

Prevalence and Characteristics of Autism Spectrum Disorder: A Retrospective Analysis of Hospital-Based Patient Cohort

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Abstract

Introduction: Autism spectrum disorders are marked by socialising and communication barriers as well as repeatable, restricted, and stigmatised behavioural patterns

Objectives: This paper describes a retrospective case series study of developmental disability cases to assess autism in patients of various ages

Methods: The patients' age, sex, type, location of residence, severity of condition, and year of birth were recorded. Moreover, the time and mode of onset and clinical feature category were analysed and statistically assessed for several clinical factors.

Results: Initial symptoms appeared in 43.7% of the children aged one to five years and 41.6% of the children aged six to ten years. Moreover, the varying autism challenges faced by individuals of various ages were investigated. The youngest patient was a one-year-old toddler, while the oldest was a 20-year-old man. It was found that teenagers and young adults were diagnosed at a considerably earlier age than younger children. The greatest apparent variation in the diagnosis stage by patient age was seen in adolescents with PDD-NOS, followed by those with autism and Asperger's syndrome. Currently, the treatment patterns and interventions for patients with autism are aimed at reducing symptoms that interfere with their daily functioning and quality of life. Consequently, therapeutic approaches invariably encompass several practitioners and are customised to an individual. The patients in the study were administered a variety of rehabilitation therapies based on the degree of their disorder, along with atypical antipsychotics such as Atomoxetine (Strattera), Methylphenidate (Concerta), and Risperidone to manage the severity of the disorders.

Conclusions: The above survey results facilitate a slightly earlier diagnosis of this developmental disorder, which will also be valuable to prescribers. The primary limitations of this study are a lack of statistics describing the prevalence of autism spectrum disorders and their therapeutic interventions in Saudi Arabia, as well as a lack of previous research on the research topic in Saudi Arabia.

Keywords: Autism Spectrum Disorder. Pervasive Developmental Disorders. American Psychiatric Association. Attention Deficit/Hyperactivity Disorder

1. Introduction

Autism Spectrum Disorder (ASD) is a lifelong neurological condition characterized by a multitude of symptoms, including persistent challenges in social engagement, restricted and repetitive behaviour patterns, impaired communication of actions, and atypical sensory responses [1]. ASD is further characterized by social dysgraphia, repetitive behaviour patterns, and heightened focus on specific interests. The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) consolidated various conditions, including autistic disorder, Asperger syndrome, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified, under the umbrella diagnosis of ASD [2]. Although ASD was once considered rare, its prevalence has been steadily increasing [2]. According to the Centre's for Disease Control and Prevention (CDC), in a surveillance area encompassing 11 regions, approximately one in every 68 children is diagnosed with a

developmental disability, with a male-to-female ratio of 4.5-to-1.2 [3]. The World Health Organization (WHO) estimates a global prevalence of ASD at 0.76%, impacting around 16% of children worldwide [4]. In the United States, as per the CDC, 1 in 59 children aged 8 years is diagnosed with ASD. Parent-reported ASD diagnoses in the U.S. in 2016 averaged 2.5%, indicating a slight increase [4]. Additionally, data from the Autistic Spectrum Disorder Monitoring Network (ADDM) suggest a notable increase in the incidence of autism spectrum disorders in the United States between 2000-2002 and 2010-2012, although the prevalence has stabilized in recent years [5]. ASD affects individuals across racial, cultural, and socioeconomic groups, though the diagnosis rates vary. Notably, Caucasians receive ASD diagnoses more frequently than Hispanics [6], potentially influenced by factors such as stigma, access to treatment, and language barriers. Recent research, excluding DSM-5 criteria, indicates that the true male-to-female ratio may be closer to 3:1, challenging the previously reported 4:1 ratio [7]. Girls meeting ASD criteria are more likely to remain undiagnosed due to their ability to "camouflage" social deficits, a phenomenon that delays timely diagnosis [8]. Genetic conditions such as Fragile X, tuberous sclerosis, Down syndrome, Rett syndrome, and others show higher rates of co-occurring ASD, though they represent a small proportion of all ASD cases [5]. Studies on sex chromosomal aneuploidy have identified a specific social functioning profile in males that predicts a higher susceptibility to autism. Furthermore, specific chromosomal regions, including X, 2, 3, 7, 15, 16, and 22, are associated with an elevated risk of ASD, largely due to the growing use of chromosomal microarrays. Advanced parental age and preterm birth are additional risk factors, possibly linked to the increased likelihood of gamete mutations [9]. The rise in ASD prevalence may be attributed, in part, to evolving diagnostic criteria preceding the release of DSM-5 and increased social isolation [10]. The incidence of autism spectrum disorders varies significantly based on geographical location, socioeconomic status, and evaluation methods [11]. In the Arab world, including the Kingdom of Saudi Arabia (KSA), ASD prevalence appears higher compared to other developing countries, with substantial numbers of verified cases and likely many undiagnosed cases [12]. Nonetheless, limited research exists on the frequency of ASD within different areas and cities in the KSA, including its relationship with demographic, socioeconomic, and family history variables [12]. ASD presents with a wide range of clinical manifestations, making diagnosis challenging and necessitating input from parents and a diverse medical/paramedical team [13,14]. Additionally, individuals with ASD often experience comorbid conditions, such as seizures, gastrointestinal problems, and sensory impairments, further complicating diagnosis and treatment [15, 16]. While there is no cure for ASD, behavioural and communication techniques tailored to individual needs can help manage symptoms and improve outcomes, especially when initiated early [17]. Given the potential for overlapping symptoms with other conditions like attention deficit hyperactivity disorder (ADHD), personalized treatment focusing on specific needs is crucial [18, 19]. This study aims to investigate the prevalence of ASD and associated risk factors, particularly in the Al-Baha region of Saudi Arabia. While the exact aetiology of ASD remains unknown, both genetic and environmental factors play significant roles. The study also seeks to raise awareness about ASD in the community, emphasizing the importance of early intervention and support for affected individuals and their families to enhance their quality of life.

