Original Research Article

Screening for attention deficit hyperactive disorder (ADHD) in Urban primary school children

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Abstract

Aims & Objectives: To find out the prevalence of ADHD in urban school children in Hyderabad city. **Settings and Design:** This is a cross sectional study of school aged children between 5 and 15 years were selected from 10 different Govt. schools &private aided schools nearby to Shadan Institute of Medical Sciences and Hospital, Hyderabad. **Materials & Methods:** 700 children aged between 5 and 15 years were randomly selected from 10 different schools in Hyderabad. The presence of ADHD was then assessed by using Vanderbilt assessment scale Teacher's version by their class teachers. The filled up questionnaire was then analyzed and those children screened positive referred to psychiatrist for further evaluation and management**. Results:** The prevalence of ADHD among urban primary school children in Hyderabad was found to be 9.57%. Prevalence of ADHD is more among male children (13.11%) compared to females (514%). Prevalence was highest in the age group of 10-11 years. Male to Female ratio of ADHD is 3.2:1 . Combined subtype of ADHD is the most common subtype (52.3%), followed by Attention Deficit (29.8%) and Hyperactive impulsive subtypes (17.9%). Children from lower socioeconomic status are more vulnerable for ADHD (10.8%) than middle & upper socioeconomic class. **Conclusion:** The present study shows a high prevalence of ADHD among primary school children with a higher prevalence among the males than the females.

Keywords: Attention Deficit Hyperactivity Disorder, Vanderbilt Assessment Scale-Teacher's Version, Prevalence, Socio-economic status.

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is the most common neurobehavioral disorder of childhood It is one of the most prevalent chronic mental health conditions affecting school aged children.

ADHD is a syndrome of inattentive, restlessness, and impulsive child behaviour. It is the most common neurobehavioral disorder of childhood[1].

Children affected by this disorder are at risk of learning disability behavioural and social problems and are also have serious impairment such as academic failure substance abuse and juvenile delinquency in adolescents an adulthood. Hence this disorder places substantial demand on mental health, educational, and judicial services.

Nineteenth century studies pointed out that ADHD was described as inattentive, excessively hyperactive, and impulsive children[2,3]. In early 20th century the syndrome was described as "Defect in moral control" which includes soft neurological signs, minor congenital anomalies, and inattentiveness[4]. However the syndrome first appeared in modern classification, it was known as hyperkinetic child syndrome[5,6].

According to International Classification of Disease (ICD), the disorder is known as Hyperkinetic Disorder[7]. In the 2nd half of 20th century, the number of cases diagnosed with this disorder increased rapidly. The year 1980, Diagnostic and Statistical Manual (DSM) - third edition, the name of the disorder was changed to Attention Deficit Disorder[8]. Since cognitive deficit was the predominant cause than over activity. DSM-IIIR (1987) changed the name to Attention Deficit Hyperactivity.

Disorder and combined all symptoms into one category (inattentive, restlessness, and impulsiveness). In DSM IV (1994), the symptoms were split into inattentive and hyperactive-impulsive types[9].

Many studies across the globe have reported the prevalence of ADHD in 5 to 10% of school aged children. Most of them are western studies and there is paucity of Indian studies.

This study will provide the much-needed epidemiologic data on ADHD and information critical to understanding the magnitude of this disorder in our community.

This study will not only enhance our understanding of ADHD in children but will also increase our ability to make most informed decisions and recommendations concerning this potential public health problem.

Our study is to know the prevalence of ADHD by screening the children in urban schools in Hyderabad using Vanderbilt Teachers assessment scale Version-2. The idea behind using the above scale is, it was available for free and mainly focuses on core symptoms of ADHD It is short, quick to complete and easy to score which can be done by Teachers.

Materials and methods

This is a descriptive type of study done at Shadan Institute of Medical Sciences and Hospital, Department of Paediatrics. The study protocol was approved by Ethical Committee for research studies of Shadan Institute of Medical Sciences and Hospital.

Study design

Cross sectional study

Study period

October 2018-September 2019

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Study setting and study population
School children in the Government schools and private aided schools in and around Shadan Institute of Medical Sciences and Hospital, Hyderabad were included in the study.

