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Corresponding Author
Gajjala Maruthi Siva Praneeth, Department of Pediatrics, Government Medical College, Anantapuram, Andhra Pradesh, India

Author Designation
[1]Associate Professor
[2,4]Assistant Professor
[3]Junior Resident

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Prevalence of Attention Deficit Hyperactivity Disorder (ADHD) Among Schools Children

[1]M. Sanjeevappa, [2]Khimavath Prathyusha, [3]Javvaji Swapna and [4]Gajjala Maruthi Siva Praneeth
[1-4]Department of Pediatrics, Government Medical College, Anantapuram, Andhra Pradesh, India

ABSTRACT
ADHD is often undiagnosed in children. There is lack of awareness of ADHD among parents, teachers and pediatricians and educationists, there is a need for continued work to gather data on prevalence of ADHD in our community, thereby sensitizing the parents, teachers and primary care physicians. Semi-structured Proforma was prepared after discussion with the psychiatrist. It is a questionnaire with 12 simple questions from DSM-IV criteria related to the ADHD symptoms. It has 6 questions related to inattention, 6 questions related to hyperactivity and impulsivity. It was translated to Telugu for easy understanding and for use in Telugu medium schools. We found 117 children with ADHD, which translates to a prevalence rate of 1.52% in school going children of age 5-12 years. The prevalence was 2.29% in boy's and0.75% in girls.

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[1].

ADHD is characterized by an age inappropriate hyperactivity, impulsiveness and inattention[2]. Children with ADHD may experience significant functional problems, such as academic underachievement, low self-esteem, troublesome interpersonal relationships with family members and peers[3]. School is the workplace for children and adolescents. Successful school performance is essential for psychological growth and development. Thus if something interferes with success in school, the impact will affect the emotional, social and family functioning of children.

ADHD is often undiagnosed in children. There is lack of awareness of ADHD among parents, teachers and pediatricians and educationists, there is a need for continued work to gather data on prevalence of ADHD in our community, thereby sensitizing the parents, teachers and primary care physicians. The prevalence of ADHD has been estimated at 3% to 5% in school age children. These reported rates vary depending on the nature of the population sampled and the method of ascertainment[4].

Many studies across the globe have reported the prevalence of ADHD in 5-10% 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.

MATERIALS AND METHODS

Source of Data: The children of government and private schools. Studying in Telugu and English medium primary schools from 3rd standard to 7th standard.

Study Design: Cross sectional-descriptive study.

Study Duration: Time period of one year.

Sample Size: N= 7600. Sample size has been calculated taking prevalence of ADHD among school going children as 5-5% significance level and 10% allowable error. It is calculated using the formula N = 4PQ/E2 where:

- P = Prevalence
- Q = 100-P
- E = Allowable error of P

Sampling Method: Multi stage, random sampling.

Inclusion Criteria:

- School children of age 8-12 years of age
- Children of ADHD with documented evidence

Exclusion Criteria:

- Children with other neurodevelopmental disorders
- Children with sequelae of central nervous system trauma
- Children with intellectual disability
- Schools which do not give consent

Study Method: All schools teaching primary education were selected:

- **In the First Stage:** Total numbers of schools were counted There were 20 government and 26 private schools
- **In the Second Stage:** In order to have representative sample 7 government and 7 private schools were selected randomly. (Lottery method)
- **In the Third Stage:** All school children from third and fourth standard were taken in to the study

Thus a sample size of 7600 was selected from each of these 14 schools. When sufficient number of study subjects cannot be found, the neighbouring schools were visited till attaining the desired number of study subjects. Approval of district education officer was taken and then school head masters and class teachers were contacted and written informed consent was taken.

Collection of Data: The collection of data was done in 4 phases.

Phase 1: Met the DDPI (Deputy Director of Public Instruction) and sought the permission and co-operation to visit the schools and collect the data. Obtained the written permission letter and was referred to BEO (Block Education Officer) of both East and West Blocks. Their permission was also obtained and list of schools with address obtained.

