

# Knowledge, Attitudes, and Practices (KAP) Study on Autism Spectrum Disorder (ASD) awareness among pediatric residents

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## Abstract

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### Keywords:

- Autism Spectrum Disorder (ASD)
- Pediatric Residents
- Developmental Screening
- ASD Prevalence

## Introduction

ASD is a neurodevelopmental condition characterized by deficits in social communication and restrictive, repetitive behaviors. Early identification and intervention are critical for improving outcomes. Despite increasing awareness, gaps in ASD-related knowledge among pediatric residents persist, affecting early diagnosis and management.

### Aims and Objectives

1. Assessing the residents' understanding of ASD, including its diagnostic criteria, prevalence, and associated factors. 2. Evaluating their attitudes toward ASD, including perceptions, confidence in managing cases, and potential biases. 3. Analyzing current practices in screening and management. 4. To identify obstacles pediatric residents face in ASD diagnosis and care.

### Materials and Methods:

A questionnaire-based survey was conducted across multiple medical institutions in India. Pediatric residents pursuing MD, DNB, and DCH were invited to participate by disseminating the questionnaire through Google Forms. Responses were analyzed statistically using Microsoft Excel, with appropriate tests applied to determine significant variations. Ethical approval was obtained, and informed consent was secured from all participants.

**Results :** A total of 53 pediatric residents participated. The mean knowledge score was 79.23%, indicating a strong theoretical understanding of ASD. However, attitude scores were moderate (49.81%), suggesting gaps in confidence and perceptions. Practice scores were high (91.04%), demonstrating adherence to clinical guidelines. No strong correlations were found between knowledge, attitudes, and practices, indicating that higher knowledge did not necessarily translate into improved attitudes or clinical confidence.

**Conclusions:** While pediatric residents exhibit strong knowledge and clinical practices regarding ASD, their attitudes remain moderate, highlighting the need for improved training programs. Enhancing autism-specific education and increasing clinical exposure through structured workshops and interactive sessions can solve this issue.

## Introduction

ASD is a group of complex neurodevelopmental disorders marked by difficulties in social communication and interaction, as well as repetitive behaviors, restricted interests, and structured activity patterns<sup>[1,2,3]</sup>. Previously, ASD was classified into subtypes like autistic disorder, Asperger syndrome, and pervasive developmental disorder-not otherwise specified (PDD-NOS), but these are now considered under the broader ASD diagnosis in DSM-5<sup>[4]</sup>.

According to the World Health Organization (WHO), approximately 1 in 160 children worldwide has ASD. Studies suggest variability in ASD prevalence based on geographic factors, with some findings indicating higher rates in rural areas<sup>[5]</sup>. In India, a study conducted in Chandigarh found that 2.25 per 1000 children are diagnosed with ASD<sup>[6]</sup>. Males are more prone to ASD than females, with a male-to-female ratio of approximately 3:1<sup>[7]</sup>.

ASD arises from a combination of genetic predisposition and environmental influences. A meta-analysis reported that if one identical twin has ASD, the chances of the other twin being affected range from 64% to 91%<sup>[8]</sup>. The Interactive Autism Network also reported that identical twins often share similar levels of autistic traits, reinforcing the genetic influence on ASD<sup>[8]</sup>. Mutations in genes such as CHD8, DYRK1A, and SHANK3 are among those identified in individuals with autism<sup>[9]</sup>. Genetic research distinguishes between syndromic autism, which is associated with other genetic syndromes like Rett syndrome, Fragile X syndrome, and Tuberous Sclerosis Complex, and non-syndromic autism, which occurs without other identifiable syndromic conditions<sup>[10]</sup>.

Prenatal and perinatal factors such as older parental age at the time of conception, maternal illnesses during pregnancy, extreme prematurity, low birth weight, and complications during birth such as hypoxia have been linked to an increased risk of autism<sup>[11]</sup>. Exposure to hazardous environmental substances, such as lead and mercury, pesticides, and air pollutants, during critical periods of brain development may contribute to the risk<sup>[12]</sup>.

ASD is characterized by two primary domains of core symptoms:<sup>[4]</sup>

1. Social Communication Challenges
2. Restrictive and Repetitive Behaviors

The various diagnostic methods available are:<sup>[13]</sup>

1. Developmental Screening
2. Comprehensive Diagnostic Evaluation
3. Additional Assessments
  - Hearing and Vision Tests
  - Genetic Testing
  - Speech and Language Evaluation

Effective ASD management relies on multidisciplinary interventions, including:

1. Applied Behavior Analysis: Involves detailed behavioral assessments and individualized intervention plans.
2. Speech Therapy: Targets both verbal and non-verbal communication deficits.
3. Occupational Therapy: Helps individuals with autism improve skills needed for daily living.

