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Gender disparities in autism spectrum disorder prevalence: A Study of Children in Special Care Centers in Batticaloa District

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Abstract

Objective: This study aimed to investigate the gender-specific prevalence of autism spectrum disorder (ASD) among children aged 3 to 16 years who attend special care centers in the Batticaloa District of Sri Lanka, as well as to identify disparities in diagnosis and management.

Methods: A descriptive cross-sectional study was conducted involving 52 children enrolled in eight special care centers. Data were collected through parental interviews and semi-structured questionnaires that included the Indian Scale for Autism Assessment. Quantitative analyses were performed using SPSS version 27 and Microsoft Excel, presenting results in terms of frequencies and percentages.

Results: A significant male predominance was observed, with 86.5% of ASD diagnoses made in boys. The highest prevalence was noted among children aged 6 to 8 years (40.4%), followed by those aged 3 to 5 years (21.2%). Firstborn children represented 44.2% of cases, suggesting potential genetic or perinatal risk factors. The ethnic distribution indicated a higher prevalence among Tamil (57.7%) and Muslim (42.3%) children, with no cases documented among Sinhalese participants.

Conclusion: The findings highlight significant gender disparities in ASD prevalence in Batticaloa, consistent with global trends yet revealing unique patterns within the rural Sri Lankan context. Strengthening gender-sensitive diagnostic approaches, enhancing parental and community awareness, and implementing context-specific policy measures are essential for improving early identification and intervention outcomes.

Keywords: Autism Spectrum Disorder; Special Care Centers; Pediatric Diagnosis; Pediatric Neurodevelopment; Sri Lanka; Gender Differences.

1. Introduction

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental disorder marked by challenges in social communication, limited interests, and repetitive behaviors (American Psychiatric Association, 2013). It affects about 1–2% of people worldwide, with males being roughly four times more frequently diagnosed than females (Zeidan et al., 2022; Shaw, 2023). This notable gender difference prompts important questions about possible underdiagnosis in females, who often exhibit subtler symptoms that may not align with traditional diagnostic criteria (Nowell et al., 2015).

In resource-limited settings like Sri Lanka, research on autism spectrum disorder (ASD) remains limited, with even less focus on gender-based differences. Batticaloa, a rural district in eastern Sri Lanka, is particularly underserved due to socioeconomic challenges, cultural stigmas, and weak healthcare infrastructure. The region is mainly inhabited by Tamil

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and Muslim communities, with no Sinhalese population, which further influences its sociocultural and demographic uniqueness. These factors lead to delays in diagnosis, making it harder for affected children and their families (Sivayokan et al., 2023). Early diagnosis and intervention are crucial; however, the lack of awareness and access to specialized care often results in these children missing out on necessary support (World Health Organization, 2021).

Gender disparities in ASD are especially concerning in rural areas. Diagnostic criteria, primarily based on how ASD appears in males, often overlook the subtle and less obvious symptoms observed in females (Hull et al., 2020). This causes misdiagnosis or underdiagnosis, further marginalizing females with ASD. Recognizing these differences is vital for developing fairer diagnostic and intervention strategies.

This study seeks to address these gaps by analyzing the gender-based prevalence of ASD among children in Batticaloa's special care centers. By emphasizing the challenges specific to rural Sri Lanka, this research aims to inform gender-sensitive policies and targeted awareness programs that can lessen diagnostic disparities and enhance outcomes for children with ASD.

2. Methodology

The study employed a descriptive cross-sectional design to examine gender differences in autism spectrum disorder (ASD) among 52 children aged 3 to 16 years across eight selected special care centers in Batticaloa District. Data collection involved interviews with parents and semi-structured questionnaires based on the Indian Scale for Autism Assessment. Quantitative data were analyzed using SPSS version 27 and Microsoft Excel, with descriptive statistics presented as frequencies and percentages.