Sample size
700 School going children aged between 5 and 15 were selected from 10 different schools in Hyderabad Sample size were calculated depending upon the prevalence of ADHD from the previous studies, by using the formula $4pq/L^2$

Inclusion criteria
Children between the age group of 5 to 15 years.

Exclusion criteria
1. Children with history of seizures/developmental delay.
2. Children with history of neurologic illness/Endocrine disorders.
3. Children with history of chronic illness/prolonged drug intake.

Tools used in the study
Vanderbilt Assessment Scale- Teacher's version:
This is a rating scale based on DSM diagnostic criteria for ADHD. It consists of several behaviour parameters. This scale is rated by teachers. The scale has two components: symptom assessment and impairment in performance. The symptom assessment screens for symptoms that meet criteria for both inattentive (items 1-9) and hyperactive ADHD (items 10-18). To meet the criteria for the diagnosis, one must have at least 6 positive responses to either the inattentive 9 or hyperactive 9 core symptoms, or both. A positive response is a 2 or 3 (often or very often). The second section of scale has a set of performance questions 36-43, scored 1-5, with 4 and 5 being somewhat of a problem/problematic. To meet the criteria for ADHD there must be at least one item of the performance set in which the child scores a 4 or 5; that is there must be impairment, not just symptoms to meet diagnostic criteria
The initial scales also have symptom screens for 3 other co morbidities such as oppositional defiant, conduct, and anxiety/depression Must score a 2 or 3 out of 10 items on questions 19-28 and score 4 or 5 on any of the performance questions 36-43 to meet screen for oppositional-defiant/conduct disorder For anxiety/depression screen, must score a 2 or 3 on 3 out of 7 items on questions 29-35 and score a 4 or 5 on any of the performance questions 36-43.

Children suspected to have ADHD
Vanderbilt Assessment Scale Teacher's Version

Methodology
After getting the approval from the institutional and Ethical Committee of Shadan Institute of Medical College and Hospital, Hyderabad the research was initiated. Prior permission was sought from the Educational Officer of GHMC for conducting the study at corporation schools.
700 children aged between 5 and 15 years were randomly selected from 10 different schools in Hyderabad after obtaining informed written consent from their parents. The schoolteachers were given awareness regarding ADHD in two sessions. During the first session, the teachers were sensitized about ADHD with the help of audio-visual aid in English and Telugu and their academic & social implications were explained. During the second session the teachers were trained to fill the Vanderbilt assessment scale Teacher's version with the help of power point presentation. Following the awareness campaign, the presence of ADHD was then assessed by using Vanderbilt assessment scale Teacher's version by their respective class teachers. Periodic school visits were undertaken during this period to clarify their doubts and help the class teachers in assessing the children and filling up the questionnaire.
The filled-up questionnaire was then analyzed, and those children screened positive were instructed to attend the hospital with their parents.

Statistical methods
Data was entered in MS excel spread sheet. Data was analysed using SPSS v21 software. P value <0.05 was considered as statistically significant.

Results and observations
A total of 700 children were included in the study. They were assessed by Vanderbilt Assessment Scale-Teacher's Version to identify children suspected to have ADHD.

Table 1: Distribution of study population by diagnosis

Diagnosis	Number	Percentage (^{0}/0)
ADHD	67	9.57
Normal	633	90.43
Total	700	100.0

ADHD, Normal
Among 700 school children screened by their respective class teachers 67 children (9.57%) were positive for ADHD using Vanderbilt Assessment Scale Teacher's Version. Hence the prevalence of ADHD in our study was 9.57%.

Age wise distribution

Table 2: Age wise distribution of study population

Age in years	Total no of children	Percentage (%)
5	14	2.0
6	84	12.0
7	129	18.4
8	100	14.3
9	114	16.3
10	124	17.7
11	91	13.0
12	44	6.3
Total	700	100.0

Among the 700 children in this study, 215 children were between the age group of 10 to 1 1 years, 214 children were between the age group of 8 to 9 years and 227 children were less than or equal to 7 years.