2. Methods

This descriptive retrospective case-series study aimed to evaluate the severity of autism spectrum disorders (ASD) and the interventions provided in different healthcare facilities within the Al-Baha region. The study involved a retrospective case series of children aged 1-15 years who were diagnosed with ASD at the age of 1 year. Data for this study were primarily collected from the Psychiatric Hospital in Bhaljureshi, as well as rehabilitation and life skill centres located in the Al-Baha region of the Kingdom of Saudi Arabia. This region encompasses several governorates, including Baljurashi, Al-Mandaq, Al-Aqiq, Al-Makhwah, and Qilwa. The dataset comprised a total of 423 patients diagnosed with various types of autism spectrum disorders, categorized based on the severity of signs and symptoms observed in the patients. Data collection spanned from August 2019 to August 2022 and involved reviewing patient records containing information about ASD and the therapeutic interventions administered to mitigate its effects. Ethical clearance was obtained for data collection, and the hospital's autism centre, which includes the Psychology Clinic and Child Psychiatric Clinic, provided relevant patient information. Medical records were accessed through an electronic hospital information system. A structured form was used to collect and document demographic information such as age, gender, place of residence, diagnosis, type of

disorder, and treatment outcomes. Statistical analysis was conducted using the SPSS/PC statistical program, and descriptive statistics, including simple frequency tables, means, and standard deviations, were generated. Inferential statistics employed chi-square tests to compare categorical variables, with a significance level set at $p < 0.05$. Figure 1 illustrates the distribution of various reproductive disorders among the patients and provides a graphical representation of the comprehensive retrospective study on various autism spectrum disorders and their corresponding treatment regimens.

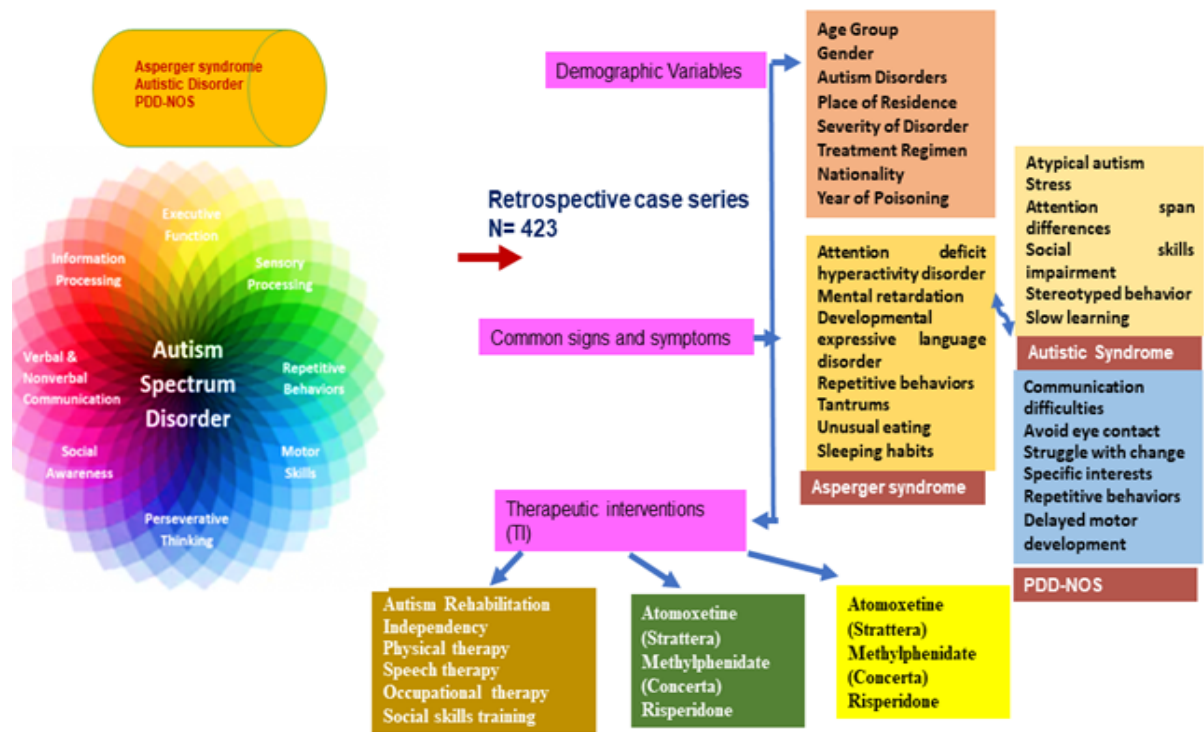


Figure 1: Graphical representation of various types of autism spectrum disorders among patients and possible therapeutic interventions provided in hospitals. “N” specifies total number of cases. “TI” signifies therapeutic interventions and “ASD” signifies autism spectrum disorders

3. Results

The hospital conducted an observational study encompassing 423 cases of individuals diagnosed with autism spectrum disorders (ASD). The study encompassed a diverse range of ASD subtypes. Data pertaining to various descriptive attributes, such as age, gender, geographic residence, disease severity, therapeutic interventions, nationality, and the year of diagnosis for individuals within the autism spectrum, were systematically collected and subsequently summarized in Table 1

Table 1. Demographic Characteristics of Autism Spectrum Disorders among Patients.

