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Clinical profile of children with autism spectrum disorder (ASD) in a tertiary care center: a descriptive study

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Abstract

Introduction: Autism spectrum disorder (ASD) is a neurodevelopmental condition and the data from Nepal remain scarce. This study aimed to describe the clinical profile of children with ASD presenting to a tertiary care center in Nepal.

Method: This prospective observational study at Patan Hospital included 30 children with ASD. Childhood Autism Rating Scale, Child Behavior Checklist, and GMDS were used for assessment. Thyroid function, vitamin D, ferritin, vitamin B12, and brainstem evoked response audiometry were evaluated.

Result: Among 30 children males counted 18(60%). Severe ASD was seen in 16 (53%) with a mean CARS score of 35.35 ± 3.94. All had poor response to name, poor eye contact and speech delay. Hand-leading behavior, parallel play, and hyperactivity was seen in 29 (97%) each. Tantrums 28(93%), delayed toilet 26(87%), sensory issues 20(67%), picky eating 13(43%), sleep disturbances 6(20%), and repetitive motor behaviors 6(20%) were common presentations. Withdrawal symptoms 15 (50%), attention problem 12 (40%), sleep problems in 10 (33%) were noted. All had age-appropriate gross motor skills and deficits in personal-social domains. Significant language delay, deficit in hand eye co-ordination and cognitive impairment was seen 93%, 50% and 40% respectively. Vitamin D, serum ferritin and vitamin B12 waslow in 25(83%), 11(37%) and 4(13%) respectively.

Conclusion: Speech delay, poor response to name, reduced eye contact, hyperactivity, parallel play, and sensory processing difficulties were the most common clinical presentations among children with ASD. Withdrawal symptoms, sleep disturbances, and inattention were frequent behavioral problems and majority have low vitamin D and iron.

Keywords: Autism spectrum disorder; Child behavior checklist; Childhood autism rating scale; Comorbidity; Developmental delay; Nepal; Neurodevelopmental disorders; Vitamin D deficiency

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Introduction

Autism spectrum disorder (ASD), commonly known as autism, is a complex neurodevelopmental condition that affects individuals worldwide and it has an impact on all stages of life.[1] In recent years, the global prevalence of ASD has increased, with estimates ranging from 0.5% to 1%, making it an important public health concern.[2] In Asia, the average prevalence is approximately 1.48 per 1,000 individuals. According to recent data from the Centers for Disease Control and Prevention, about 1 in 36 children in the United States are diagnosed with ASD, and at least 78 million people are affected worldwide.[3] A systematic review and meta-analysis reported a prevalence of 6 per 1,000 populations in Southeast Asia[4], while in Nepal, the estimated prevalence among school-aged children is 3 per 1,000.[5]

Beyond core features, children with ASD frequently present with language delay, behavioral problems, and other comorbidities, which can complicate management.[1] Despite the growing global literature, data from Nepal remain sparse and largely limited to prevalence estimates, with little focus on the full clinical spectrum and developmental profile of affected children. Early characterization of the local clinical profile is essential for timely diagnosis and context-specific intervention. Therefore, this study aimed to assess the clinical profile of children with ASD presenting at Patan Hospital, Lalitpur, Nepal.

Method

This is a prospective observational study which was conducted at Pediatric outpatient department (developmental clinic at Pediatric referral clinic and Patan private clinic) Patan Hospital from 1 September 2025 to 30 November 2025. All children referred to the developmental clinic with suspected autism spectrum disorder (ASD), who were subsequently diagnosed with ASD, as well as those with a prior confirmed diagnosis, were enrolled using consecutive sampling. Thus, all children who fulfilled the criteria in the study period were enrolled. A prior written consent was obtained from the parents.

Children were excluded if their parents' declined participation or if they had received iron, vitamin D, or vitamin B12 supplementation within the preceding three months. Prior to enrollment, the study objectives and procedures were explained to the parents, and informed consent was obtained.

A detailed clinical history was obtained, and comprehensive neurological examinations were performed. Developmental assessments for all participants were conducted by the principal investigator. The Childhood Autism Rating Scale, Second Edition (CARS-2)[6], was used for diagnosis and severity classification of ASD. The Griffiths Mental Development Scales (GMDS)[7] were administered to evaluate developmental levels across multiple domains. Behavioral assessment was performed using the paper-based Child Behavior Checklist[8] for ages 1.5–5 years. T-scores were calculated based on parent responses, with scores >70 indicating the clinical range, 65–70 indicating the borderline range, and <65 considered within the normal range.

Children with neurodevelopmental problems can have micronutrient deficiency and as mandatory testing all participants underwent laboratory investigations, including thyroid function tests, serum vitamin D3 (ng/ml), vitamin B12 (pg/ml), and serum ferritin (ng/ml). Data were recorded using a predefined proforma.