Age wise prevalence of ADHD

Table 3: Age wise prevalence of ADHD

Age in years	No of children with ADHD	Prevalence
5	1	7.14
6	7	8.3
7	11	8.5

8	7	7.0
9	9	7.9
10	15	12.1
11	12	13.2
12	5	11.3
TOTAL	67	9.57

Prevalence of ADHD was found to be highest among the children between the age group of 10 and 1 1 years.

Age with ADHD comparison

Table 4: Age wise distribution of study population by diagnosis

Age in years	ADHD	Normal	Total
5	2	12	14
6	7	77	84
7	11	118	129
8	7	93	100
9	9	105	114
10	15	109	124
11	11	80	91
12	5	39	44
TOTAL	67	633	700

Chi square = 3.548, P VALUE = 0.940 (NS)

Age wise distribution of study population by diagnosis (ADHD vs NORMAL) was not found to be statistically significant on performing chi square test (P value >0.05).

Table 5: Comparison of age between ADHD and normal children

Age distribution	ADHD group	Normal
N	67	633
Mean	8.91	8.65
SD	1.944	1.84

Unpaired T test: 1.102, P value: 0.271 (NS)

Mean age of ADHD children was 8.91 years and mean age of normal children was 8.65 years. On performing unpaired t test this difference was not found to be statistically significant (P value >0.05).

Gender wise distribution

Table 6: Gender wise distribution of study population

Gender	Number of children	Percentage (%)
MALE	389	55.5
FEMALE	311	44.5
TOTAL	700	100.0

Out of 700 children, 389 (55.5%) were males and 311 (44.5%) were females.

Gender wise distribution of ADHD

Table 7: Gender wise prevalence of ADHD

Gender	Number of children	Prevalence (%)
MALE	51	13.1 1
FEMALE	16	5.14
TOTAL	67	9.57

Males were having more prevalence of ADHD as compared to females (13.1 1% vs 5.14%). Also, among those total children having ADHD (67), males were more (51,76.11%)) than females (16, 23.9%).

Gender with ADHD comparison

Table 8: Gender wise distribution of study population by diagnosis

Gender	ADHD	Normal	Total
MALE	51 (13 11%)	338 (86 89%)	389
FEMALE	16 (5M4%)	295 (94 86%)	31 1
TOTAL	67 (9.57%)	633 (90 43%)	700

Chi square = 1 1 767, P VALUE = 0.001 (S)

As shown in the above tables ADHD was more in males (13.11%) as compared to females (5.14%) and this difference was found to be statistically significant on chi square test (P value <0.05).

ADHD subtypes

Table 9: Distribution of study population based on subtypes of ADHD

ADHD subtype	Number of children	Percentage (%)
ATTENTION DEFICIT	20	29.8
HYPERACTIVE	12	17.9
COMBINED	35	52.3
TOTAL	67	100.0

Attention deficit hyperactive combined

In this study, the most common subtype of ADHD was the combined subtype (52.3%) followed by the Attention Deficit subtype (29.8%) and Hyperactive-Impulsive type (17 9%).

Gender wise distribution of ADHD subtypes

Table 10: Gender wise distribution of ADHD subtypes

ADHD subtype	Attention deficit	Hyperactive	Combined
MALE	12 (60%)	10 (83.3%)	29 (82.8%)
FEMALE	8 (40%)	2 (16.7%)	6 (17.2%)
TOTAL	20	12	35

In this study all the subtypes of ADHD are seen more in males than females.

Socio economic status distribution

Table 11: Distribution of socio-economic status in the study population

Socio economic status	Total no of children	Percentage
UPPER	6	0.9
UPPER MIDDLE	22	3.2
LOWER MIDDLE	74	10.5
UPPER LOWER	248	35.4
LOWER	350	50.0
TOTAL	700	100.0

Majority of cases in the study population belonged to upper lower (35.4%) and lower economic status (50%).

Socio economic status prevalence of ADHD

Table 12: Socio-economic status wise prevalence of ADHD

Socio economic status	Total no of children with ADHD	Prevalence (%)
UPPER	0	0.0
UPPER MIDDLE	1	4.5
LOWER MIDDLE	6	8.1
UPPER LOWER	22	8.9
LOWER	38	10.8
TOTAL	67	9.57

The prevalence of ADHD is more in children from lower socioeconomic group.

