

PREVALENCE OF HYPERACTIVITY-IMPULSIVITY AND INATTENTIVENESS IN CHILDREN WITH INTELLECTUAL DISABILITY: ANALYSIS BY GENDER AND AGE

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Abstract

Background: Behavior problems are recurrent in children with Intellectual disability (ID). **Objective:** The study aimed to assess gender and age-related hyperactivity-impulsivity and inattentiveness in children with mild ID. **Materials and Methods:** A sample of 70 children with mild ID ages ranging from 5-9 years (18 males; 17 females) and 10-15 years (18 males; 17 females) was selected from special schools and rehabilitation centers through a purposive sampling method. Data was collected using the ADHD Symptoms Rating Scale (ADHD-SRS). Descriptive statistics and the Chi-square (χ^2) test were employed to analyze the association between categorical variables. Linear regression was performed to predict hyperactivity-impulsivity, inattentiveness, and combined type of ADHD. **Results:** Males had a higher prevalence rate of hyperactivity-impulsivity (30.6%) than females (23.5%). Conversely, females exhibited a greater prevalence of inattentiveness (38.2%) than males (19.4%). Male children with mild IDs had more combined ADHD symptoms than females. Research findings revealed gender-based differences in hyperactivity-impulsivity and inattentiveness in ID children. **Conclusion:** The study suggested developing an early intervention programme to improve development and quality of life of children with ID by addressing behavioural issues.

Keywords: Hyperactivity-Impulsivity, Inattentiveness, Children with Mild Intellectual Disability, Gender, Age.

INTRODUCTION

During the development period, a number of children go through behavior problems such as restive, daydreaming, acting without thinking, or having difficulty in attention. This is not necessarily indicative of Attention Deficit Hyperactivity Disorder (ADHD), but it is common and should not be ignored. ADHD is a situation that generally manifests in the prime of the age before the age of 7 years. According to DSM-5 TR, ADHD is a neurodevelopmental disorder defined by impairing levels of inattention, disorganization, and/or hyperactivity-impulsivity (APA, 2022). The diagnostic criteria for ADHD in DSM-5 TR are similar to DSM-5.

As stated in research from the Centers for Disease Control and Prevention in 2016, nearly 6.1 million children (9.4 percent) from the age of 2 to 17 in the United States have ever been diagnosed with ADHD (Danielson, et.al., 2016). According to an epidemiological analysis of twenty countries derived from the World Mental Health Surveys, the United States had the highest prevalence of ADHD among children and adolescents (8.1 percent), followed by Iraq (0.1 percent), Poland (0.3 percent), and

Romania (0.4 percent) (Fayyad et al., 2017). A meta-analysis conducted in India unveiled that the prevalence of attention deficit hyperactivity disorder (ADHD) in infants and adolescents varies between 1.30% and 28.9%. Based on gender disparities, the occurrence of ADHD in males was 9.40%, while in girls it was 5.20 %.

The prevalence ranged from 7.6% to 15% among children aged 8-15 years (Joseph & Devu, 2019). Despite the lack of worldwide consensus on ADHD prevalence, estimated prevalence of ADHD globally varies between 5.29% to 7.1%, and in India, it ranges from 2% to 17% (Joshi & Angolkar, 2021).

The main characteristics of ADHD include the disorder of hyperactivity-impulsivity, and inattention and disorganization. Hyperactivity-impulsivity is common in children and it occurs mostly simultaneously at a time. DSM-V TR defines hyperactivity-impulsivity as a predominant subtype of ADHD.

“Hyperactivity-impulsivity refers to excessive levels of overactivity, fidgeting, inability to remain sitting, intruding into other people's activities, and inability to wait, which are symptoms that exceed what is expected for a person's age or level of development”. On the other hand, “inattention and disorganisation refer to a lack of capacity to focus on tasks, appearing to not pay attention, and missing important materials for tasks, at levels that are inconsistent with one's age or developmental level”(APA, 2022).

The studies related to etiology have determined multiple causes of ADHD majorly genetic, neuroanatomical, neurochemical, and environmental (Batstra et al., 2017). According to neuroimaging researches, ADHD pathogenesis is influenced by prefrontal-striatal circuitry (Hoogman et al., 2017; Papadopoulos et al., 2021). The most popular theory given by Barkley, behavioral inhibition regulates four cognitive executive functions: speech internalization, working memory, self-regulation, and reconstitution, and ADHD is caused by impairments in these areas (Barkley, 1997; Del Lucchese et al., 2021; Wang et al., 2018). Furthermore, there is substantial evidence linking ADHD to medical complications that occur during pregnancy, preterm birth, inadequate breastfeeding, a familial history of mental health issues in children, and a low socioeconomic background (Kassa et al., 2018; Murugan et al., 2016).

