

# PREVALENCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN SCHOOLCHILDREN IN THE CITY OF SALVADOR, BAHIA, BRAZIL

Milena Pereira Pondé<sup>1</sup>, Antonio Carlos Cruz Freire<sup>2</sup>

**ABSTRACT - Background:** Attention deficit hyperactivity disorder (ADHD) is the most common neuropsychiatric disorder of infancy and one of the most prevalent chronic diseases found in schoolchildren. **Objective:** To evaluate the prevalence of ADHD in schoolchildren through the use of a questionnaire responded by school-teachers. **Method:** A total of 774 children enrolled in the public and private school systems were evaluated. The diagnostic instrument used was a Teacher ADHD scale. **Results:** Results showed that 6.7% of children were considered highly likely to have the disorder. Of the more severe cases of ADHD, the hyperactive-impulsive subtype was more frequently identified in girls, while the inattentive subtype was more prevalent among boys. **Conclusion:** The symptoms of attention deficit in hyperactive children may be underestimated by teachers since the symptoms of hyperactivity are more noticeable and disruptive.

**KEY WORDS:** child and adolescent mental health, epidemiology, attention deficit hyperactivity disorder.

## **P revalência do transtorno de déficit de atenção e hiperatividade em escolares na cidade do Salvador, Bahia, Brasil**

**RESUMO - Introdução:** O transtorno de déficit de atenção e hiperatividade (TDAH) é o distúrbio neuropsiquiátrico mais comum na infância, estando, também, entre as doenças crônicas mais prevalentes em crianças escolares. **Objetivo:** Estimar a prevalência do TDAH em escolares através de inquérito com professores. **Método:** Foram avaliadas 774 crianças, matriculados na rede pública e privada de ensino. O instrumento diagnóstico utilizado foi a Escala de TDAH versão para professores. **Resultados:** Estimou-se que 6,7% das crianças apresentavam alta probabilidade de apresentar o distúrbio. Dentre os casos mais severos de TDAH o subtipo hiperativo-impulsivo foi mais prevalente nos escolares do sexo feminino, enquanto o subtipo desatento foi mais prevalente entre as crianças do sexo masculino. **Conclusão:** Os sintomas do déficit de atenção em crianças hiperativas podem ser subestimados pelos professores visto que os sintomas da hiperatividade são mais disruptivos e visíveis.

**PALAVRAS-CHAVE:** saúde mental na infância e adolescência, epidemiologia, transtorno de déficit de atenção e hiperatividade.

Attention deficit hyperactivity disorder (ADHD) is characterized by three groups of symptoms, the predominance of which defines the subtype of the disease: predominantly inattentive, predominantly hyperactive-impulsive, or combined<sup>1</sup>. Children with ADHD may have difficulties at school, relationship problems and low self-esteem<sup>2</sup>. Comorbidity with other psychiatric disorders is frequent and may result in serious social repercussions and exclusion<sup>3,4</sup>. ADHD is estimated to affect 5.5%-8.5% of schoolchildren, and the mean prevalence from the various studies carried out is 6.9%<sup>5</sup>. A pilot study estimated that

7.9% of schoolchildren have a high probability of ADHD<sup>6</sup>.

The objective of the present study was to evaluate the prevalence of ADHD in schoolchildren in the city of Salvador, Bahia, Brazil, by analyzing a questionnaire responded by teachers.

## **METHOD**

A study was carried out based on a total of 237,057 students enrolled for the 2004 school year in primary schools in the city of Salvador, Bahia, Brazil. Of these, 35,537 were enrolled in private schools, while 201,520 were enrolled in

<sup>1</sup>Assistant Professor of Pharmacology and Psychiatry, Bahia School of Medicine and Public Health, Salvador, BA, Brazil; <sup>2</sup>Investigator, Bahia School of Medicine and Public Health, Salvador BA, Brazil; recipient of a grant from the Bahia State Foundation for the Support of Research. This study was supported by the Bahia School of Medicine and Public Health and funded by the Bahia State Foundation for the Support of Research.

Received 25 July 2006, received in final form 30 November 2006. Accepted 14 December 2006.