Some special educational Strategies for children suffering from ASD include:

1. Individualized Education Plans
2. Visual Supports
3. Structured Teaching

Awareness of ASD among medical practitioners, and the general public varies significantly across regions and professions. Awareness among healthcare professionals can lead to timely and accurate diagnosis, which is essential for accessing early support measures that can significantly improve a child's developmental trajectory<sup>[11]</sup>. Educated communities are better equipped to support individuals with autism, from recognizing early signs to advocating for necessary resources and accommodations in educational and social settings<sup>[14]</sup>.

The relevance of this study is rooted in its potential to enhance pediatric practice and patient outcomes. Increased understanding and acceptance of autism can lead to better support systems, greater advocacy for resources, and enhanced quality of life for autistic individuals and their loved ones.

## Aim and Objectives

### Aim

To assess the knowledge, attitudes, and practices

(KAP) of pediatric residents regarding Autism Spectrum Disorder (ASD).

### Objectives

1. To evaluate knowledge of ASD, including its diagnostic criteria, clinical presentation, risk factors, and available interventions among residents of Pediatrics.
2. To assess their attitudes towards ASD, including perceptions of children with autism, confidence in managing ASD cases, and any existing misconceptions or biases.
3. To analyze current clinical practices among pediatric residents related to ASD.
4. To identify challenges and barriers faced by pediatric residents in diagnosing and managing ASD, such as inadequate training, lack of resources, and systemic limitations.

### Materials and Methods:

#### Study Setting:

This is a study conducted among pediatric residents across various medical institutions in India.

#### Study Design:

A cross-sectional, questionnaire-based study designed to assess the knowledge, attitudes, and practices (KAP) regarding ASD.

#### Study Period:

This study took place over three months, from January 2025 to March 2025.

#### Study Population:

The study population consists of pediatric residents from medical institutions across India who are currently pursuing:

- MD (Doctor of Medicine)
- DNB (Diplomate of National Board)
- DCH (Diploma in Child Health)

#### Inclusion Criteria:

- Pediatric residents currently enrolled in medical colleges across India.
- Residents who voluntarily agree to participate and provide informed consent.

#### Exclusion Criteria:

- Pediatric residents who have completed their final examination and are no longer in training.
- Residents who do not provide consent for participation.

#### Sampling Technique:

A convenience sampling method will be used to recruit participants. The questionnaire will be disseminated electronically.

#### Data Collection Tool:

A Google Forms-based questionnaire will be used to collect responses from participants. The questionnaire is designed to evaluate knowledge, attitudes, and practices related to ASD.

#### Methodology:

Study participants will receive a structured, self-administered questionnaire via digital platforms. The responses will be collected electronically and compiled for further analysis.

#### Data Analysis:

- The data will be meticulously collected, expertly compiled, and rigorously analyzed using Microsoft Excel.
- Additionally, appropriate statistical tests will be applied to find any variations.

#### Ethical Considerations:

In adherence to ethical principles, this research study will ensure voluntary participation through an informed consent.

#### Results:

A total of 53 pediatric residents from various institutions in India participated in this study. The following observations were recorded (Table 1–4).

The mean scores for each domain of the KAP study were as follows:

Among the 53 pediatric residents in the study, 72.9%, 18.8% and 8.3% were pursuing MD, DCh and DNB degrees (Table 1).

**Table 1. Distribution of Pediatric Residents by Course Pursued:**

Course Pursuing	Number	Percentage
MD	39	72.9%
DCh	10	18.8%
DNB	4	8.3%

**79.23% of the knowledge based questions were answered correctly** (Table 2).

**Table 2. Responses to Knowledge-Based Questions on ASD:**

Knowledge about ASD	Number	Percentage
1.What kind of a disease is ASD?		
• Autoimmune	0	0
• Metabolic	0	0
• Neurodevelopmental	53	100
• Degenerative	0	0
2.ASD always has a genetic cause.		
• True	4	7.54
• False	49	92.45
3.What is the prevalence of ASD in India?		
• 1 in 1000 children	15	28.30
• 1 in 50 children	14	26.41
• 1 in 500 children	14	26.41
• 1 in 250 children	10	18.87
4.Which among the following is seen to be associated with ASD?		
• Mental retardation	22	41.50
• Reduced danger awareness	27	50.94
• Seizures	3	5.66
• Increased sexual drive	1	1.89
5.Name three symptoms or signs of ASD. (Multiple answers)		
• Repetitive behavior	26	NA
• No eye contact	14	NA
• Social isolation	34	NA
• Language delay	24	NA
• Sensory problems	3	NA
• Attention to detail	1	NA
• Self harm	2	NA
• Hyperactive	3	NA
• Poor school performance	2	NA
• Poor attention	4	NA
• Sensitivity to sound	1	NA
6.What is the best way to manage ASD?		
• Behavioral therapy	52	98.11
• Medications	1	1.89
• Hospitalisation	0	0
• Isolation from other children	0	0

