of life. Some people are mildly impaired by their symptoms, while others are severely disabled. In this study, the distribution of study population according to co-occurring condition showed that more than one fourth 30(37.5%) of patients had sleep disturbance, 30(37.5%) ADHD, 19(23.8%) bruxism, 17(21.3%) constipation, 10(12.5%) epilepsy, 10(12.5%) febrile seizure 5(6.3%) gratification syndromic and 3(3.8%) malabsorption. HambletonA et al., stated that children, teens and adults with ASD can also develop mental health conditions or disorders. They also observed that more common co-occurring conditions include anxiety disorders, eating disorders, attention deficit hyperactivity disorder (ADHD), bipolar disorder or depression [25] . Rosen TE et al., reported that individuals with ASD are at increased risk for experiencing one or more co-occurring psychiatric conditions. When present, these conditions are associated with additional impairment and distress. It is therefore crucial that clinicians and researchers adequately understand and address these challenges [26]. However, due to symptom overlap, diagnostic overshadowing, and ambiguous symptom presentation in ASD, the assessment of co-occurring conditions in ASD is complex and challenging. Likewise, individual difference

factors, such as age, intellectual functioning, and gender, may influence the presentation of co-occurring symptoms. Relatedly, a transdiagnostic framework may offer utility in assessing and treating co-occurring conditions. However, with the exception of anxiety disorders, treatment research for co-occurring psychiatric conditions in ASD is relatively limited.

CONCLUSION

The mean age at which early ASD features were initially noticed by mothers in the studied children was 19.9 ± 7.8 months. During this initial observation, no children exhibited any signs of social interaction, eye contact, response to calls, or joint attention. Additionally, speech delay was identified in approximately 75% of the children, while speech regression was observed in over 50% of cases. Abnormal stereotyped hand movements were noted in around one-third of the cases. Identifying these early clinical features of ASD can facilitate early intervention and potentially lead to improved outcomes.

RECOMMENDATIONS

The Speech delay are not always early key features of ASD but absent social interaction, eye to eye contact, response to call and joint attention may early presenting features of ASD. So, a further study could be design to assess the early clinical features of ASD children. Nonetheless, more systematic multi-center studies are required to generate data regarding early clinical features of ASD for Bangladeshi children while formulating strategies for initial management of the disease with greater accuracy.

LIMITATION

The data was not so large and data collected from single point source

ACKNOWLEDGEMENT

AUTHOR CONTRIBUTIONS

Conceive and study design, data collection and data analysis: Prof. Dr. Gopen Kumar Kundu.

Clinical Help: Dr Sadia Sultana and Dr Sharmina Afrin

Review and editing: Dr Ishrat Zahan Nigar

REFERENCES

1. Maenner MJ, Warren Z, Williams AR, Amoakohene E, Bakian AV, Bilder DA, et al. Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2020. MMWR Surveill Summ. 2023; 72: 1–14.

2. Baio J, Wiggins L, Christensen DL, Maenner MJ, Daniels J, Warren Z, et al. Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014. MMWR Surveill Summ. 2018; 67: 1-23.

3. Akhter S, Hussain AH. E, Shefa J, Kundu GK, Rahman F, Biswas A. Prevalence of Autism Spectrum Disorder (ASD) among the children aged 18-36 months in a rural community of Bangladesh: A cross sectional study. F1000Research. 2018; 7: 424.

4. Survey of Autism and Neurodevelopmental Disorders in Bangladesh. Directorate General of Health Services, Ministry of Health and Family Welfare, Government of Bangladesh. 2013.

5. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders-5th Edition [Internet]. American Psychiatric Association; 2013.

6. Amiet C, Gourfinkel-An I, Bouzamondo A, Tordjman S, Baulac M, Lechat P, et al. Epilepsy in Autism is Associated with Intellectual Disability and Gender: Evidence from a Meta-Analysis. Biol Psychiatry. 2008; 64: 577-582.

7. Christensen DL, Baio J, Braun KVN, Bilder D, Charles J, Constantino JN, et al. Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2012. MMWR Surveill Summ. 2016; 65: 1-23.