Variables categories	Frequency	%
Age Group		
1-5	186	43.7
6-10	176	41.6
11-15	58	13.8
16-20	4	0.5
Gender		

Male	278	65.7
Female	145	34.3
Autism Disorders		
Asperger Syndrome	172	40.6
Autistic disorder	135	31.9
PDD-NOS	116	27.42
Place of Residence		
Al-Aqiq	4	0.9
Al-Baha	262	61.9
Al-Gara	17	4.0
Al-Hajra	2	0.5
Al-Mandaq	2	0.5
Al-Miha	1	0.2
Al-Mikhwah	12	2.8
Baljurashi	103	24.3
Namerah	1	0.2
Qilwa	19	4.5
Severity of Infection		
Requires support	139	32.8
Requires substantial support	162	38.2
Requires extensive substantial support	122	28.84
Treatment regimen		
Atomoxetine (Strattera)	128	30.3
Methylphenidate (Concerta)	108	25.5
Risperidone	187	44.2
Nationality		
Saudi	343	81.8
Non-Saudi	80	18.9
Year of Drug Poisoning		
2019.0	55	13
2020.0	108	25.5
2021.0	85	20.1
2022.0	175	41.4

Age and Gender

Among the 423 cases examined, a majority, comprising 278 individuals (65.7%), were identified as male, whereas 145 individuals (34.3%) were identified as female, resulting in a male-to-female ratio of approximately 1:1.9. The age distribution within the studied population ranged from a minimum of 1 year to a maximum of 20 years. Specifically, the age group with the highest representation consisted of individuals aged 1 to 5 years, encompassing 186 cases (43.7% of the total), followed closely by the age bracket of 6 to 10 years, which comprised 176 cases (41.6% of the total). Among the study participants, 58 individuals (13.3%) fell within the

age range of 11 to 15 years, while a smaller subset of four patients (0.5%) exhibiting autism disorders were aged between 16 and 20 years (as illustrated in Table 1).

Autism disorders

Our analysis revealed that out of the total sample of 423 patients, a substantial portion, constituting 141 individuals (equivalent to 33.15% of the sample), were diagnosed with Asperger's syndrome, which falls within the category of developmental disorders. Additionally, an equal number of 141 patients, accounting for the same percentage of 33.15%, were identified as suffering from autistic disorder, characterized as a neurological and developmental disorder. Furthermore, the remaining 141 cases, also representing 33.15% of the total, exhibited symptoms consistent with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). This observation underscores the variability in the manifestation of disorders within the autism spectrum, with individuals potentially experiencing a range of disorders characterized by differing levels of severity and associated signs and symptoms (see Table 1 and Figure 2 for further details).

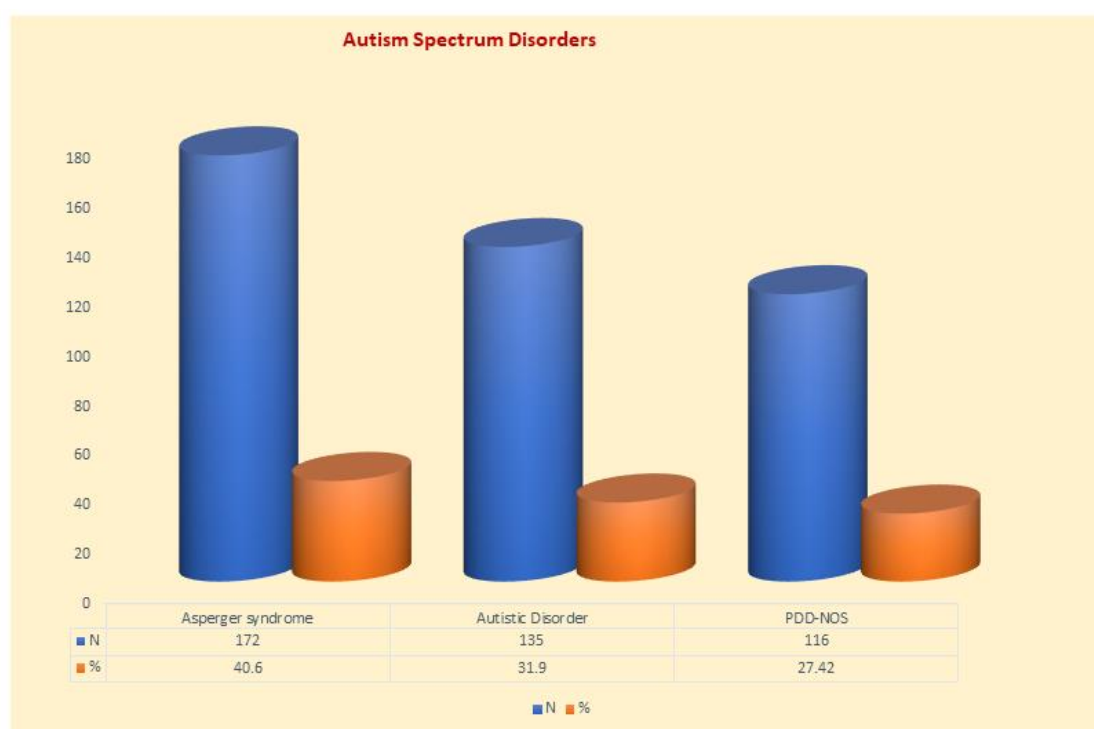


Figure 2: Variations in the Frequency and Percentage of Autism Spectrum Disorder. Series 1 represented by blue colour gives frequency of various types of ASD and series 2 represented by orange colour gives percentage of ASD among various patients

Place of Residence

The prevalence of autism spectrum disorders was observed across multiple regions within Baha Province. Notably, Al-Baha reported the highest number of affected patients, with a total of 262 cases, representing 61.9% of the overall sample. Following closely behind was Baljurashi, with 103 cases, accounting for 24.3% of the cases in the study. The Qilwa region exhibited 19 cases (4.5%), while Al-Gara documented 17 cases, equivalent to 4.0% of the total. In contrast, the Namerah region had the lowest incidence of cases, with just one patient, constituting a mere 0.1% of the sample (refer to Table 1 for a comprehensive breakdown of these findings).

