

Original Article

The prevalence and factors affecting attention deficit hyperactivity disorder among school children in Khartoum State

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ABSTRACT

Attention deficit hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders in children, characterized by age-inappropriate features of inattention, hyperactivity and impulsivity or both. The aim of this study is to determine the prevalence and socio demographic correlates of ADHD symptoms in general basic schoolchildren. A cross-sectional study conducted in Khartoum North. A random sample of 190 general basic schools was chosen, from which sample of 1000 students from both boys and girls were selected by systematic random sampling, their age ranges between 7 and 14 years. They were screened for different subtypes of ADHD symptoms using the SNAP-IV-C teacher and parent rating scale, which is a revision of the Swanson Nalon and Pelham (SNAP) questionnaire. The overall

prevalence of ADHD was 9.4%. The prevalence of children with ADHD/inattentive sub type, ADHD/hyperactive-impulsive sub type, ADHD/ combined subtype were 3.5%, 6.9 % and 1.0 %, respectively. The prevalence rate increased significantly with the increase in age. The study showed that the prevalence of ADHD symptoms among school children in Sudan was high as rated by both teacher and parents rather than what has been reported in other studies. ADHD symptoms are more common among boys than girls and more prevalent in late childhood and in those who lived in rural area.

Keywords:

Attention deficit; Hyperactivity; ADHD; Child; Teacher; Parents; Sudan.

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INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder of childhood and young adults. Its main features are attention deficit, physical over activity and impulsivity. In addition, children with ADHD often present with significant psychosocial problems such as poor academic attainment, difficulties in interpersonal relationships [1].

The prevalence of ADHD among school age children varied considerably across different studies and populations [2]. This may be due to the diagnostic methods used rather than the true prevalence differences, because during the last decade there were changes in the diagnostic classification and the adopted thresholds differ with different studies [3,4]. In the same time, the ADHD symptoms are especially difficult to define because it is hard to draw a line at where normal levels end and the clinically significant levels that requiring clinical intervention begin [5]. To diagnose ADHD according to DSM-5 symptoms must be present in at least two different settings (e.g. school, home) for six months or more and with a degree that is greater than what was expected for other children of the same age [6]. Because symptoms will vary depending on the context within a given setting, an informant who has seen the individual should be consulted by the treating doctor so as to confirm these symptoms [7].

ADHD is a chronic neurodevelopmental disorder and the affected children may suffer from social isolation and poor self-esteem due to inability to control their own behaviour with their mates and when it is left untreated they are at great risk of learning problems, family difficulties and potential long-term unfavourable effects [8-10]. So screening for early detection and diagnosis are important in preventing these secondary consequences of educational and social impairment¹on the other hand studies showed that in 30 to 50 percent of those diagnosed with ADHD

in childhood their symptoms would continue into adulthood [11]. There is an increased risk of suicide attempt associated with those ADHD children by early adulthood, primarily when there is comorbidity with mood disorder, conduct, or substance use disorders [6]. It has been estimated that more than 50% of children with ADHD are prone to have comorbidity with other psychiatric disorders such as depression, anxiety disorder and Oppositional Defiant Disorder (ODD) [12-15].

ADHD is found in all cultures with variation in the prevalence rate [16]. According to the epidemiological studies, it generally ranges from 4% to 12% in the general population at age group of 6 to 12years, with boys four to nine times more commonly diagnosed than girls [17]. In the Arab region the prevalence rate of ADHD was found to be higher than the prevalence of ADHD in other parts of the world [18].

METHODS

This is a cross sectional study, conducted in children basic educational schools in Khartoum state, Sudan. Study population was the students of the general basic school children in the area, aged 6-14 years, both males and females. One hundred and ninety schools were included with a total of 75,003 students. Since the distribution of the schools and the number of children in each school is different in the five educational units, the sample was taken as a proportional one, that was randomly selected, and hence one thousand of the students were enrolled in the study. The total number of the schools was 190 schools; from each unit four schools (two boys and two girls schools) were randomly selected manually from a list supplied by the local education department of the schools in the locality. From each school equal number of students was chosen by simple random method from the first to the eighth class, but the number differ from unit to

unit in each school.