Children's intellectual development is very crucial to achieve success in later life. But unfortunately, children with ID are delayed in cognitive development. Along with cognitive delay, the number of emotional and behavioral problems and psychiatric problems is more frequent among intellectually disabled children than in the general population (Jones et al., 2014). When it is compared to rates of ADHD in neurotypical children or adults, peer-reviewed studies of ADHD in people with intellectual disabilities found, it is a higher prevalence (Emerson & Einfeld, 2010; Landa et al., 2013).

The worldwide reviews indicate that ADHD affects a sizable percentage of children in India (Joseph & Devu, 2019). However, most of the researches are focused on ADHD in typically developed children, in children with ID, studies are very few. In this order, studies addressing gender and age variations in ADHD in children with ID received the least attention. Hence, the study was sought to ascertain the prevalence of hyperactivity-impulsivity and inattentiveness in children with ID as well as examine the differences in ADHD symptoms with respect to gender and age.

MATERIALS AND METHODS

Design and Participants

A cross-sectional analytical research investigation was undertaken between February 2023 and January 2024. A purposive sampling method was used to select a sample of 70 children with mild intellectual disability (ID) ages 5-9 years (18 males; 17 females) and 10-15 years (18 males; 17 females) from special schools (Vaishnav Special school, Indore; Vaishnav Rehabilitation and Therapy Center, Indore; Manovikas Special School, Ujjain, and Kamla Rehabilitation Centre, Ujjain) in the district of Indore, Madhya Pradesh, India.

Ethical approval was obtained from the institutional authority, letter dated 12th January 2023, and No.0001. The sample was selected on criteria based on their level of intelligence (IQ = 50 – 69, Mild Intellectual Disability). As exclusion criteria, children with autism and children with epilepsy were excluded from the study.

Measures

ADHD Symptoms Rating Scale (ADHD-SRS) developed by Holland, et.al was used to assess hyperactivity-impulsivity and inattentiveness (Holland et al., 2001). It is a standardized, norm-referenced rating scale developed to measure symptoms of Attention Deficit Hyperactivity Disorder (ADHD) in children and adolescents from 5 to 18 years.

This scale has 56 items designed exclusively to measure ADHD characteristics. This scale comprises of two ADHD-SRS subscales, Hyperactivity-Impulsive (H-I) and Inattentive (IN), that are based on the two DSM-IV ADHD categories, Hyperactivity-Impulsivity and Inattention.

Furthermore, a total score is calculated by adding the subscale values. It is a 5-point rating scale. Scoring of this scale is, 0 = Behaviour does not occur, 2 = Behaviour occurs one to several times in a month, 3 = Behaviour occurs one to several times in a week, 4 = Behaviour occurs one to several times in a day, and 5 = Behaviour occurs one to several times in an hour. The coefficient alpha reliability estimates were found 0.90 which indicate very strong internal consistency reliability for the ADHD-SRS (Holland et al., 2001). For the current study the Cronbach α was 0.81.

Data Collection

The permission of the head of the institute was taken for collecting data related to the children with mild intellectual disabilities. Before administering the scales, informed consent was taken from the parents of each child. After taking consent, ADHD-SRS was explained to teachers for rating the occurrence of the behavior of the child in the classroom.

Data Analysis

The Statistical analysis for the present study was done by using SPSS. Frequency tables were used to describe data. Association between categorical variables was done using the χ^2 test. Linear regression was performed to predict hyperactivity-impulsivity, inattentiveness, and combined type of ADHD in children with mild ID with respect to gender and age.

RESULTS

Table 1: Gender and Age Wise Distribution of the Children with Mild ID (N=70)

Variables	Gender		Total (%)
	Male (%)	Female (%)	
Age in Years			
5-9	18(51.4)	17(48.6)	35(100)
10-15	18(51.4)	17(48.6)	35(100)
Total (%)	36(51.4)	34(48.6)	70(100)

The results shown in Table 1 indicate the percentage of subjects as per their age was equally distributed, whereas regarding gender the males were more (51.4%) than females (48.6%).