Ethical approval was obtained from the Institutional Review Committee (IRC) of PAHS. The IRC approval number is DRS-2503-211992. Data were entered into Microsoft Excel for analysis. Categorical variables were expressed as percentages, while continuous variables were summarized using means and standard deviations.

Result

A total of 37 children presenting to the Pediatric Outpatient Department (OPD) were assessed for autism spectrum disorder. Seven cases were excluded for various reasons, Figure 1. After the exclusion, 30 children were included in the study. The mean age of the participants was 34.57±10.83 months. The mean paternal age was 33.3±3.97 years, while the mean maternal age was 31.33±4.23 years at the time of conception. Two participants were born preterm at 32 and 34 weeks of gestation and three had a history of perinatal asphyxia. The mean birth weight was 2947.86±542.82 grams. Among the 30 cases, 15(50.00%) were first-born, 12(40.00%) were second-born, and 3(10.00%) were third-born.

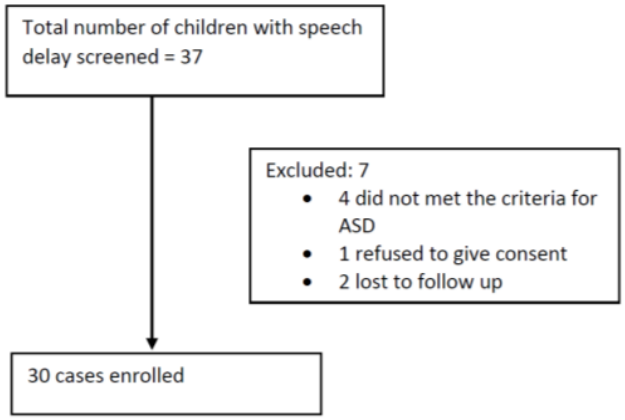

Figure 1. Flow diagram of the screened population and the enrolled population (N=37)

Males constituted the majority at 18(60.00%) and females 12(40.00%), giving a male-to-female ratio of 1.5:1, Figure 2.

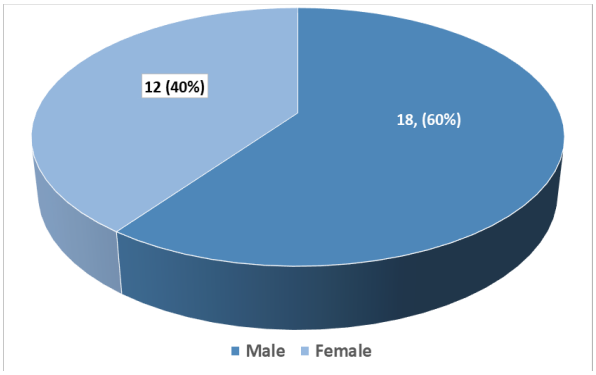

Figure 2. Pie chart showing sex distribution of the cases (N=30)

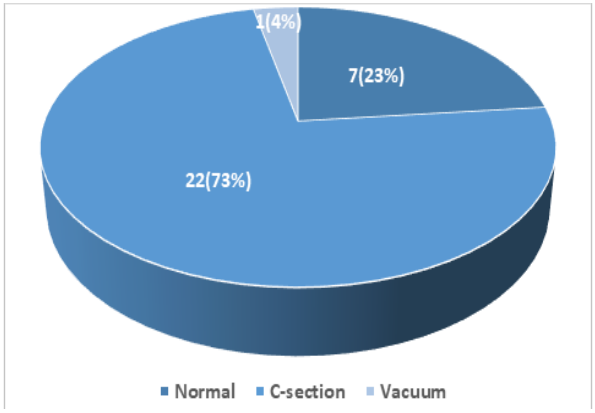

Figure 3. Pie chart showing distribution of mode of delivery among the cases. (N=30)

The majority of children 22(73.00%) were delivered by spontaneous vaginal delivery.

All 30(100.00%) children presented with speech delay, poor eye contact, and poor response to name. Hand-leading behavior, parallel play, and hyperactivity were each present in 29(96.67%) children. Tantrums were noted in 28(93.33%), delayed toilet training in 26(86.67%), sensory issues in 20(66.67%), and picky eating in 13(43.33%). Less frequent features included language regression, sleep problems, and repetitive motor behaviors, each in 6(20.00%) children, Table 1

More than half of the children, 16(53.33%), were classified as having severe ASD (CARS score >36.5), while 14(46.67%) had mild-to-moderate ASD (CARS score 30–36.5). The mean CARS score across all participants was 35.35±3.94), Table 2.