Severity of disorder and supportive system provided

The assessment of the disorder's severity was established through an evaluation of the level of support necessary for each patient. It was discerned that among the patients, 141 individuals, representing 33.3% of the total, were

identified as requiring basic support based on the severity of their condition. Similarly, another 141 patients, also constituting 33.3% of the sample, necessitated substantial support. Finally, the remaining 141 patients, equivalent to 33.3%, demonstrated a need for extensive substantial support (as depicted in Figure 3). This segmentation underscores the range of support requirements among individuals within the study population, reflecting varying degrees of severity in their respective autism spectrum disorders.

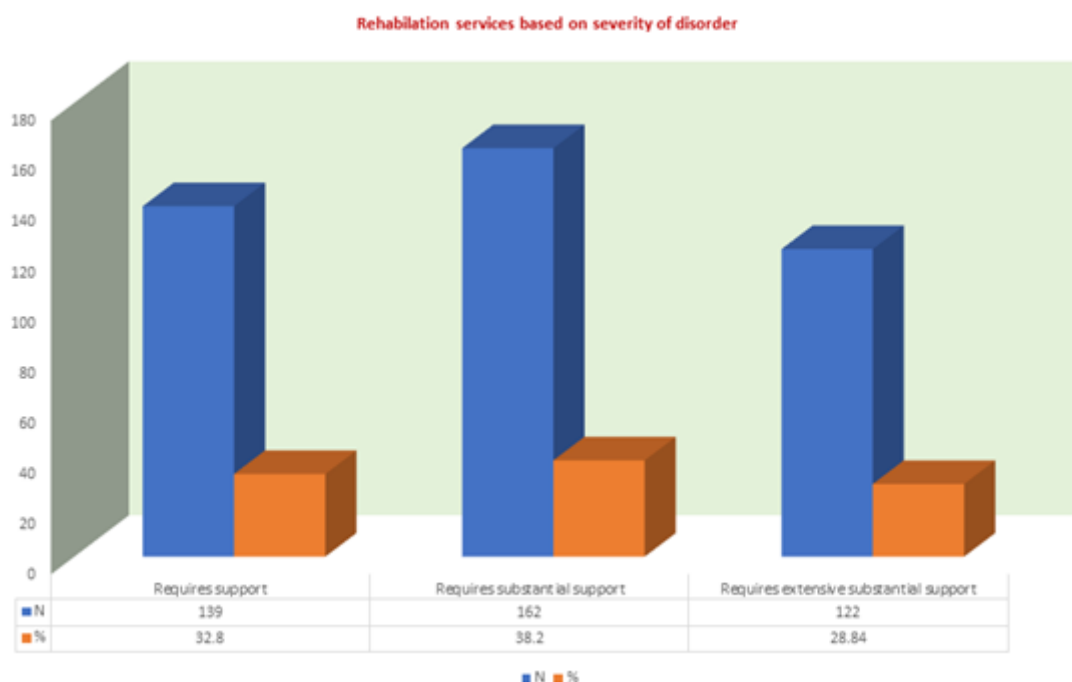


Figure 3: Represents various support system provided to patients on the basis of severity of disorder. As shown series 1 represented by blue colour gives a frequency about supportive system provided to patients based on the type of ASD they are suffering from. Series 2 represented by orange colour depicts percentage of supportive system provide to patients based on severity of ASD type.

Treatment regimen

A variety of treatment protocols were administered, tailored to the specific signs, symptoms, and complications exhibited by the patients. Among these interventions, Risperidone, classified as an atypical antipsychotic medication, was recommended for approximately 187 patients, constituting 44.2% of the total sample. This recommendation was made based on the severity of their condition. In cases of attention deficit hyperactivity disorder (ADHD), a different medication, atomoxetine (marketed as Strattera), was prescribed to 128 patients, accounting for 30.3% of the overall population. Additionally, Methylphenidate, known as Concerta, a central nervous system (CNS) stimulant medication commonly used in the treatment of ADHD, was administered to around 108 patients, representing a success rate of 25.5% (see Table 1 for further details). These therapeutic strategies were employed to address the individualized needs of patients and the specific challenges associated with their conditions.

Nationality and Year of Poisoning

Within the cohort of 423 patients under study, autism spectrum disorders were prevalent in 343 individuals of Saudi nationality, comprising 81.8% of the total cases. In contrast, non-Saudi individuals accounted for 80 cases, representing 18.9% of the sample (as depicted in Figure 3). Furthermore, when examining the data over multiple years, it was observed that in 2022, the number of patients diagnosed with autism spectrum disorders totaled 175, corresponding to 41.45% of the cases. The subsequent year, 2021, saw a total of 85 patients with autism disorders, constituting 20.1% of the sample. In 2019, there were 55 patients diagnosed with autism spectrum disorders,

accounting for 13% of the cases (refer to Table 1 for comprehensive details regarding these findings). These trends highlight the evolving prevalence of autism spectrum disorders over the specified time periods.

Correlation between Autism Disorders According to Various Age Groups

Within the cohort of 423 patients, it was observed that autism spectrum disorders were more prevalent among Saudi individuals, with 343 cases (81.8%), compared to non-Saudi individuals, who accounted for 80 cases, representing 18.9% of the sample (as indicated in Figure 3). When examining the data over several years, the prevalence of autism spectrum disorder varied. In 2022, 175 patients were diagnosed with autism spectrum disorder, comprising 41.45% of the cases, while in the following year, 2021, the total number of patients with autism disorder was 85, constituting 20.1% of the sample. In 2019, 55 patients were identified with a disorder, accounting for 13% of the cases (detailed in Table 1). These fluctuations highlight changes in the prevalence of autism spectrum disorders over time. Statistical analysis indicated a significant difference ($\chi^2=151.33$, $P<0.01$) in the distribution of autistic disorder across different age groups. Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) is a distinct subtype within the autism spectrum disorder spectrum. It is worth noting that individuals with PDD-NOS meet some, but not all, of the ASD criteria. The prevalence of PDD-NOS was highest in the 1-5 age group, with 69 patients, followed by 46 patients in the 6-10 age group, and 26 patients in the 11-15 age group. There were no patients with PDD-NOS in the 16-20 age group. Typically, individuals with PDD-NOS exhibit moderate symptoms of ASD, and it is often referred to as atypical autism (as displayed in Table 2). Conversely, typical autism (autistic disorder) was most commonly found in the 1-5 age group, followed by the 6-10 age group, and the 11-15 age group. There were very few cases of autistic disorder in the 16-20 age group. Regarding Asperger's syndrome, the highest number of patients, totaling 75, were in the 6-10 age group, followed by the 1-5 age group and the 11-15 age group. The 16-20 age group had the lowest number of patients with Asperger's syndrome (detailed in Table 2).