SNAP-IV-C was administered to both teachers and parents covering the three main features of ADHD, which are inattention, hyperactivity and impulsivity. SNAP-IV-C is a rating scale, which is a revision of the Swanson, Nalonand Pelham (SNAP) questionnaire [19]. The tentative 5% cut-off point for ADHD inattention for teacher is 2.56 and for parent is 1.78. For ADHD hyperactivity-impulsivity is 1.78 for teacher and 1.44 for parent were used. The scale was translated in Arabic, and a pilot study was conducted, 50 students from a separate school were involved to validate this scale. Data was collected by directly interviewing the children with the help of their parents and teachers. The teachers with the help of the parents also filled the Socio-demographic data in the questionnaire.

An ethical approval for this study was obtained from Sudan Federal Ministry of Health and ethical consent was taken from all participants and parents.

Statistical Analysis

The collected data was analysed using the Statistical Package of Social Sciences (SPSS). The results were expressed in figures, tables and graphs. Chi square test was used to test the significant difference between the variables. P-value ≤ 0.005 is considered significant.

RESULTS

The sociodemographic characteristics of the sample in the study:

Distribution of the study population according to gender showed that 511 (51.1%) were males and 489 (48.9%) were females (Table 1). Table 2 shows the distribution of the student in each age group, 199 students (19.9%) were in the age group (6-8) year, 380 students (38.0%) in the age group (9-11) year, while 421 students (42.1%) were in the age group (12-14) year.

Table 1- Distribution of study population according to gender

Gender	Frequency	Percentage
Male	511	51.1
Female	489	48.9
Total	1000	100

Table 2 - Distribution of study population according to age groups

Age group	Frequency	Percent
(6-8) Year	199	19.9
(>8-11) year	380	38.0
(>11-14) year	421	42.1
Total	1000	100

Table 3 shows that the ages of over three quarter 772 (77.2%) of the students' fathers were over 40 years, 14 (1.4%) below 30 years and 216 (21.6%) fathers were between (30 – 40) years.

Most of the mothers 561 (56.1%) aged between (31-40) years, 288 (28.8%) were more than 41 years while 151 (15.1%) mothers were 30 years and below.

Table 3 - Age groups of the parents

Age groups	Fathers		Mothers	
	Frequency	Percent	Frequency	Percent
(20-30) Year	14	1.4	151	15.1
(>30-40) Year	216	21.6	561	56.1
(>40-50) Year	478	47.8	251	25.1
(>50) Year	292	29.2	37	3.7
Total	1000	100	1000	100

The scale data:

The assessment of the students by their teachers using teacher scale, revealed that the of inattentive subtype symptoms were found to affect 35 students (3.5%), impulsive subtype symptoms affected 90 students (9.0%) and the combined subtype affected 10 students (1.0%). Using the parents scale the prevalence of inattentive subtype symptoms was found to affect 119 students (11.9%), for impulsive subtype symptoms

156 students (13.9%) were affected and for the combined subtype 52 students (5.2%) were affected. When the assessment was conducted to the students in the two settings together (teachers and parents) using the two scales the prevalence was found to be 34 students (3.5%), for inattentive subtype symptoms, 69 students (6.9%) for impulsive subtype symptoms and 10 (1.0%) for the combined subtype symptoms (Table 4). The overall prevalence of ADHD was 6.4%.

Table 4 - The prevalence and subtypes of Attention deficit hyperactivity disorder among the study population

Item	Inattentive		Hyperactive Impulsive		Combined	
	No.	%	No.	%	No.	%
	Prevalence of Teacher scale	35	3.5	90	9	10
Prevalence of Parent scale	119	11.9	156	13.9	52	5.2
Prevalence in both settings	34	3.5	69	6.9	10	1

The age groups in the two setting showed that in the age group (6-8) there were 6 students (3.0%) with symptoms of inattentive subtypes and 11(5.6%) with impulsive subtype symptoms, in the age group (>8-11) there were 7 students (1.8%) with inattentive symptoms and 17 students (4.5%) with impulsive

subtype symptoms and in the age group (>11 -14) there were 21 students (5.1%) with inattentive symptoms while 41 students (9.9%) with impulsive symptoms, p= 0.007 for impulsive subtype symptoms and p=0.040 for inattentive subtype (Table 5).

Table 5 - Comparison between the students' age groups and parents and teachers Scoring of impulsivity symptoms in the study population

Age group	Inattention	Parents and teachers
	Impulsivity Symptoms	
6-8 year	6	11
>8-11 year	7	17
>11-14 year	21	41
P-value	.040	.007

The number of male students with symptoms of inattentive subtypes in both teacher and parent setting's scales were 25 with a percent of (4.9%); the females students were 9 (1.8%) with male to female ratio of 2.7:1 ($p=0.008$). Number of boys with the symptoms of impulsive subtypes in both settings was 48 (9.6%) and the number of girls was 21 (4.3%) with a ratio of 2.3:1 ($p=0.002$) (Table 6).