Table 1. Clinical profile of study population (N=30)

Variables		*f* (%)
Speech delay		30(100.00%)
Language regression		6(20.00%)
Poor eye contact		30(100.00%)
Pointing	Protoimperative	4(13.33%)
	Protodeclarative	0
Hand lead		29(96.67%)
Parallel play		29(96.67%)
No response to name		30(100.00%)
Repetitive motor behavior		6(20.00%)
Echolalia		4(13.33%)
Toe walking		3(10.00%)
Lining of objects		1(3.33%)
Insistence on sameness		3(10.00%)
Sensory issues		20(66.67%)
Sleep problems		6(20.00%)
Picky eating		13(43.33%)
Hyperactivity		29(96.67%)
Family history of ASD		4(13.33%)
Tantrums		28(93.33%)
Aggression		4(13.33%)
Seizures		4(13.33%)
Delayed toilet training		26(86.67%)
Constipation		7(23.33%)

Table 2. Severity Classification of children with autism spectrum disorder according to the childhood autism rating scale (CARS) (N=30)

ASD Score	Mean(SD)	*f* (%)
Mild to moderate (30-36.5	35.35±3.94	14(46.67)
Severe (>36.5)		16(53.33)

Table 3. Distribution of behavioral problems among children with autism spectrum disorder according to the child behavior checklist (1.5–5 Years) (N=30)

Behavioral Problems	T-score			
	Mean (SD)	<65, *f* (%)	65-70, *f* (%)	>70, *f* (%)
Emotionally Reactive	52.33±2.58	30(100.00%)	0(0.00%)	0(0.00%)
Anxious/depressed	57.13±7.75	20(66.67%)	6(20.00%)	4(13.33%)
Somatic complaints	51.33±2.54	30(100.00%)	0(0.00%)	0(0%)
Withdrawn	68.10±6.71	4(13.33%)	11(36.67%)	15(50.00%)
Sleep problem	61.50±9.34	16(53.33%)	4(13.33%)	10(33.33%)
Attention problem	66.23±7.71	6(20.00%)	12(40.00%)	12(40.00%)
Aggressive behavior	54.66±8.18	25(83.33%)	3(10.00%)	2(6.67%)

Table 4: Z-Score distribution across developmental domains in the study population (N = 30)

Developmental Domains	Z score			
	0 and above, *f* (%)	0 to -1, *f* (%)	-1 to -2, *f* (%)	<-2, *f* (%)
Locomotor	27(90.00%)	3(10.00%)	0(0.00%)	0(0.00%)
Hand eye coordination	0(0.00%)	2(6.67%)	13(43.33%)	15(50.00%)
Language	0(0.00%)	0(0.00%)	2(6.67%)	28(93.33%)
Personal social	0(0.00%)	0(0.00%)	0(0.00%)	30(100.00%)
Performance	9(30.00%)	5(17.00%)	4(13.00%)	12(40.00%)

Withdrawn behavior was the most affected domain, with 15(50.00%) children in the clinical range (T-score >70) and a further 11(36.67%) in the borderline range (65–70). Attention problems were in the clinical range at 12(40.00%) and borderline at another 12(40.00%). Sleep problems were in the clinical range in 10(33.33%) and borderline in 4(13.33%). Anxiety/depression was in the clinical range at 4(13.33%) and borderline in 6(20.00%). Aggressive behavior was in the clinical range in 2(6.67%) and borderline in 3(10.00%). Emotional reactivity and somatic complaints were within the normal range in all 30(100.00%) children, with no borderline or clinical scores recorded for either domain, Table 3.

All 30(100.00%) children showed a Z-score below −2 in the personal-social domain, indicating universal and severe deficit in this area. Language delay below −2 standard deviations was present in 28(93.33%) children. Hand-eye coordination was below −2 in 15(50.00%) and between −1 and −2 in 13(43.33%). Cognitive performance (performance scale) was below −2 in 12(40.00%) children. Locomotor skills were largely preserved, with 27(90.00%) scoring at or above zero, Table 4.

Thyroid function test results were within normal limits in all participants. The mean vitamin B12 level was 550.17pg/ml (range: 202–1000), with four cases (13%) falling within the deficient range. The mean vitamin D level was 25.57ng/ml (range: 11–44.6), with deficiency observed in 25 cases (83%). Low ferritin levels were identified in 11(37%) children. All children had normal BERA results.

Discussion

In this study, 30 children with autism spectrum disorder (ASD) were enrolled. The mean age at diagnosis (AoD) was 34.57 ± 10.83 months. A previous study from Nepal reported a higher mean AoD of 58 months.[9] The earlier presentation in our study may be attributed to the fact that most participants were from Lalitpur Metropolitan City, and the majority of parents were well educated (29 out of 30 had attained a bachelor's degree or higher). Increased awareness and access to healthcare services may have contributed to earlier diagnosis.