Table 2. AUD Disorders, Signs and Symptoms and Services Provided According to the Patients Age Group.

AUD disorders	1-5	6-10	11-15	16-20	χ^2 (P value)
Asperger Syndrome	51	75	14	1	151.33 (0.01 ^s)
Autistic disorder	66	55	18	1	
PDD-NOS	69	46	26	0	
Clinical Features					151.33 (0.01 ^s)
Attention deficit hyperactivity disorder	66	55	18	1	
Mental retardation					
Developmental expressive language disorder					
Repetitive behaviors					
Tantrums					
Unusual eating					
Sleeping habits					
Atypical autism	69	46	26	0	
Stress					
Attention span differences					
Social skills impairment					
Stereotyped behavior					
Slow learning					
Communication difficulties	51	75	14	1	
Avoid eye contact					

Struggle with change					151.33 (0.01)^s
Specific interests					
Repetitive behaviors					
Delayed motor development					
Severity of autism					
Requires Support	69	46	26	0	
Requires Substantial Support	51	75	14	1	
Requires extensive Substantial Support	66	55	18	1	
Services Provided					
Autism rehabilitation	69	46	26	0	
Independency					
Physical therapy					
Educational based therapy					
Occupational therapy					
Behavioral management therapy					
Autism Rehabilitation	51	75	14	1	151.33 (0.01)^s
Independency					
Physical therapy					
Speech therapy					
Occupational therapy					
Social skills training					
Autism rehabilitation	66	55	18	1	
Independency					
Physical therapy					
Speech-Language therapy					
Occupational therapy					
Behavioral management therapy					
Treatments Provided					
Atomoxetine (Strattera)	1	101	25	1	423.136 0.001^s
Methylphenidate (Concerta)	0	75	33	0	
Risperidone	185	0	0	1	

χ^2 = chi-square analysis; s = significant difference; ns = non-significant difference; significance of P values is in bold

Signs and Symptoms Encountered with Respective to Age Groups

Distinct categories of signs and symptoms were observed in patients presenting with different autism spectrum disorders (ASD). Individuals diagnosed with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) typically exhibited milder symptoms, including variations in attention span, social skill deficits, and a slower learning capacity. These patients are often referred to as atypical autism cases due to the absence of severe symptoms. In contrast, patients with typical autistic disorders typically displayed attention deficit issues along with profound intellectual disabilities. They often exhibited significant developmental and repetitive behavioral challenges, including impaired eating habits. ASD patients, in general, may manifest differences, such as those

associated with genetic factors, although the exact etiology remains unknown. Children diagnosed with Asperger's syndrome exhibited a range of signs and symptoms, including difficulties with social interactions, avoidance of eye contact, and challenges in interpreting social cues and character traits. Statistical analysis revealed a chi-square value of 151.33, indicating a statistically significant difference ($P < 0.01$) among the various categories of autism spectrum disorders (as summarized in Table 2). These findings underscore the diversity in symptomatology and clinical presentations across different ASD subtypes.

Severity of Disorders with Respective to Age Groups

Patients with autism spectrum disorder received a supportive system tailored to the severity of their condition. The level of support provided was categorized as follows:

1. A mild supportive system was extended to patients with atypical autism (PDD-NOS):

For the 1-5 age group, 69 patients received this level of support.

In the 6-10 age group, 46 patients benefited from mild support.

The 11-15 age group included 26 patients who received this type of support (as outlined in Table 2).

2. A substantial supportive system was offered to patients diagnosed with Asperger's syndrome:

In the 1-5 age group, 51 patients were provided with substantial support.

The 6-10 age group had the highest number of patients receiving substantial support, with 75 cases.

Within the 11-15 age group, 14 patients benefited from substantial support.

Additionally, one patient in the 16-20 age group received substantial support (as detailed in Table 2).

3. An extensive substantial supportive system was administered to patients with severe autistic disorder:

Among the 1-5 age group, 66 patients received extensive substantial support.

In the 6-10 age group, 55 patients received this level of support.

For the 11-15 age group, 18 patients were provided with extensive substantial support.

Finally, one patient in the 16-20 age group received extensive substantial support (as depicted in Table 2). These differentiated levels of support reflect the individualized approach taken to address the varying severity and specific needs of patients across different age groups and autism spectrum disorder subtypes.

Rehabilitation and Intervention Services

Therapeutic interventions for autism spectrum disorder (ASD) primarily target the alleviation of symptoms that interfere with daily functioning and overall quality of life. These interventions often entail a multi-faceted approach involving various healthcare providers and are customized to meet the specific needs of individual patients. Rehabilitation services were provided to patients in accordance with the severity of their disorder, ensuring that the interventions were tailored to their unique requirements. Additionally, patients received prescriptions for a range of atypical antipsychotic medications, including Atoxetine (Strattera), methylphenidate (Concerta), and risperidone, with the goal of mitigating the severity of their disorder. Furthermore, a comprehensive analysis of various autism-related issues was conducted, stratified by sex, as detailed in Table 3. This approach allowed for a more nuanced examination of the impact of sex on the presentation and management of ASD-related challenges.

Table 3. Correlation between Characteristics of Autism Disorders According to Gender.