3. Results

Out of the 52 children examined, 86.5% were male, indicating a notable gender disparity. The highest prevalence was identified among children aged 6-8 years (40.4%), followed by those aged 3-5 years (21.2%). Firstborn children accounted for 44.2% of the sample, potentially reflecting genetic or perinatal influences. The ethnic distribution demonstrated that 57.7% of the children were Tamil, while 42.3% were Muslim, with no cases reported among Sinhalese children.

Table 1 Demographic and Ethnic Characteristics of Children Diagnosed with Autism Spectrum Disorder

Demographic and Neonatal Characteristics		**Column**	
		Count	Column N %
Gender of the children	Male	45	86.5%
	Female	7	13.5%
Age of the children	3-5 Year	11	21.2%
	6-8 Years	21	40.4%
	9-11Years	10	19.2%
	12-16 Years	10	19.2%
Ethnicity of the child	Tamil	30	57.7%
	Muslim	22	42.3%
	Sinhalese	0	0.0%
Number of children	1	9	17.3%
	2	13	25.0%
	3	24	46.2%
	4	5	9.6%
	>5	1	1.9%

Birth order	1st	23	44.2%
	2nd	16	30.8%
	3rd	10	19.2%
	4th	3	5.8%
	5th	0	0.0%

Source: Primary data

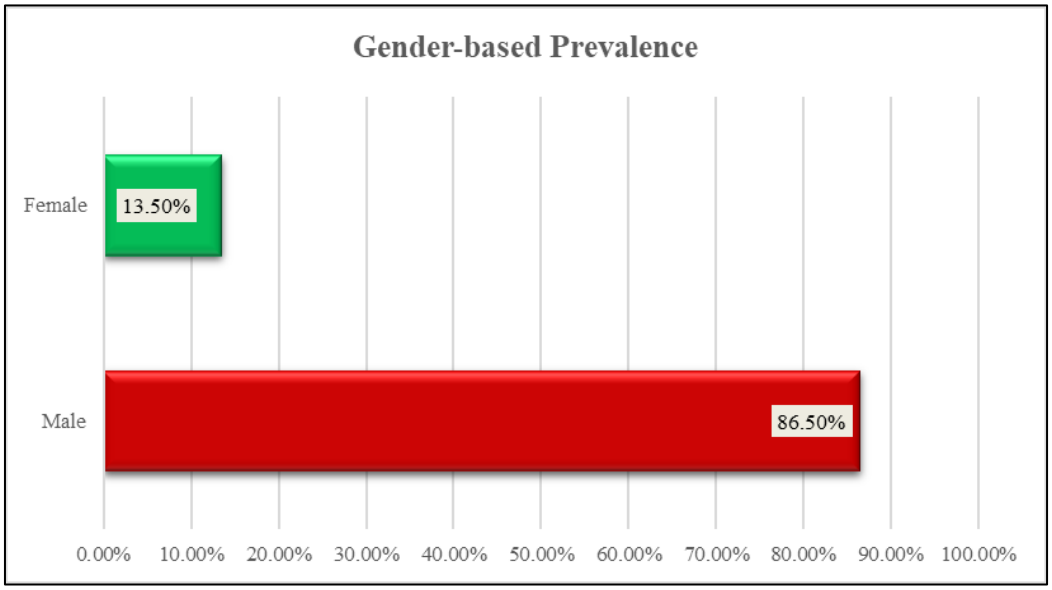

Figure 1 Gender-based Prevalence of ASD in Batticaloa District