7.What are the major reasons for the increasing prevalence of ASD? (Multiple answers)		
• Increased awareness	7	NA
• Increased screentime	24	NA
• Nuclear families	13	NA
• Genetic factors	5	NA
• Environmental factors	4	NA
• Poor parenting	7	NA
• Single child	3	NA
• Better diagnostics	2	NA
• Widespread screening	3	NA
8.What is your source of information about ASD?		
• Newspapers and Journals	2	3.77
• Medical textbooks	29	54.71
• Physicians and health care workers	17	32.07
• Internet	3	5.66
• Social media	1	1.89
• Parent of autistic child	1	1.89
9.ASD is more common in boys than girls		
• True	46	86.79
• False	7	13.20
10.Onset of ASD is usually in		
• Childhood	34	64.15
• Infantile period	18	33.96
• Neonatal period	1	1.89
11.Blood investigations are required for the confirmation of diagnosis of ASD		
• False	51	96.22
• True	2	3.77
12.ASD is not just a disease of children but could also progress into adulthood		
• True	50	94.34
• False	3	5.66
13.Which investigation is least useful in the routine workup of ASD?		
Thyroid function tests	2	3.77
Serum lead levels	7	13.20
Genetic testing	2	3.77
Complete blood count	42	79.23

Although the correct prevalence of ASD in India is 1 in 50 children, only 26.41% of respondents identified this correctly, indicating a gap in awareness.

Although mental retardation is the most accurately recognized association with ASD (41.50%), more than half of the respondents selected other options, highlighting gaps in understanding.

While ASD typically begins in the infantile period, only 33.96% of respondents identified this correctly, with the majority (64.15%) selecting childhood and a small minority (1.89%) incorrectly choosing the neonatal period.

**49.81% of the attitude based questions were answered correctly** (Table 3).

**Table 3. Responses to Attitude-Based Statements About ASD:**

Practice about ASD	Number	Percentage
1. Routine screening and social awareness programmes are needed for ASD at schools and kindergartens.		
• Strongly agree	36	67.92
• Agree	15	28.30
• Disagree	1	1.89
• Strongly disagree	1	1.89
2. Mainstream schools should provide children with ASD the necessary accommodations and support.		
• Strongly agree	14	26.41
• Agree	26	49.05
• Disagree	13	24.53
• Strongly disagree	0	0
3. Allowing parents to be present in the classroom can enhance the support that kindergartens provide for children with ASD.		
• Strongly agree	8	15.09
• Agree	30	56.60
• Disagree	15	28.30
• Strongly disagree	0	0
4. Preschools should employ specialized educators and therapists to assist children with ASD in their learning environment.		
• Strongly agree	28	52.83
• Agree	21	39.62
• Disagree	1	1.89
• Strongly disagree	3	5.66
5. Health insurance policies need modifications to ensure they provide coverage for ASD?		
• Strongly agree	21	39.62
• Agree	28	52.83
• Disagree	4	7.55
• Strongly disagree	0	0

The vast majority of respondents (96.22%) supported the need for routine screening and social awareness programs for ASD in schools and kindergartens, with 67.92% strongly agreeing and 28.30% agreeing, while only 3.78% disagreed.

A significant majority (92.45%) favored the inclusion

of special education teachers and therapists in preschools for children with ASD, with 52.83% strongly endorsing the idea and 39.62% agreeing, while only a small fraction (7.55%) opposed it.

**91.04% of the practice based questions were answered correctly** (Table 4).

**Table 4. Responses to Practice-Based Questions Regarding ASD:**

Practices regarding ASD	Number	Percentage
1. Do you know anyone who is possibly suffering from ASD?		
• Yes	23	43.40
• No	30	56.60
2. How would you feel if you were to spend some time with someone who is having ASD?		
• I would spend time to understand more about ASD	51	96.23
• Comfortable, because I feel I myself too have ASD	2	3.77
• I would prefer not to spend time because I am worried I might also develop some traits of ASD from him/her	0	0
• I would absolutely not spend time because they might harm me	0	0
3. If you were to come across a person suffering from ASD, what are the ways in which you would help him/her to have a better social life?		
• Teach them to greet people	4	7.56
• Simple story method to explain life situations	2	3.77
• Advise behavioral therapy	13	24.53
• Reduce screen time	7	13.21
• Neurodevelopmental screening	3	5.66
• Parental counselling	3	5.66
• Structured classroom program advisory	1	1.89
• Give comfort to express himself/herself	7	13.21
• Help with daily needs	3	5.66
• Improve family time	4	7.56
• Communication exercises	6	11.32
4. Would you attend a workshop or training on ASD if you were given an opportunity?		
• Yes	52	98.11
• No	1	1.89

A notable 43.40% of respondents reported knowing someone who may have ASD, while the majority (56.60%) did not.