Autism spectrum disorders	Female	Male	χ^2 (P value)
Asperger Syndrome	44	128	34.55

Autistic disorder	73	62	0.001 ^s		
PDD-NOS	28	88			
Signs and Symptoms					
Attention deficit hyperactivity disorder	73	62	34.552 0.001 ^s		
Mental retardation					
Developmental expressive language disorder					
Repetitive behaviors					
Tantrums					
Unusual eating					
Sleeping habits					
Atypical autism	28	88			
Stress					
Attention span differences					
Social skills impairment					
Stereotyped behavior					
Slow learning					
Communication difficulties	44	128			
Avoid eye contact					
Struggle with change					
Specific interests					
Repetitive behaviors					
Delayed motor development					
Severity					
Requires Support	28	88	34.552 0.001 ^s		
Requires Substantial Support	44	128			
Requires extensive Substantial Support	73	62			
Services Provided					
Autism rehabilitation	28	88	34.552 0.001 ^s		
Independency					
Physical therapy					
Educational based therapy					
Occupational therapy					
Behavioral management therapy					
Autism rehabilitation	44	128			
Independency					
Physical therapy					
Speech therapy				73	62
Occupational therapy					
Social skills training					
Autism rehabilitation	73	62			
Independency					
Physical therapy					

Speech-Language therapy			
Occupational therapy			
Behavioral management therapy			
Treatments Provided			
Atomoxetine (Strattera)	38	90	2.847
Methylphenidate (Concerta)	35	73	0.241 ^{ns}
Risperidone	72	115	

χ^2 = chi-square analysis; s = significant difference; ns = non-significant difference; significance of P values is in bold

In our investigation, a statistically significant difference of 0.001 was identified when comparing individuals with autism spectrum disorder (ASD) across genders, with a chi-square value of 34.552 signifying this difference as statistically significant. Notably, within the spectrum, Asperger syndrome and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) exhibited comparable prevalence in both males and females. However, it is worth emphasizing that autistic disorders manifested a higher prevalence in females compared to males. This underscores the substantial gender-related disparity in the prevalence of autism, as illustrated in Table 3. The precise etiological basis for this discrepancy remains elusive, and it is hypothesized to arise from inherent genetic distinctions between the sexes. Furthermore, we observed that clinical manifestations correlated with autism spectrum disorder (ASD) varied by gender. Among females with autistic disorder, 73 individuals displayed comorbid conditions such as attention deficit hyperactivity disorder (ADHD), mental retardation, language disorders, and tantrums, whereas only 62 of the 423 male patients exhibited similar co-occurring symptoms. Conversely, among male patients with Asperger's syndrome, communication difficulties, repetitive behaviours, and delayed motor development were more pronounced, with 28 of the 423 patients presenting these symptoms. These differences were statistically significant, indicated by a p-value of 0.001 and a chi-square value of 34.552, as detailed in Table 3. Consequently, considering the severity of the disorder, we tailored our rehabilitation and treatment approaches. It was observed that males outnumbered females in requiring substantial and mild support, whereas females necessitated more extensive substantial support. Thus, services were administered in accordance with the varying levels of autism spectrum disorder (ASD) severity. Additionally, pharmacotherapy was prescribed differentially based on gender and the specific autism diagnosis. Notably, risperidone and atomoxetine were more frequently prescribed to male patients, while methylphenidate was administered more frequently to female patients. However, there was no statistically significant difference between males and females concerning the administration of pharmacotherapy services, as documented in Table 3. In a separate analysis, we found a statistically significant difference of 0.001, with a chi-square value of 846.0, when examining the relationship between diverse signs and symptoms and autism spectrum disorders among patients (Table 4). Patients diagnosed with PDD-NOS exhibited prominent symptoms including attention deficit hyperactivity disorder (ADHD), mental retardation, repetitive behaviours, and language disorientation. The study identified 172 out of 423 patients presenting with PDD-NOS. Similarly, individuals diagnosed with Asperger's syndrome displayed milder symptoms, primarily characterized by differences in attention span, social skills impairment, and slower learning abilities, with a total of 135 patients falling into this category (Table 4). For patients diagnosed with autistic disorder, significant challenges were noted in communication, eye contact, repetitive behaviour, and motor development delay, with 116 out of 423 patients exhibiting these features (Table 4).

4. Table 4. AUD Disorders with Signs and Symptoms.

Signs and Symptoms	Asperger Syndrome	Autistic Disorder	PDD-NOS	χ^2 (P value)
Attention deficit hyperactivity disorder	0	0	172	
Mental retardation				

Developmental expressive language disorder				846.0 0.001^s
Repetitive behaviors				
Tantrums				
Unusual eating				
Sleeping habits				
Atypical autism	135	0	0	
Stress				
Attention span differences				
Social skills impairment				
Stereotyped behavior				
Slow learning				
Communication difficulties	0	116	0	
Avoid eye contact				
Struggle with change				
Specific interests				
Repetitive behaviors				
Delayed motor development				

χ^2 = chi-square analysis; s = significant difference; ns = non-significant difference; significance of P values is in bold

Patients diagnosed with various autism spectrum disorder (ASD) subtypes have received a variety of antipsychotic medications. Notably, our analysis revealed no statistically significant difference between patients with different ASD subtypes and the specific medications they were prescribed, as indicated in Table 5. Among the total cohort of 423 patients, we observed the following prescription patterns among patients with specific ASD subtypes:

1. Among the 172 patients diagnosed with Asperger's syndrome, 64 patients were prescribed atomoxetine, 43 patients received methylphenidate, and 65 patients were prescribed risperidone (Table 5, Figure 4).
2. Similarly, among the 135 patients diagnosed with autistic disorder, 40 patients were prescribed atomoxetine, 29 patients received methylphenidate, and 66 patients were prescribed risperidone (Table 5, Figure 4).
3. In the case of the 116 patients diagnosed with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), we observed that 24 patients were prescribed atomoxetine, 36 patients received methylphenidate, and 56 patients were prescribed risperidone.