Phase 2: Schools were stratified into Government and Private random sampling of schools was done. Then headmaster/principal of these schools were contacted, details of the study was explained and sought consent and co-operation to do the study. After obtaining consent the details of the school, i.e., total no of students, no of boys, no of girls in the schools were collected.

Phase 3: With the permission of school head, a meeting with all the teachers was arranged. In the meeting, teachers were given a short presentation on ADHD explaining the rationale for the study. The purpose of this presentation was to create awareness and also for encouraging to participate actively in the study. Details of the semi-structured Proforma, including how to fill it and the criteria to use was given with few examples. Doubts if any were clarified and Proforma was given to them. Then teachers were asked to complete the 12 item questionnaire for each of the students in class. The questionnaires were collected later and then analysed. The score of 15 out of possible 36 was taken as cut-off point and those with score >15were considered positive and these children enumerated. The teachers were asked to fill the 28 item Conner's teacher rating scale for the children who were screened positive.

Phase 4: The children who met the criteria were enumerated and their parents were invited to participate in the next step and were asked to fill the 27 item Conner's parent rating scale. As many parents were uneducated and were unable to understand the rating scale, they were helped by the investigator himself. The parents, either mother or father along with the child were interviewed directly by the psychiatrist at SVRRGGH and ADHD was diagnosed based on DSM-IV criteria. The children meeting the criteria of ADHD as per the DSM-IV were subjected to detailed physical and neurological examination. Children with intellectual disability, conduct disorder and oppositional defiant disorder were excluded. Children who did not come for completion of their assessment were also excluded.

Total number of children screened positive in Phase 3 was 180. Out of 180 children 6 children were excluded because they were >12years. In phase 4, after interviewing and physical examination 5 children were found to have intellectual disability, 10 children had conduct disorder (oppositional defiant disorder) and were excluded. 42 children were not meeting the DSM-IV criteria for ADHD and were also excluded.

Study Instruments: Semi-structured Proforma was prepared after discussion with the psychiatrist. It is a questionnaire with 12 simple questions from DSM-IV criteria related to the ADHD symptoms. It has 6 questions related to inattention, 6 questions related to hyperactivity and impulsivity. It was translated to Telugu for easy understanding and for use in Telugu medium schools.

Conner's Rating Scale, Revised (CRS-R): Developed by C. Keith Conners, Ph.D., CRS-R is used as part of a comprehensive examination and is designed to be easily administered and scored. These rating scales assist in determining whether children between the ages 3 to 17 years might suffer from ADHD. CRS-R is the widely used rating scale and has set the standard for assessing ADHD and related problems. These scales were "normed" using data from more than 8000subjects crossing all cultural and ethnic boundaries. As with any psychological evaluation instruments the CRS-R is not perfect. One runs the risk of obtaining false positives or false negatives. Therefore the information obtained from completed forms should not be used in isolation.

CRS-R is available in long and short versions for both parents and teachers. Short version of both parent and teachers rating scale was used in our study. The parent's short version contains 27 items and teacher's short version (Annexure 4) has 28 items.

RESULTS

We found 117 children with ADHD, which translates to a prevalence rate of 1.52% in school going children of age 5-12 years. The prevalence was 2.29% in boys and 0.75% in girls. Chi-square value = 27.299, degree of freedom 1, $p<0.001$ (significant difference) male: female ratio is 3.17: 1. The above Table 1 also shows the sex distribution of the children screened which was51.65% boys and 48.35% girls (1.07:1) whereas the boys: girl ratio among ADHD children is 3.17:1 and is significant. ($p<0.001$). This Table shows 2 the prevalence of ADHD in different age groups. The prevalence is highest in 12years group and lowest in 8 years age group. The prevalence in-creases as age progresses and is not significant statistically (p-value 0.3056).