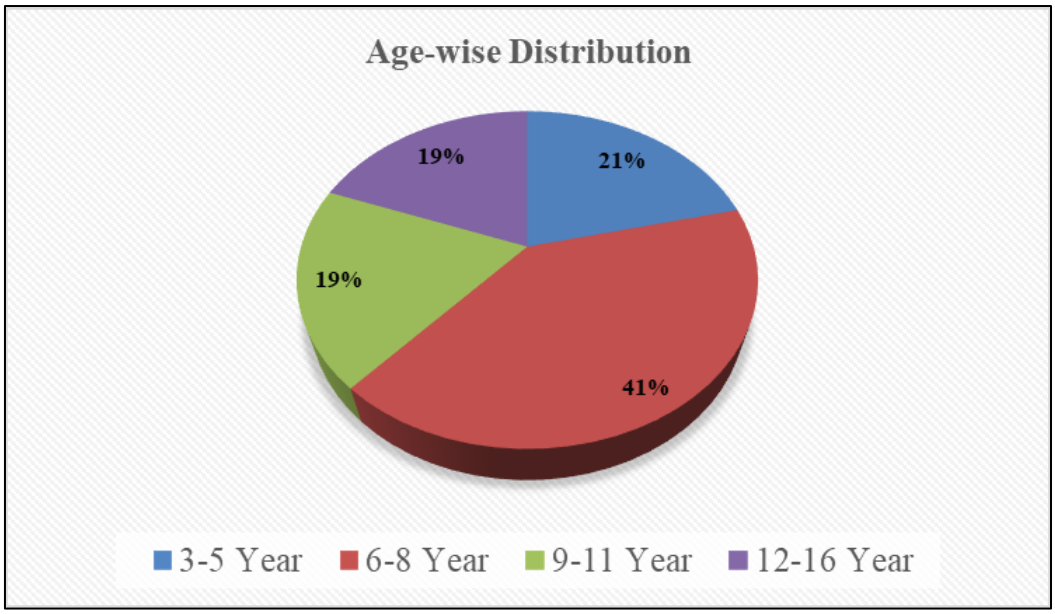

Figure 2 Age-wise Distribution of Children Diagnosed with ASD

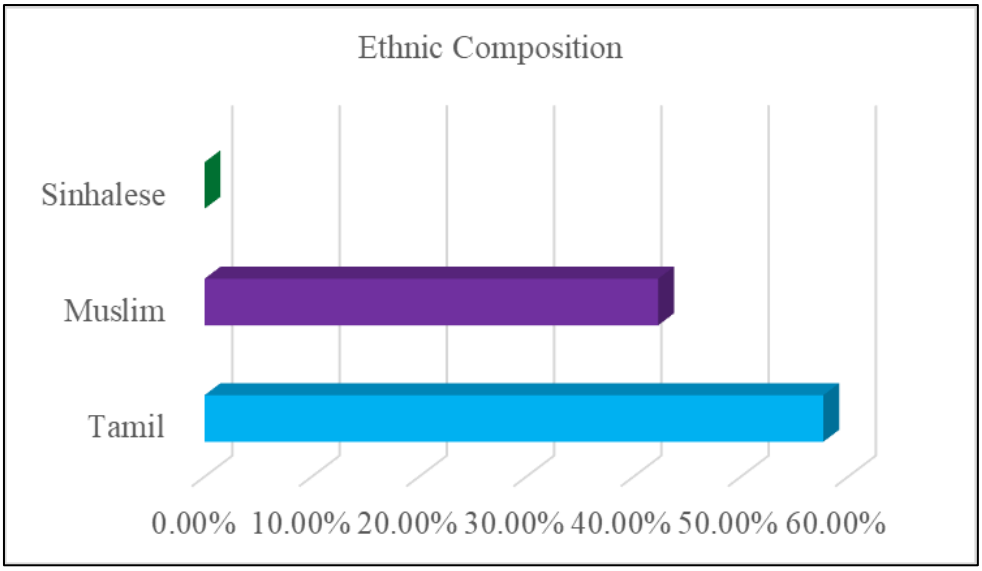

Figure 3 Ethnic Breakdown of Children with ASD in the Study

Figure 4 Map of Batticaloa District Showing Study Locations

Key Findings

- Male Predominance in ASD Diagnosis: 86.5% of children diagnosed with autism spectrum disorder (ASD) in Batticaloa were male, a finding that reflects global trends but raises concerns about underdiagnosis in females.
- Age Distribution: The highest prevalence of ASD was observed in children aged 6-8 years (40.4%), followed by those aged 3-5 years (21.2%), underscoring the importance of early diagnosis and intervention.
- Ethnic Breakdown: The majority of children diagnosed with ASD were Tamil (57.7%), followed by Muslim (42.3%). There were no Sinhalese children in the study, consistent with the demographic composition of the Batticaloa region, which comprises only Tamil and Muslim communities.
- First-Born Children: A higher percentage of children diagnosed with ASD were first-born (44.2%), highlighting a potential genetic or environmental influence on ASD risk.