These findings illustrate the diverse medication profiles prescribed to individuals across different ASD subtypes and highlight that there were no statistically significant disparities in medication usage based on the specific ASD diagnosis, as detailed in Table 5.

5. Table 5. Treatment and Disorders.

AUD disorders	N	Atomoxetine	Methylphenidate	Risperidone	χ^2 (P value)
Asperger Syndrome	172	64	43	65	11.242 (0.024 ^{ns})
Autistic disorder	135	40	29	66	
PDD-NOS	116	24	36	56	

χ^2 = chi-square analysis; s = significant difference; ns = non-significant difference; significance of P values is in bold

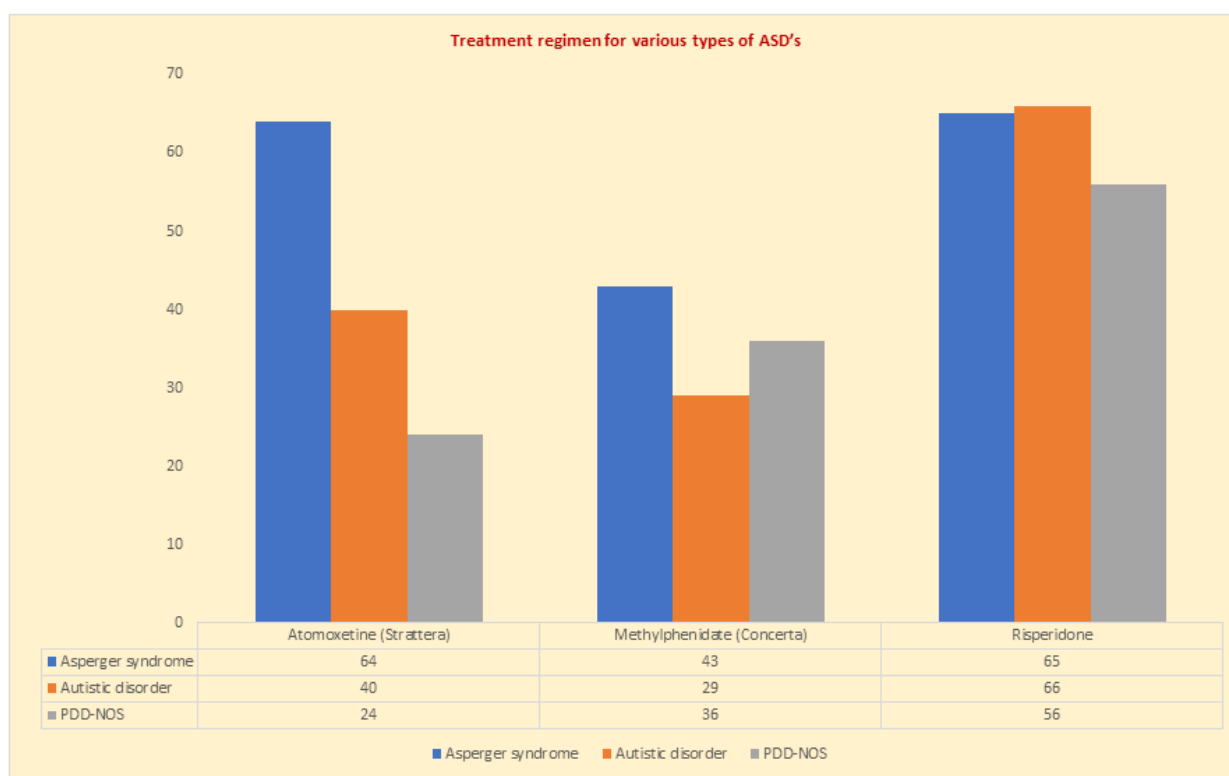


Figure 4: Various types of autism spectrum disorders and therapeutic regimen provided in hospitals. Patients suffering from Asperger syndrome, autistic disorder and PDD-NOS are provided with different therapeutic interventions depending on the type of ASD they are suffering from.

4. Discussion

The results of this investigation elucidate challenges, efficacious methodologies, and therapeutic approaches for individuals diagnosed with autism spectrum disorder (ASD). Moreover, the study offers recommendations for systemic modifications aimed at enhancing the hospitalization experiences of young children with ASD and their families. Notably, our research encompassed a comprehensive sample drawn from a wide-ranging Saudi population, covering the Baha Province and its multifarious locales. Our assessment involved an extensive cohort of patients, allowing us to discern early indicators of ASD and explore previously uncharted associations among various contributing factors.

Our investigation unveiled age-related patterns in the diagnosis of ASD, particularly among children with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), Asperger's syndrome, and Autistic Disorder. Notably, our findings revealed a higher prevalence of autism spectrum disorders among toddlers aged 1 to 5 years. These observations align with both prospective and retrospective studies, corroborating the notion that many children with ASD manifest their symptoms gradually over the initial 18 months of life. [20]. Furthermore, our investigation revealed that male children exhibited a significantly higher likelihood, approximately 65.7% more, of being diagnosed with ASD compared to their female counterparts. It is important to note that our study did not incorporate variables such as higher socioeconomic status or heightened parental concern, which may impact the timing of early ASD diagnoses. Nevertheless, we emphasize the significance of acknowledging gender disparities in ASD prevalence, regardless of whether females or males are more susceptible. Our findings align with prior published research, which has consistently reported a disproportionate ratio of males to females, with males being more prominently represented among individuals diagnosed with autism spectrum disorder. [20].

The findings of our current study underscore the presence of fundamental autistic characteristics, encompassing deficits in social communication and social interaction, coupled with restricted and repetitive patterns of

behaviour, interests, or activities. These core features were discerned not only in individuals with Asperger's syndrome but also in those with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) and Autistic Disorder, albeit with subtle distinctions. Furthermore, the prevalence of Asperger's disorder exhibited a propensity to manifest in adolescent children, while Autistic Disorder and PDD-NOS were more commonly identified in toddlers. To elucidate these patterns, our research employed clinical assessments augmented by developmental screening aimed at identifying children at risk of ASD. Subsequently, such at-risk individuals were referred to specialists for a definitive diagnosis and comprehensive neuropsychological evaluation. Importantly, our study's findings were fortified by a meta-analysis examining the co-occurrence of autism and anxiety disorders among children and adolescents with ASD. [21, 22].