Fig. 1 shows the percentage of children diagnosed with different subtypes of ADHD. In our study the combined type was more prevalent and accounted for 40% of children with ADHD. This was closely followed by hyperactivity subtype with 39% and Inattention type accounted for only 21%. Fig. 2 shows the prevalence of ADHD subtypes in our study sample. In this study the prevalence of hyperactivity subtype was 0.61% the inattention type was 0.33% and combined type was 0.62%. Combined type was more predominant in our study closely followed by hyperactivity.

This Table shows 3 the prevalence of 3 ADHD subtypes in different age groups. As you can see from the above table the hyperactivity subtype decreases as the age progresses, whereas inattention and combined type increases as age progresses. There is no significant variation p-value 0.614739. Table 4 shows the prevalence of ADHD subtypes in various age groups. In children of 8-10 years prevalence of ADHD is 1.29%. The hyperactivity type is 0.56%, combined type is

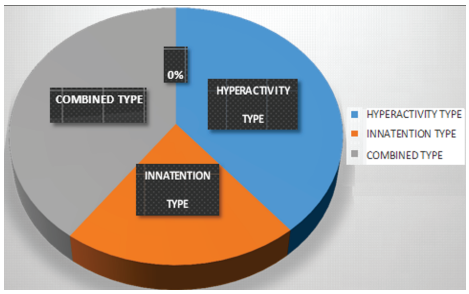

Fig 1: ADHD Subtypes

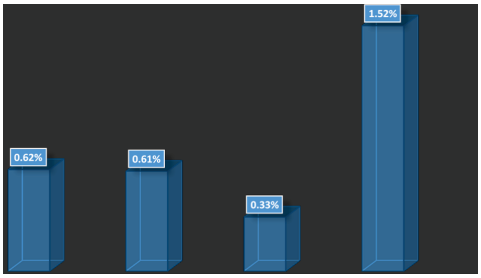

Fig 2: Prevalence of ADHD Subtypes

0.46% and inattention type is 0.26%.In children of 10-12 years prevalence of ADHD is 1.77%. The hyperactivity type is0.58%, combined type is 0.61% and inattention type is 0.33%.

DISCUSSIONS

This study examined the prevalence of ADHD in 7691 school age children of age group 8to 12 years by cross sectional survey. Although the prevalence of 1.52% is low when compared with the studies in western countries and some studies in India, it is consistent with some Indian studies in school age children. A review of 71 studies conducted in all continents showed a wide range of prevalence ranging from 0.2-23%.

Essau Groen Conradt *et al*.[5] in their study conducted in Germany in1999 using DSM-IV criteria in children 12-17 years shows a very low prevalence of 0.2%. This study also showed 0.2% prevalence in boys and 0.2% prevalence in girls with sex ratio of 1:1. Vasconcelos Werner Malheiros *et al*.[6] in their study in Brazil in2003 in elementary school children found a prevalence of 26.8%. This study was conducted in children of age 6 to 15 years. They used DSM-IV criteria without requirement of impairment and using teachers as source of information.

These studies were done using different criteria (DSM and ICD) and strategy adopted to collect information were different (i.e. only parents or teacher or both, whether functional impairment required, whether child was interviewed) Studies based on information from only parents or teachers have higher prevalence than the studies which collect information from both parents and teachers, which in turn will be higher compared to studies which includes interview, in addition to the information from both parents and teachers. Our study used a two stage design to collect data. First screening phase was with information from teachers and then from parents. This phase was followed by diagnostic interview of children to determine the diagnosis based on DSM-IV criteria. These type of studies report a low prevalence which may be the true prevalence. Hence the prevalence in our study is low[7].