- Diagnostic Gaps: The study emphasizes the urgent need for gender-sensitive diagnostic tools, especially in rural settings where cultural stigmas and limited healthcare resources contribute to delays in diagnosis.
- Recommendations for Improvement: Propose initiatives such as awareness programs, gender-sensitive diagnostic frameworks, and routine ASD screenings to improve early identification and intervention.

4. Discussion

This study highlights a significant male predominance in autism spectrum disorder (ASD) diagnoses in the Batticaloa district, with males accounting for 86.5% of identified cases. This finding aligns with global evidence that indicates males are approximately four times more likely to receive an ASD diagnosis than females (Shaw, 2023). However, such disparities raise important concerns about the potential underdiagnosis of females. Diagnostic tools and criteria often focus on externally visible behavioral traits more commonly observed in males, such as overt repetitive behaviors and disruptive social interactions. In contrast, females may exhibit subtler manifestations, including enhanced social mimicry, better compensatory behaviors, and less obvious restrictive patterns, which can lead to their under-recognition in both clinical and educational settings (Hull et al., 2020; Nowell et al., 2015).

The study also identifies systemic challenges specific to rural Sri Lanka that contribute to diagnostic delays. These challenges include limited healthcare infrastructure, a shortage of trained professionals specializing in neurodevelopmental disorders, and cultural stigmas surrounding developmental and mental health issues. Such barriers not only delay diagnosis but also hinder access to early intervention services (Sivayokan et al., 2023). Female children may be disproportionately affected, as developmental differences are often normalized, overlooked, or attributed to environmental and cultural factors.

The age distribution of ASD diagnoses in this study shows that the highest prevalence occurs among children aged 6 to 8 years, with fewer diagnoses during the critical early childhood years. This indicates a lack of early screening and highlights a missed opportunity for timely interventions, which are essential for optimizing developmental outcomes. The notable representation of firstborn children (44.2%) in the sample also raises important questions regarding potential genetic predispositions or perinatal risk factors, warranting further research.

Finally, the observed ethnic differences in prevalence, especially the absence of reported cases among Sinhalese children, should be interpreted cautiously. This may reflect sampling limitations rather than true variations in prevalence. Nevertheless, it emphasizes the importance of investigating whether cultural attitudes, health-seeking behaviors, and stigma contribute to diagnostic disparities across different ethnic groups.

4.1. Addressing the Gaps

4.1.1. This study emphasizes the importance of

Gender-Sensitive Diagnostics: Developing diagnostic criteria that recognize and accommodate gender-based differences in ASD presentation is essential. Customizing these frameworks for cultural contexts can improve early detection.

- Awareness campaigns that educate parents, teachers, and healthcare providers about the diverse presentations of autism spectrum disorder (ASD) can significantly help reduce underdiagnoses, especially among females.
- Policy-Level Interventions: Government-led initiatives, such as routine ASD screenings at community healthcare centers, can bridge diagnostic and treatment gaps in underserved areas.
- Further research involving the expansion of studies to encompass additional regions and populations within Sri Lanka is imperative for developing a comprehensive understanding of ASD prevalence and presentation.
- By addressing these gaps, we can reduce gender and geographical disparities in ASD diagnosis and care, ensuring equitable opportunities for affected children to thrive.

4.2. Practical Applications

The findings of this study offer several practical applications that can be implemented to address the observed gender disparities and improve ASD care in rural Sri Lanka

4.2.1. Community Awareness Programs

- Implementation: Develop and conduct workshops targeting parents, teachers, and healthcare providers to improve awareness of ASD symptoms, particularly in females, who may exhibit subtler behaviours.

- Impact: Increased awareness can lead to earlier recognition and intervention, improving developmental outcomes for children.