Socio economic status with ADHD comparison

Table 13: Socio-economic status wise distribution of study population by diagnosis

Socio economic status	ADHD	Normal	Total
UPPER	0	6	6
UPPER MIDDLE	1	21	22
LOWER MIDDLE	6	68	74
UPPER LOWER	22	226	248
LOWER	38	312	350
TOTAL	67	633	700

Chi square = 2.269, P VALUE = 0.686(NS)

Socio-economic status wise distribution of study population by diagnosis (ADHD vs NORMAL) was not found to be statistically significant (P value >05).

Discussion

ADHD is one of the best investigated child mental health disorders ADHD has received a great deal of clinical scientific, and public attention In recent years In the last decade, western literature on this syndrome has grown but in India only a few studies have been done Hence this study was done to fill this void. Of the total 700 children screened by their class teachers using Vanderbilt Assessment Scale-Teacher's version, 67 children were suspected having ADHD.

Prevalence of ADHD

The prevalence of ADHD in this study was [10] out of 700] 9.57%. This is consistent with that of several studies which showed a wide range of prevalence rates between 2% and 17% [11].

Studies that are available in India, reported prevalence rates ranging from 8 to 200% [12]. Most of these studies were conducted among the children attending the outpatient clinic.

Prevalence of ADHD in India

Venkata JA et al[13] has done a study in 2013 on the Prevalence of Attention Deficit Hyperactivity Disorder in primary school children at Coimbatore. 635 children from four different schools were selected based on the CARS score as per the teachers rating. Prevalence of ADHD among primary school children was found to be 11.33%.

Sharma P et al [14] observed from their study that ADHD prevalence was found to be 6.34% (13/205). Majority (69.3%) of the ADHD-positive children were living in a joint family and belonged to lower/lower middle class Family history of ADHD was absent in all the ADHD-positive children

Bhardwaj A et al [15] reported a prevalence of 6.3% from their study In a recent study done in south India in state of Tamil Nadu by Joytshna et al [13] the prevalence of ADHD among primary school children was found to be 11.32%. Prevalence was found to be higher among the males (66.7%) as compared to that of females (33.3%). The prevalence was highest in the age group 9 and 10 years.

Importantly, however, there is no uniform opinion on the prevalence rates and huge difference in prevalence reported by various studies have been found across the world.

Similarly, Suvarna BS et al.[16] reported a higher prevalence of 12.2% of ADHD in children aged 4—6 years in Southwest Mumbai, India, Ramya HS et al. [17] and Mannapur R et al. [18] have reported a lower prevalence of 1.3% and 2.3% of ADHD in their respective studies.

Worldwide prevalence of ADHD

According to Wang et al. [19] the point prevalence of ADHD reported in the included studies ranged from 0.73% to 14.40% with a pooled prevalence of 6.26% (95% C': 5.36-7.22%).

According to another study the overall mean of worldwide prevalence of ADHD is 2.2% (range: 0.1-8.1%) has been estimated in children and adolescents (aged < 18 years)[20].

While El-Gendy SD et al. [21] reported a higher prevalence of 21.8% and 16 2% of ADHD based on the teacher and parent scales, respectively, in primary school children aged 6—12 years, EL-Nemr FM et al. [22] and Safavi P et al. [23] reported higher prevalence rates of 19.7% and 17.3% in their respective studies.

According to Kurtzke et al. [24] epidemiological studies with a higher prevalence should be considered as estimated or screening prevalence because many false positives may be included. That may explain part of the differences observed between the results obtained from different studies.

One might speculate that the variability of ADHD prevalence rates across the studies reported here could be a function of the geographic and cultural characteristics of study samples (i.e, with higher rates of ADHD found in Western societies where cultural factors may play a role in creating or identifying cases). What is considered abnormal in one culture may be acceptable in another. For instance, "to talk excessively" parents decide what "excessively" means according to their own culture. This may also explain the low prevalence in our country includingour study.