8. Parmeggiani A, Barcia G, Posar A, Raimondi E, Santucci M, Scaduto MC. Epilepsy and EEG paroxysmal abnormalities in autism spectrum disorders. Brain Dev. 2010; 32: 783-789.

9. Costanzo V, Chericoni N, Amendola FA, Casula L, Muratori F, Scattoni ML, et al. Early detection of autism spectrum disorders: From retrospective home video studies to prospective 'high risk' sibling studies. Neurosci Biobehav Rev. 2015; 55: 627-635.

10. Karmel BZ, Gardner JM, Meade LS, Cohen IL, London E, Flory MJ, et al. Early Medical and Behavioral Characteristics of NICU Infants Later Classified With ASD. Pediatrics. 2010; 126: 457-467.

11. Pineda R, Melchior K, Oberle S, Inder T, Rogers C. Assessment of Autism Symptoms During the Neonatal Period: Is There Early Evidence of Autism Risk?. Am J Occup Ther. 2015; 69: 1-11.

12. Jones W, Klin A. Attention to eyes is present but in decline in 2–6-month-old infants later diagnosed with autism. Nature. 2013; 504: 427-431.

13. Baranek GT. Autism during infancy: A retrospective video analysis of sensory-motor and social behaviors at 9-12 months of age. J Autism Dev Disord. 1999; 29: 213-224.

14. Emond A, Emmett P, Steer C, Golding J. Feeding Symptoms, Dietary Patterns, and Growth in Young Children With Autism Spectrum Disorders. Pediatrics. 2010; 126: e337-342.

15. Garon N, Bryson SE, Zwaigenbaum L, Smith IM, Brian J, Roberts W, et al. Temperament and its Relationship to Autistic Symptoms in a High-Risk Infant Sib Cohort. J Abnorm Child Psychol. 2009; 37: 59-78.

16. Richdale AL, Schreck KA. Sleep problems in autism spectrum disorders: Prevalence, nature, & possible biopsychosocial aetiologies. Sleep Med Rev. 2009; 13: 403-411.

17. Siperstein R, Volkmar F. Brief Report: Parental Reporting of Regression in Children with Pervasive Developmental Disorders. J Autism Dev Disord. 2004; 34: 731-734.

18. Woolfenden S, Sarkozy V, Ridley G, Williams KA. systematic review of the diagnostic stability of Autism Spectrum Disorder. Res Autism Spectr Disord. 2012; 6: 345-354.

19. Lyall K, Croen L, Daniels J, Fallin MD, Ladd-Acosta C, Lee BK, et al. The Changing Epidemiology of Autism Spectrum Disorders. Annu Rev Public Health. 2017; 38: 81-102.

20. Wu S, Wu F, Ding Y, Hou J, Bi J, Zhang Z. Advanced parental age and autism risk in children: a systematic review and meta-analysis. Acta Psychiatr Scand. 2017; 135: 29-41.

21. Shelton JF, Tancredi DJ, Hertz-Picciotto I. Independent and dependent contributions of advanced maternal and paternal ages to autism risk. Autism Res. 2010; 3: 30-39.

22. Parner ET, Baron-Cohen S, Lauritsen MB, Jørgensen M, Schieve LA, Yeargin-Allsopp M, et al. Parental Age and Autism Spectrum Disorders. Ann Epidemiol. 2012; 22: 143-150.

23. Bearss K, Johnson C, Smith T, Lecavalier L, Swiezy N, Aman M, et al. Effect of Parent Training vs Parent Education on Behavioral Problems in Children With Autism Spectrum Disorder. JAMA. 2015; 313: 1524-1533.

24. Kamruzzaman MD, Md M, Islam Z, Siddique AB, Ahsan MR, Azam AM. Review Articles Autism Spectrum Disorder. Bangladesh J Child Heal. 2018; 43: 41-48.

25. Hambleton A, Pepin G, Le A, Maloney D, Aouad P, Barakat S, et al. Psychiatric and medical comorbidities of eating disorders: findings from a rapid review of the literature. J Eat Disord. 2022; 10: 132.

26. Rosen TE, Mazefsky CA, Vasa RA, Lerner MD. Co-occurring psychiatric conditions in autism spectrum disorder. Int Rev Psychiatry. 2018; 30: 40-61.