Table 2: Hyperactivity-Impulsivity association with Gender and Age (N=70)

Variable		Total (%)	Risk Levels of Hyperactivity-Impulsivity			p- Value
			High (%)	At Risk (%)	Normal (%)	
Gender	Male (%)	36(100)	11(30.6)	9(25.0)	16(44.4)	0.048*
	Female (%)	34(100)	8(23.5)	18(52.9)	8(23.5)	
	Total (%)	70(100)	19(27.1)	27(38.6)	24(34.3)	
Age	5-9	7(20)	14(40)	14(40)	35(100)	0.364
	10-15	12(34.3)	13(37.1)	10(28.6)	35(100)	
	Total (%)	19(27.1)	27(38.6)	24(34.3)	70(100)	

%=percentage; *p≤ .05 = significant;

The results table 2 demonstrates that the total highest occurrence of hyperactivity-impulsivity in relation to gender and age were 27.1% and 38.6%. The high-risk level of Hyperactivity-impulsivity was more in males as 30.6%, however, for the level of at-risk, females were higher as 52.9%.

The p-value 0.048<0.05 indicates the significant differences in levels of hyperactivity-impulsivity in males and females. As regards age, 5-9 years of children showed more hyperactivity-impulsivity than 10-15 years for both levels - high risk and at-risk as 40%. However, statistically, the results were not significant with respect to age.

Table 3: Inattentiveness Association with Gender and Age

Variable		Total (%)	Risk Levels of Inattentiveness			p- Value
			High (%)	At Risk (%)	Normal (%)	
Gender	Male (%)	36(100)	7(19.4)	17(47.2)	12(33.3)	0.05*
	Female (%)	34(100)	13(38.2)	17(50)	4(11.8)	
	Total (%)	70(100)	20(28.6)	34(48.6)	16(22.8)	
Age	5-9	35(100)	6(17.1)	21(60)	8(22.9)	0.079
	10-15	35(100)	14(40)	13(37.1)	8(22.9)	
	Total (%)	70(100)	20(28.6)	34(48.6)	16(22.8)	

%=percentage; *p≤ .05 = significant;

The results table 3 illustrates that the total highest occurrence of Inattentiveness in relation to gender and age was 28.6%. Both risk levels (high and at-risk) of inattentiveness were highest in females at 38.2% and 50%. The p-value 0.05≤0.05 shows the significant differences in levels of inattentiveness in males and females. Pertaining to age, for high-risk level, 10-14 years' children shown more inattentiveness as 40% than 5-9 years, though for at-risk level, 5-9 years' children exhibit more as 60%. However, statistically, the results were not significant with respect to age.

Table 4: Linear Regression Function on Hyperactivity-Impulsivity, Inattentiveness and Combined Type of ADHD

Variables	Estimate	Std error	t ratio	p-value
<i>Hyperactivity-Impulsivity</i>				
Constant	115.42	14.63	7.89	.000**
Gender	-0.44	6.33	-3.96	.000**
Age	-0.05	1.12	-0.44	0.660
<i>Inattentiveness</i>				
Constant	81.37	7.70	10.58	.000**
Gender	-0.20	3.33	-1.69	0.097
Age	-0.24	0.59	-2.09	0.040*
<i>Combined Type ADHD</i>				
Constant	196.79	21.37	9.21	.000**
Gender	-0.37	9.25	-3.32	.001**
Age	-0.12	1.63	-1.06	.295

*p ≤ .05 = Significant; **p ≤ .01 = Highly Significant;

Both factors gender and age were considered in the regression model to predict hyperactivity-impulsivity, inattentiveness, and combined type of ADHD in children with ID. Based on Table 4, among the two factors gender and age on hyperactivity-impulsivity, the constant value was 115.42, the slope parameter of gender (β) was -0.44, p-value ≤ .01 is highly significant.

Therefore, gender shows a highly significant negative association with hyperactivity-impulsivity. That means hyperactivity-impulsivity is lower in female children and higher in male children. But, regarding age, the β value has negatively associated that means, if age is increasing, hyperactivity-impulsivity will decrease. However, statistically, the results are not significant.

According to Table 4, the two factors gender and age on inattentiveness, the constant value was 81.37, the slope parameter of gender (β) was -0.20, that is negatively associated, though, statistically the results are not significant.

However, for age $\beta = -0.24$, p-value ≤ .05 is significant. Therefore, age shows a significant negative association with inattentiveness. That is, if age is increasing, inattentiveness will decrease.

As Table 4 demonstrates the effect of gender and age on combined type of ADHD, the constant value was 196.79, the slope parameter of gender (β) was -0.37, p-value ≤ .01 is highly significant. Therefore, gender shows a highly significant negative association with the combined type of ADHD.