According to Kurtzke, epidemiological studies with a higher prevalence should be considered as estimated or screening prevalence because many false positives maybe included. That may explain part of the differences observed between the results obtained from different studies. More recent community based epidemiological studies have reported much lower prevalence figures. The Great Britain office of national statistics conducted a survey of more than 10,000 children and found a DSM-IV based prevalence of 1.4% in 1999and 1.5% in 2004. a similar profile is seen in recent studies conducted in developing countries. In Brazil DSM-IV based prevalence of 1.8-2% in Bangladesh and 1.6%in India was noted. In our study the prevalence is 1.52% and is consistent with these recent studies[8].

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 including our study. Epidemiological surveys in western countries have reported a greater incidence in boys than in girls the ratio ranging from 2:1 to 10:1 whereas Indian studies have reported ADHD to be 3.3-7.7 times more common in boys than girls[9].

Table 1: Prevalence of ADHD by gender

Gender	ADHD	Non ADHD	
Male	89 (2.29%)	3884	3973
Female	28 (0.75%)	3690	3718
	117	7574	7691

Table 2: Prevalence of ADHD based on age

Age Group	ADHD	Non ADHD	Total
8 Years	14 (1.2 %)	1128	1142
9 Years	22 (1.8%)	1181	1203
10 Years	21 (1.2%)	1725	1746
11 Years	24 (1.3%)	1704	1728
12 Years	36 (1.9%)	1836	1872
Total	117 7574	7691	

Table 3: Age and type wise prevalence of ADHD

		Type of disorder		
Age group	Combined	Hyperactivity	Inattention	Total
8-10 Years	21 (44.6%)	24 (54.4%)	12 (46.1%)	57
11-12 Years	26 (55.3%)	20 (45.4%)	14 (53.8%)	60
	47 (100%)	44 (100%)	26 (100%)	117

Table 4: The prevalence of ADHD subtypes in various age groups

		ADHD			
Age	Combined	Hyperactive	Inattention	Total	Children screened total
8-10 Years	21 (0.51%)	24 (0.58%)	12 (0.29%)	57 (1.39%)	4091
11-12 Years	26 (0.72%)	20 (0.55%)	14 (0.38%)	60 (1.6%)	3600
	47(0.61%)	44 (0.57%)	26 (0.33%)	117 (1.52%)	7691

Our study gives the sex ratio of 3.71:1 which is low compared to above studies but a recent meta-analysis of studies done in last decade gives a pooled prevalence of 2.4:1. According to Godman and Lames the gender differences strengthen the evidence for a biologically based, often genetically transmitted etiology of hyperkinetic disorder. This difference may be due to the fact that girls have ADHD with higher predominance of inattention type, causing less trouble to the family and at school and are therefore less easily identified.

Our study shows higher prevalence in the age groups 10-12 years. The prevalence of ADHD was found to increase with age. This is consistent with the findings of Schmidt Chawla and Gada which also showed a higher prevalence of ADHD in age group 11-12 years. This difference may be due to increased demands of attention both in school as well as home as the child grows. In our present study the prevalence of ADHD subtypes showed a significant variation. Hyperactivity sub type was more prevalent in the age group 8-10 years with a prevalence of 0.58%. Combined type was more prevalent in 10-12 years age groups with prevalence of 0.77%. There hyperactivity decreases as age progresses whereas the combined type and inattention type increases with age. This finding in our study is also consistent with past studies, although some studies have shown inattention type to be the more prevalent in higher age groups.

A possible explanation for this finding is that younger children who qualify for the predominantly ADHD-Hyperactivity type do not exhibit levels of inattention because they have not yet faced demands on their attention capacity which is required in higher classes and becomes evident at older ages. It is therefore possible that as the ADHD- Hyperactivity children become older they may also show maladaptive levels of inattention so that they may change their sub type to that of ADHD-Combined type. This variation may also be due to the fact that the child becomes aware of his/her condition and tries to suppress these hyperactivity and impulsivity features as he/she grows older[10].

CONCLUSION

We found a prevalence of 1.52% with male: female ratio of 3.17:1.

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