An overwhelming majority (96.23%) expressed a willingness to spend time with an autistic individual to better understand autism.

a. **Knowledge (K) Score** (out of 13): Mean = 10.30, Median = 10, SD = 1.88

b. **Attitude (A) Score** (out of 5): Mean = 2.49, Median = 3, SD = 1.09

c. **Practice (P) Score** (out of 4): Mean = 3.64, Median = 4, SD = 0.48

These findings indicate that while knowledge about ASD is high (79.23%) and practices are well-adopted (91.04%), attitudes remain moderate (49.81%), suggesting areas for improvement in perceptions and confidence in managing ASD. (As illustrated in Figure 1)

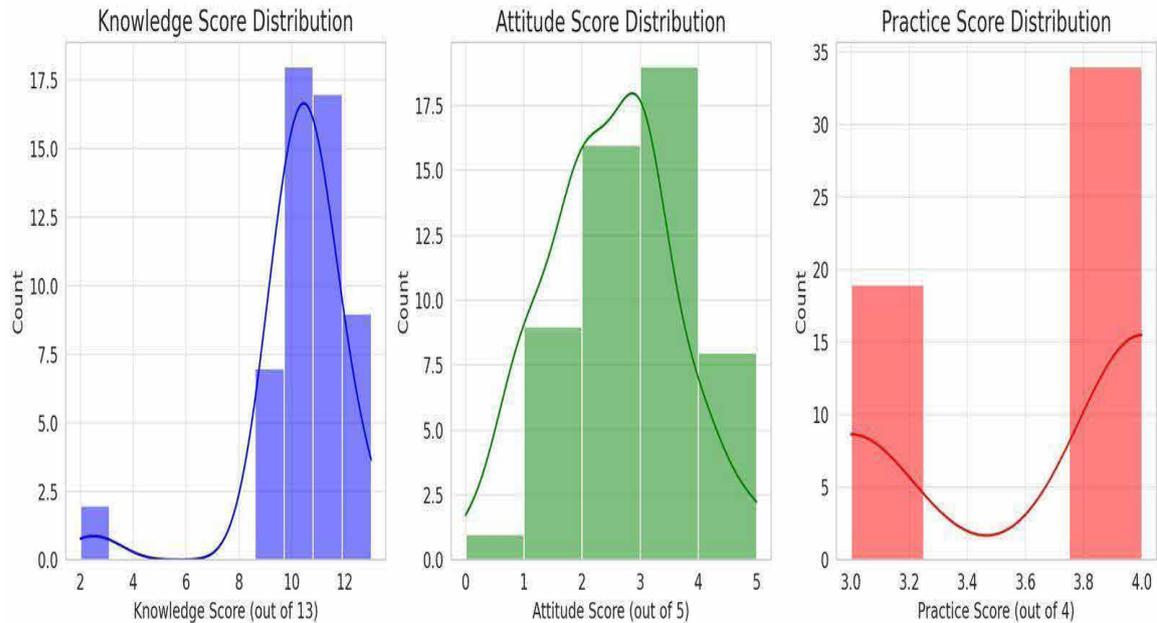
**Pearson correlation tests revealed:**

- Knowledge vs. Attitude: 0.058 (very weak correlation)

- Knowledge vs. Practice: -0.090 (very weak correlation)

- Attitude vs. Practice: 0.048 (very weak correlation)

These results indicate no strong correlation between K, A, and P scores, meaning better knowledge does not necessarily lead to improved attitudes or practices.



**Figure 1. Distribution of Knowledge, Attitude, and Practice Scores Among Pediatric Residents**

**Discussion:**

The study highlights that ASD is widely recognized as a neurodevelopmental disorder, though misconceptions about its cause persist. While 92.45% correctly identified that ASD does not always have a genetic cause, awareness regarding its prevalence in India was varied, with only 26.41% selecting the correct estimate (1 in 50 children).

41.50% identified mental retardation as a common comorbidity of ASD, though other factors such as reduced danger awareness (50.94%) were also mentioned. The most commonly recognized symptoms included social isolation (34%) and repetitive behavior (26%) reflecting general awareness of autistic traits.