The male-to-female ratio in our study was 1.5:1, with a male predominance of 60%. This finding is consistent with a prevalence study from Southeast Asia, which reported 64.4% males.[4] However, other studies[10] have reported higher ratios including a Nepalese study showing a male-to-female ratio of 3.9:1.[11] The lower ratio observed in our study may be due to the small sample size, which may not accurately reflect the true population distribution.

Parental age has been identified as a potential risk factor for ASD, with advanced parental age associated with increased risk.[12] In this study, the mean paternal and maternal ages at conception were 33.3 ± 3.97 years and 31.33 ± 4.23 years, respectively, comparable to findings from another Nepalese study.[11] Half of the children (50%) were first-born, consistent with previous research.[11] While no definitive explanation exists for this observation, it may reflect greater parental awareness and healthcare-seeking behavior among first-time parents in urban settings.

Clinically, all children (100%) presented with speech delay, poor eye contact, and poor response to name. Other common features included hand-leading behavior, parallel play, and hyperactivity (97% each). Similarly, high number of children had tantrums, delayed toilet training, sensory issues, picky eating, sleep disturbances and repetitive motor behaviors in 20%. Echolalia, aggressive behavior, and seizures were each reported in 13% of cases.

Sleep disturbances, as parents reported, in our study (20%) were lower than a prevalence of 31% reported in a study on sleep disorders in children with ASD.[13] Similar to their findings, affected children in our study had frequent nocturnal awakenings and difficulty initiating sleep. Feeding difficulties were also noted, aligning with a scoping review reporting that 8.2–54.8% of children with avoidant-restrictive food intake disorder (ARFID) are autistic.[14] Sensory processing issues were observed in 67% of participants, comparable to other studies reporting prevalence as high as 83%.[15]

Developmental assessment using the Griffiths Mental Development Scales (GMDS) revealed that all 30(100%) children had age-appropriate gross motor skills, while all demonstrated deficits (<2 standard deviations below the mean) in personal-social domains. Language delay was prominent, with 93% scoring below 2 standard deviations, and 50% had deficits in hand-eye coordination. Cognitive impairment (performance scale) was observed in 40% of children. Previous studies have reported intellectual disability in approximately 33% of children with ASD.[16]

Based on the Childhood Autism Rating Scale (CARS), more than half (53%) of the participants were classified as having severe ASD, with a mean CARS score of 35.35 ± 3.94. This is comparable to findings from a clinic-sociodemographic study of children with ASD in Nepal.[11]

Behavioral problems were assessed using the Child Behavior Checklist (CBCL 1.5–5). The most common clinical-range problem was withdrawal (50%), followed by attention problems (40%), sleep problems (33%), anxiety/depression (13%), and aggressive behavior (7%). A meta-analysis has shown wide variability in

anxiety (0–84%) and sleep problems among children with ASD.[17] Other literature reports higher rates of comorbid conditions, including depression (20%), anxiety (11%), sleep disturbances (13%).[18] Aggressive behavior was observed in 13% of participants, which is lower than reported in other studies, where up to 68% of individuals with ASD exhibited aggression toward caregivers and 49% toward others. [19,20] This difference may be due to a higher proportion of mild-to-moderate cases in our sample. Attention-deficit/hyperactivity disorder (ADHD) symptoms were observed at rates comparable to previous studies reporting a prevalence of approximately 21%.[21]

In our study, vitamin D deficiency was the most common laboratory abnormality, present in 83% of cases. Vitamin B12 deficiency was observed in 13%, low ferritin level in 37% while all participants had normal thyroid function. These findings are consistent with studies reporting that up to 74% of children with ASD have vitamin D levels below 30 ng/mL.[22]

This study has several limitations. First, the short study duration (three months) resulted in a small sample size, limiting the generalizability of the findings. Second, some variables relied on parental reporting, which may introduce recall bias. Additionally, behavioral assessments were based solely on parent reports; incorporating information from multiple settings (e.g., school or clinical observation) could have strengthened the validity of the findings.

Conclusion

Speech delay, poor response to name, reduced eye contact, hyperactivity, parallel play, and sensory processing difficulties were the most common clinical presentations among children with autism spectrum disorder. The personal-social and language domains were the most significantly affected developmental areas. Withdrawal symptoms, sleep disturbances, and inattention emerged as the most frequent behavioral problems. Additionally, a high proportion of children in this population exhibited deficiencies in vitamin D and iron.

Conflict of Interest

None

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Author Contribution

Concept, design, planning: ARO; Literature review: ARO Data collection/analysis: ARO; Draft manuscript: ARO, AN, BS; Revision of draft: ARO, AN, BS; Final manuscript: ARO, AN, BS; Accountability of the work: ARO, AN, BS.

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