Table 6 - Prevalence of Attention deficit hyperactivity disorder among the study sample according to gender

	Prevalence of inattention		Prevalence of impulsivity	
	No.	%	No.	%
Male	25	4.9%	48	9.6%
Female	9	1.8%	21	4.3%
Total	34	6.7%	69	13.9%
p. Value	.008		.002	

Considering the place of birth in the two settings for inattentive subtype symptoms 21 (4.6%) of students were born in a rural area while 13 (2.4%) of them in the urban area ($p=0.046$) (Table 7).

Table 7 - Distribution of study population according to the place of birth

Area	Frequency	Percent	Inattention	Impulsivity
Rural	461	46.1	21	38
Urban	539	53.9	13	31
Total	1000	100.0	34	69

For impulsive subtype symptoms 38 (8.3%) of them were born in urban area ($P=0.079$) in (Table 8). students were born in rural area and 31 (5.8%) of

Table 8 - Comparison between family income with symptoms of inattentive and impulsive subtypes in the study population

Income groups	Low income Total studied 275 (27.5%)		Average income Total studied 713 (71.3%)		High income Total studied 12 (1.2%)	
	No.	%	No.	%	No.	%
	Inattentive subtypes in both settings	13	4.7	21	3.0	0
Impulsive subtypes in both settings	16	5.8	52	7.3	1	8.3

The income of the families of the students with symptoms of inattentive subtypes in both settings showed low income 13 (4.7%), average income 21 (3.0%), and no family with high income ($p=0.316$). Comparing with symptoms of impulsive subtypes in both settings, Low income were 16 (5.8%), average income 52 (7.3%), and high income only one student (8.3%) ($p=0.687$).

Regarding the number of the children in the family, 30 (7.2%) students with symptoms of impulsivity lived in a family with more than 5 children, 20 (6.0%) students lived in a family with 3-5 children, and 19 (8.0%) students lived in a family with less than 3 children ($p=0.644$).

For inattentive subtype symptoms 15 students (3.6%) lived in a family with more than five children, 14 (4.2%) lived in a family with three to five children, and 5 (2.0%) lived in a family with less than three children ($p=0.387$).

DISCUSSION

This study showed high prevalence of ADHD symptoms among school children in Sudan in both Parents and teachers scales. This is similar to the previous studies done in Arabian, Turkish and Ukrainian students, which used rating scales or screening questionnaires, which found that the overall prevalence of ADHD symptoms among general basic school children for both parents and teachers

setting scales was 9.4% [18-21]. It is also similar to other studies done in Taiwan and America were the prevalence range between 3-10% [22,23]. In study done by Rader R, et al about 2 to 16 percent of school-aged children had ADHD disorder [24]. In study done by Vasconcelos et al, ADHD prevalence in a sample of 403 school-aged children from a public elementary school was 17.1% [25]. The estimated average prevalence of ADHD in Egypt was 7.48% [26].

ADHD is a worldwide disorder and has a large variability in the estimated prevalence, which is due to the methods used rather than geographical variations [27]. The variable incidence of ADHD ranges from 2% to 16% is depending on the diagnostic criteria and the used assessment tools [28].

The prevalence of the symptoms of impulsive subtypes in both teacher and parent setting's scales was higher in males than females ($p=0.002$). The frequency of them in the symptoms of inattentive subtypes in both teacher and parent setting's scales was higher in males ($p=0.008$). Results were consistent with the results in all Arab studies showed that the prevalence rate of ADHD was higher in males than in females [17-19].

There was significant statistical difference ($p=0.007$) according to the age group, ADHD symptoms of impulsivity subtype are more common in the adolescents, also in the inattentive subtype the same age group is the most affected one with ($p=0.040$). This is consistent with other previous studies; there is increasing frequency of ADHD symptoms among

adolescence and young adults [29,30].

Considering the place of birth in the two settings for inattentive subtype symptoms most of them were born in a rural area ($p=0.046$). For impulsive subtype symptoms most of them were born in rural area ($P=0.079$).

CONCLUSION

The study showed high prevalence of ADHD

symptoms among school children in Sudan at both of parents and teachers scales. It is more common among boys than girls and more common among those who live in rural areas with significant association. Family size has no effect on the prevalence. Screening for ADHD and early detection of the problem is very important, which should be school based through trained multidisciplinary team that is aware of the problem and its management.

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