A vast majority (98.11%) correctly identified behavioral therapy as the best management

approach. Similarly, physicians express mixed views on alternative methods in ASD, with some approaches lacking scientific validation<sup>[15]</sup>. Misconceptions regarding the diagnostic process exist, as 3.77% incorrectly believed blood investigations were required. Encouragingly, 94.34% acknowledged that ASD persists into adulthood, reflecting an understanding of its lifelong nature.

The study also explored perceptions of ASD in educational settings. While 96.22% supported routine screening and awareness programs in schools, and 92.45% advocated for special educators in preschools, fewer respondents (75.46%) supported full inclusion of autistic children in regular schools. 71.69% agreed that parents should be allowed in classrooms.

When examining perceived factors behind the

increasing prevalence of ASD, the most cited reasons were increased screen time (24), nuclear families (13), and increased awareness (7).

In terms of social interactions and attitudes, 43.40% reported knowing someone with ASD, and 96.23% expressed willingness to engage with autistic individuals to understand them better. When asked about supporting autistic individuals, behavioral therapy (24.53%) was the most recommended approach, followed by reducing screen time (13.21%). Encouragingly, 98.11% were open to attending ASD workshops, reflecting strong interest in learning more.

Overall, the findings suggest good general awareness of ASD but reveal gaps in knowledge. Similar patterns have been reported in Indian studies exploring beliefs among healthcare disciplines<sup>[16]</sup>. While awareness of ASD among healthcare professionals is widespread, knowledge gaps persist in key areas such as early diagnosis and intervention strategies<sup>[17,18]</sup>. A systematic review found that healthcare providers' knowledge of ASD varied significantly, with correct response rates ranging from 47.37% to 71.05% on ASD knowledge assessments, indicating a need for enhanced training<sup>[19]</sup>. In some regions, such as Australia, about 62% of general practitioners achieved a high score in ASD knowledge tests<sup>[20]</sup>, while in the USA, a substantial proportion of both pre-qualified medical students and practicing clinicians rated their knowledge as merely 'somewhat informed' or lower<sup>[19]</sup>. The lack of specialized healthcare professionals, such as developmental pediatricians and child psychologists, can hinder timely and accurate diagnosis and effective treatment<sup>[21]</sup>. Cultural perceptions and linguistic barriers can hinder ASD awareness, leading to underreporting and delayed interventions<sup>[22]</sup>.

The results align with previous studies showing that healthcare professionals often have sufficient knowledge about ASD but may lack confidence in its management<sup>[23]</sup>. Despite high knowledge scores, moderate attitudes indicate possible misconceptions or lack of hands-on exposure. Factors like firsthand engagement with individuals diagnosed with ASD and demographic elements influence attitudes and knowledge levels. A study found that direct interaction with autistic

individuals is a significant predictor of positive attitudes, although knowledge alone, without such contact, did not consistently predict positive attitudes across different ethnic groups<sup>[14]</sup>.

Future training programs should focus on improving attitudes by incorporating real-world case discussions, role-playing, and patient interactions. Surveys indicate that many residents feel inadequately prepared to address ASD, with deficiencies in their ability to conduct developmental screenings and manage ASD-related care<sup>[24,25]</sup>. Enhancing training programs to include comprehensive, evidence-based education on ASD can improve early detection rates and the overall quality of care provided to autistic children<sup>[26]</sup>.

## Conclusion

The study reveals a complex landscape of strengths and areas for growth among pediatric residents. Overall, these residents demonstrate solid knowledge of ASD, suggesting they are well-versed in its core characteristics, diagnosis, and general management. Their clinical practices, how they apply this knowledge in real-world settings, are also commendable, indicating effective patient handling and adherence to established medical protocols.

However, the study identified only a moderate level of attitude towards individuals with ASD. This suggests a potential emotional or empathetic disconnect that could influence patient-family interactions or long-term commitment to ASD care. Interestingly, there was no significant correlation found between knowledge, attitude, and practice. In essence, possessing more knowledge didn't necessarily lead to better attitudes or improved clinical behavior, and vice versa.

## Key Findings:

- Pediatric residents have good knowledge but only moderate attitudes towards ASD
- Clinical practices related to ASD management are good
- No significant correlation was found between knowledge, attitude, and practice meaning that one does not affect the other

## Recommendations:

1. Incorporate mandatory autism training into Pediatric residency programs which is holistic in nature that not only builds knowledge and skills

but also fosters empathy, cultural competence, and reflective practice.

2. Increase clinical exposure through ASD-specific rotations.

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