Additionally, within our sample, the most prominently represented categories of early indicators encompassed issues related to social interaction, interpersonal relationships, and language development. These findings align with existing literature in the field, thereby providing further validation for the prevalence and significance of these early indicators in the diagnosis and assessment of individuals with autism spectrum disorder (ASD) [23] and attention deficit complications were more frequent in patients aged between 1 and 6 years. This discovery serves to corroborate the existing body of literature regarding the prevalence of motor delays and motor impairments, which are frequently observed in individuals with autism spectrum disorder (ASD) [24]. Based on the comparative findings, it becomes evident that the clinical presentation of autism is characterized by a spectrum of clustered symptoms rather than a rigid set of diagnostic criteria. Consequently, the accuracy of diagnosis relies more heavily on the capacity to identify and recognize these diverse clusters of symptoms. The robust co-occurrence of these pivotal indicators holds promise as a valuable tool for the early identification of children with autism. Nonetheless, accumulating evidence strongly supports the feasibility and imperative nature of early detection and intervention in addressing autism spectrum disorders [25]. Early detection often paves the way for timely intervention; hence, it is crucial for parents, caregivers, and educators to remain vigilant in identifying ASD symptoms in young individuals. There exists a multitude of therapeutic approaches for addressing ASD, which can be employed either individually or in combination [26]. It is imperative that any therapeutic plan is customized to the specific strengths and weaknesses of the child in question. The early recognition of these particular strengths serves as a valuable resource for educators, enabling them to identify activities that resonate with the child's interests and consequently facilitate the engagement of their unique talents and abilities [27]. Our study aligns with prior research by demonstrating the utilization of diverse interventions for children with autism, encompassing both rehabilitation services and pharmacotherapies. These interventions encompass a range of rehabilitative services tailored to the individual's specific needs, including autism rehabilitation, physical therapy, speech-language therapy, behavioural management therapy, and occupational therapy. The selection of these interventions is contingent upon the severity of the disorder from which the patients are afflicted. Numerous studies have consistently indicated that individuals with autism often exhibit complex behaviours, underscoring the necessity of employing a multifaceted approach that combines various techniques and methodologies to effectively address their unique challenges and requirements. [28].

Occupational therapy approaches are tailored to the specific needs of individuals with autism, with the overarching goal of enhancing their quality of life and facilitating their participation in everyday activities and employment opportunities. This approach recognizes the individualized nature of autism and aims to empower individuals to achieve their full potential. It is important to note that there is currently no definitive treatment for the core symptoms of autism spectrum disorder (ASD). However, various medications are available to address co-occurring symptoms, which can potentially enhance the overall functioning and well-being of individuals with ASD. These medications are designed to alleviate specific challenges or difficulties associated with ASD, thereby improving the individual's overall quality of life and daily functioning [30].

In our research investigation, we explored the prescription patterns of atomoxetine, a pharmacotherapeutic agent commonly employed in the management of psychiatric disorders, among individuals diagnosed with autism spectrum disorders. Atomoxetine is frequently prescribed for the amelioration of symptoms associated with attention deficit hyperactivity disorder (ADHD) and can be employed as a monotherapy or in conjunction with

psychostimulant medications. Moreover, it has been utilized as a cognitive enhancer, aiming to enhance vigilance, attention, and memory faculties.

Various treatment regimens were administered based on the individual patient's clinical indications, symptomatology, and the complications they presented. Specifically, risperidone, classified as an atypical antipsychotic agent, was administered to a cohort comprising 44.2% of the total patient population (n=187), with the allocation contingent on the severity of their clinical presentation. Subsequently, atomoxetine, marketed under the trade name Strattera, was prescribed to 30.3% (n=128) of patients, primarily those diagnosed with attention deficit hyperactivity disorder (ADHD). Furthermore, methylphenidate (Concerta), a central nervous system stimulant commonly employed for the management of ADHD, was administered to approximately 25.5% (n=108) of individuals. Our research findings align with prior investigations, indicating that behavioural therapy is typically the initial therapeutic approach, with pharmacological interventions introduced as adjunctive measures to facilitate patients' daily functioning and overall well-being [31].

5. Conclusion

Our research outcomes suggest that the initial manifestations of autism spectrum disorder (ASD) exhibit considerable diversity and may manifest heterogeneously. These early symptoms can vary based on factors such as the onset mode, age at presentation, and timing of autism diagnosis. The distinction between idiopathic and non-idiopathic cases, as well as the presence of early epilepsy, may not necessarily be crucial determinants in understanding these early presentations. Moreover, it is apparent that the cognitive level of an individual can influence the mode of onset. Our findings underscore the importance of acquiring additional data through early clinical observations and biomarker research to facilitate the development of innovative methodologies for early ASD diagnosis. Such advancements hold the potential to enable early intervention and mitigate the progression of the disorder. Effective integration of various approaches into the lives of individuals with autism can significantly aid them in fulfilling diverse responsibilities and tasks. When skilfully implemented within an occupational therapy intervention program, these strategies can empower individuals with autism to develop a broad spectrum of abilities.

Compliance with Ethical Standards

Conflict of Interest The authors affirm that they have no affiliations or financial interests that could potentially create a conflict of interest with the subject matter. Furthermore, they do not hold any financial or proprietary stakes in any of the materials discussed within this article.

Ethical Approval The study was conducted according to the guidelines of the Declaration of Health Affairs and approved by the Institutional Review Board of Al-Baha University (IRB number: KFH/IRB20112022/6).

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