Age distribution of ADHD

Children with ADHD were also stratified on the basis of their age The prevalence rate in each age group was identified.

Prevalence of ADHD was found to be highest among the children between the age group of 10 and 11 years. This is consistent with that of several studies in which the prevalence of ADHD was found to be highest with a mean age between 9 to 11 years[25].

This difference may be due to increased demands of attention both in school as well as home as the child grows.

Gender distribution

ADHD is more prevalent among the male children compared to that of the female children.

Total no. of male children screened were 389, out of which 51 of them were diagnosed with ADHD. Prevalence of ADHD among the male children was 13.11%.

Total no of female children screened were 311, out of which 16 of them were diagnosed to have ADHD Prevalence of ADHD among the female children was 5 14%.

Ramya HS et al [17] reported from their study that prevalence was 1.6% in boys and 1% in girls.

Male to Female ratio of ADHD in this study is 3.2:1. This is consistent with that of previous studies which identified a similar gender difference i.e; the male predominance, with the ratios ranging from 10:1 in clinically referred sample and 3:1 in a community sample [26].

Generally speaking, ADHD is more commonly diagnosed in boys than girls, but research into ADHD in adulthood suggests an almost equal prevalence between men and women.

ADHD subtypes

In this study:

- Attention Deficit- 20 (29.8%)
- Hyperactive-impulsive- 12 (17.9%)
- Combined- 35 (52.3%)

Ramya HS et al [17] reported from their study that the prevalence of hyperactivity subtype was 34.1%, the inattention type was 9.8% and combined type was 56.1%.

The Hyperactive-impulsive type is predominant in PrahbhjotMalhi et al [27] study, but in this study Combined type is predominant. The similarity of both studies is that the percentage of attention deficit cases were almost the same.

Also contrary findings were reported by RajeshwariMannapur et al [18] they found that out of 23 ADHD subjects, 11 (47.82%) were hyperactive /impulsive type, 7 (30.45%) were inattentive type and 5 (21 .73%) were diagnosed to have combined type of ADHD.

A study on the prevalence of subtype of ADHD by Malhi et al [27], which estimated 50% of children diagnosed to be ADHD-hyperactive type, 35% were ADHD-inattentive type and only 15% were ADHD-Combined type.

Genderwise distribution of ADHD subtypes

In our study Combined subtype of ADHD was observed in 29 out of total 51 male children (56.8%) making it the most common subtype in male children. Attention Deficit type of ADHD accounted for 50% (8 out of 16) female children of total ADHD.

Bhardwaj A et al [15] observed in their study that male students having maximum hyperactivity (60.7%) followed by mixed type (26.8%) and inattention type (12.5%), whereas in female student's inattention type was maximum (45%) followed by mixed symptoms (30%) and hyperactivity (25%).

About 10 out of 12 children with hyperactive type of ADHD were males which is similar to others observation of predominance of hyperactive ADHD among males.

ADHD and socioeconomic status

Out of 598 children screened from upper-lower and lower socioeconomic status 60 children had ADHD. The prevalence being 10.03%.

The prevalence among middle and upper socioeconomic class in this study is 6.86%. Chi-square test indicated this difference was not statistically significant.

This is consistent with previous study done by Venkata JA et al [13] who reported a high prevalence of ADHD in low socioeconomic status (16.33%) than middle (6.84%) and upper socioeconomic status.

Limitations in the study

- Children from Low socio-economic status were predominantly studied.

Recommentations

- Epidemiological survey of ADHD is important in planning health services.therefore further interview based studies assessing the prevalence of ADHD as defined by DSM criteria are required in different parts of the country to get a clearer picture of its burden in our country.
- All children should be screened before entering in the school specially at Grade-I, if diagnosed with ADHD they should be provided benefits during education and employment like given in other disabilities.

Conclusion

Parents play an important role, so training programs should be developed to increase the parenting skills. These should focus on increasing parent's skills in managing their child's behaviour, facilitating social skills development and encouraging parent's positive interaction with their child. Large-scale cross-national studies are needed, with common, in depth diagnostic methods and similar sampling frames, to determine if meaningful differences exist in prevalence rate across countries.

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