That means ADHD symptoms are less in female children than males. But, regarding age, the β value has negatively associated that means, if age is increasing, ADHD symptoms will decrease. However, statistically, results are not significant.

Conclusively, table 4 revealed that gender showed a significant association with hyperactivity-impulsivity and combined type of ADHD but age was not statistically significant. However, age was significantly associated with inattention but gender was not significant.

DISCUSSION

To determine the prevalence of hyperactivity-impulsivity and inattentiveness in children with ID in respect to gender and age was the purpose of the study. The total occurrence rate of hyperactivity-impulsivity and inattentiveness were 38.6% and 28.6% respectively. In relation to the hyperactivity-impulsivity type, the findings of the study revealed that males are more likely to have high-risk levels than females which is congruent with previous studies (Kamal et al., 2021; Slobodin & Davidovitch, 2019).

The previous studies related to ADHD reported that males are thought to be more prone to hyperactivity and impulsivity than females, with most researchers suggesting a ratio of 3:1–5:1, while other authors reported a ratio as high as 9:1 in favor of males (Arnett et al., 2015; Kamal et al., 2021).

The results of the study showed a high prevalence of inattentiveness in females compared to males, which is similar to the previous study, females with ADHD are more likely to males as classified inattentive type (Stibbe et al., 2020). According to some other researches, to have an inattentive subtype of ADHD, girls are up to twice as likely as boys, and they may have greater internalizing symptoms and inattention, as compared to hyperactive and aggressive symptoms in boys (Biederman et al., 2004; Slobodin & Davidovitch, 2019).

As per the combined type of ADHD, the study's findings that male children with ID are more prone to developing symptoms than female children are consistent with previous research on children with intellectual disabilities that found a distinct male-to-female ratio of the disorder (1.5:1) (Arnett et al., 2015; Memišević & Sinanović, 2015). Based on a study conducted by Kamal et al., there is a notable disparity in the prevalence of ADHD symptoms between the genders, with females experiencing the disorder at a rate of 5.4% and males at 13% (Kamal et al., 2021).

Similarly, other resresearches have documented that females may have lower prevalence rates of ADHD due to variations in ADHD presentation between males and females (Arnett et al., 2015; Slobodin & Davidovitch, 2019; Willcutt, 2012).

In relation to age, 5-9 years children shown more hyperactivity-impulsivity than 10-14 years, these results are similar to other study in which adolescents exhibit the mainly inattentive type of ADHD, whereas hyperactive-impulsive type was the most common in children (Albatti et al., 2017; Willcutt, 2012).

Despite the fact that in a couple of reviews, the ratio of males and females with ADHD was declined with age, although the gender ratio from 1 to 1.6 is still present among people of 19 years, in accordance with global meta-regression studies of adults with ADHD (Willcutt, 2012). Following adolescence, studies in above 18 years of people with ADHD have found that males and females exhibit comparable phenotypic characteristics (Biederman et al., 2004).

The severity of ADHD symptoms differs among individuals, and the combination of hyperactive, impulsive, and inattentive symptoms, along with their associated consequences, may evolve over time (Caci et al., 2015; Holmberg & Bölte, 2014). A meta-analysis of multiple studies involving individuals of all ages revealed that the inattentive subtype of attention deficit hyperactivity disorder (ADHD) was the most prevalent in all samples, with the exception of pre-school children, who exhibited a predominance of hyperactivity-impulsivity (Willcutt, 2012).

LIMITATIONS

The study have shown gender based differences in hyperactivity-impulsivity and inattentiveness in children with mild ID. Despite of this implication, the study has some limitations. The small sample size and selection through purposive sampling reduces the generalizability of the results. In the present investigation, solely gender and age demographic variables were examined; subsequent studies may delve into additional socio-demographic variables. In order to expand the scope of behavioural intervention development for children with intellectual disabilities, it is necessary to consider additional categories of children with intellectual disabilities beyond those who were included in the study of mild intellectual disabilities.

CONCLUSION

This study examined gender and age-related hyperactivity-impulsivity and inattentiveness in intellectually disabled children. Many ADHD and subtype studies have focused on the general population. Limited research exists on ADHD and its subcategories, hyperactivity-impulsivity and inattentiveness, in intellectually disabled children. In the study, male children with ID had a higher prevalence of ADHD symptoms than females, with hyperactivity-impulsivity being more prevalent in males and inattentiveness in females. This study suggests implementing an early intervention programme to change behavioural problems to help children with ID develop and live a high quality life.

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Conflicts of Interests

Authors declare that they have no conflict of interest.

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