4.2.2. Gender-Sensitive Diagnostic Frameworks

- Implementation: Design and disseminate culturally appropriate diagnostic tools tailored to capture gender differences in ASD presentation. Collaborate with healthcare professionals to train them on these tools.
- Impact: More accurate and inclusive diagnosis across genders, reducing underdiagnoses in females and improving access to specialized interventions.

4.2.3. School-Based Screening Programs

- Implementation: Introduce ASD screenings in schools and preschools as part of regular health check-ups. Use simplified screening questionnaires adapted to rural contexts.
- Impact: Early detection at the school level can lead to timely referrals and interventions, especially for children in underserved areas.

4.2.4. Policy Advocacy for Routine ASD Screening

- Implementation: Collaborate with policymakers to incorporate ASD screening into national healthcare programs. Emphasize enhancing diagnostic and therapeutic resources in rural healthcare facilities.
- Impact: Routine screenings will ensure early identification of ASD, reducing delays in diagnosis and treatment for both genders.

4.2.5. Culturally Sensitive Interventions

- Implementation: Develop interventions that honor local cultural norms while tackling the stigma linked to neurodevelopmental disorders. For example, community-based support groups can promote understanding and help reduce isolation for families.
- Impact: Improved community acceptance and support systems can encourage families to seek early diagnosis and treatment.

4.2.6. Longitudinal Research and Data Collection

- Implementation: Create a database to track ASD cases in Batticaloa and similar rural districts, monitoring prevalence, diagnostic trends, and treatment results over time.
- Impact: Ongoing data collection will support future research and help shape targeted healthcare efforts for children with ASD.
- By integrating these applications into healthcare, education, and policy frameworks, we can make significant progress toward reducing diagnostic disparities and ensuring equal access to ASD care in Sri Lanka.

4.3. Comparison with Global Studies

The findings of this study align with international research showing a strong male predominance in autism spectrum disorder (ASD) diagnoses. For example, studies in high-income countries, including the United States, report a male-to-female diagnosis ratio of about 4:1 (Shaw, 2023). Similarly, Zeidan et al. (2022) highlight the global consistency of this ratio, citing both biological factors and diagnostic biases.

On the other hand, the Batticaloa study highlights unique challenges typical of low-resource settings. Cultural stigmas and limited awareness greatly influence diagnostic practices in rural Sri Lanka, where females with ASD are often overlooked because of societal expectations about gendered behavior. For example, traits like shyness or introversion in females might be seen as culturally acceptable rather than as signs of a developmental disorder (Hull et al., 2020).

Studies from other regions of Sri Lanka, like Sivayokan et al. (2023) in Northern Sri Lanka, also show a similar male predominance. They highlight delayed speech and communication difficulties as the main parental concerns, which align with this study's findings. Unlike urban areas with higher diagnostic rates due to better healthcare access, Batticaloa encounters extra challenges caused by poor infrastructure and a shortage of trained professionals.

Globally, the underdiagnosis of females with ASD remains a persistent issue. Research by Nowell et al. (2015) identifies that diagnostic criteria, primarily developed for males, often fail to capture the nuanced presentations seen in females. This issue is magnified in resource-poor settings like Sri Lanka, where awareness and resources are limited.

This comparative perspective underscores the importance of context-sensitive solutions. While global research offers valuable insights into gender-based disparities, localized efforts must address cultural, social, and economic barriers to improve diagnostic equity.

5. Conclusion

This study highlights significant gender disparities in the prevalence of autism spectrum disorder (ASD) among children attending special care centers in the Batticaloa district. The findings emphasize the urgent need for targeted awareness initiatives, the development and implementation of gender-sensitive diagnostic tools, and policy-driven strategies to improve healthcare accessibility and equity. Strengthening early detection and intervention frameworks is essential to ensure that all children with ASD, regardless of gender or sociodemographic background, receive timely, appropriate, and comprehensive support.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflicts of interest, financial or non-financial, that could have influenced the design, conduct, or reporting of this study.

Statement of Informed Consent

Written informed consent was obtained from the parents or legal guardians of all participating children. Participation was voluntary, and confidentiality was strictly maintained throughout the research process.

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