Dra. Milena Pereira Pondé - Avenida Centenário 2883/410-411 - 40155-150 Salvador BA - Brasil. E-mail: pondem@terra.com.br

public schools. Assuming a prevalence of ADHD of 8.5%, a confidence interval of 95% and a presumed error of 3%, the sample size was calculated at 660 children. Schools were randomly selected from a list supplied by the State Education Department of all schools in the city of Salvador. Meetings were held with teachers and directors of the selected institutions, at which time information was supplied with respect to the study, and the staff that voluntarily agreed to participate in the study signed informed consent forms. In the selected schools, all students enrolled in the first to fourth grades of primary school were included in the study, making a total of 774 children, a larger sample than that required according to the calculated sample size.

The attention deficit hyperactivity disorder scale, Teacher version<sup>7</sup>, was used as the diagnostic instrument. This scale is designed to evaluate ADHD behavioral symptoms within a school environment in which the teacher is the source of information. This instrument was chosen because physicians rely on data supplied by parents and/or teachers for reaching a diagnosis. The instrument is composed of 49 items sub-divided into four factors that evaluate ADHD within the school environment: Factor 1 – Attention deficit (16 items); Factor 2 – Hyperactivity-impulsiveness (12 items); Factor 3 – Learning problems (14 items); and Factor 4 – Antisocial behavior (7 items). The scale is a 6-point, Likert-type scale, designed for the teacher to select one of the following options: DC (disagree completely), D (disagree), DP (disagree in part), AP (agree in part), A (agree) and AC (agree completely). Each answer is awarded a score ranging from 1 to 6. After obtaining a score for each item, these scores are added together to provide a total score for each factor. The results are then transformed into percentiles using correlation tables contained in the instruction manual of the scale. Percentiles  $\leq 25$  suggest that the child has fewer problems with respect to that factor than the majority of children and he/she is classified as below expectation. Percentiles between 26 and 75 suggest that the student is within the mean, i.e. within expectation. Percentiles between 76 and 94 suggest that the child has more problems than the majority, and he/she is classified as above expectation. Percentiles  $>95$  indicate that the child is in the range with the greatest probability of the disorder and is classified as highly probable. This instrument was chosen because it had already been validated in Brazil, because it emphasizes the importance of information provided by teachers and allows behavior to be recorded that may have been omitted if techniques of direct observation of the child were used, and because, in addition to permitting identification of children with high probability of having ADHD, this method also identifies the group of symptoms most prevalent: impulsiveness, hyperactivity, attention deficit and antisocial behavior.

All the students in the selected schools were evaluated by their respective teachers. After the completed questionnaires were returned, forms with any missing data or discrepancies in answers were returned to the respective teachers for correction. The information was stored in a database using the SPSS statistical software package, version 9.0 for Windows. Analysis of the demographic variables

and those concerning ADHD was carried out using the same program.

## RESULTS

In the period between May and August, 2004, a total of 774 children were evaluated, 356 of whom were enrolled in the public school system and 418 in the private system. Children in the private education system ranged from 6 to 12 years of age, 46% being in the 6-8 year age bracket, while 54% were 9-12 years of age. In the public school system, children ranged between 6 and 17 years of age, 35% being in the 6-8 year age group, 60% in the 9-12 year age bracket, while 5% were between 13 and 17 years of age. With respect to gender, 430 children (44.4%) were girls, while 344 (55.6%) were boys.

The evaluation instrument is designed in such a way that, prior to completing the questionnaire, the teacher first gives his/her impression of the student. With respect to the cases identified by the evaluation instrument as having a high probability of attention deficit, 36% of these students in the public school system and 29% in the private school system failed to be identified by the initial impression of their teacher. On the other hand, with respect to the cases of high probability of hyperactivity-impulsiveness, there was 100% agreement between the teacher's initial impression and the final diagnosis obtained using the ADHD scale in the public school system and 91% agreement in the private school system.

Analysis of the scores of the four sub-scales showed that 81 schoolchildren (10.5%) had more problems than the majority of children with respect to the predominantly inattentive subtype, and were classified as above expectation. Of these, 56 (7.2%) belonged to the public school system and 25 (3.2%) to the private education system ( $p=0.0000112$ ). In addition, still with respect to the predominantly inattentive subtype, 31 children (4%) were classified as having high probability of the disorder, 13 (1.7%) of whom were enrolled in public schools and 18 (2.3%) in private schools ( $p=0.876$ ), (Table 1). With respect to gender, 17 (54.8%) were boys and 14 (45.2%) were girls. Of the 31 children with high probability of the predominantly inattentive subtype, all except one were in the 6-11 year age group, while the remaining child was 13 years old. The following symptoms were the most common and severe in the predominantly inattentive subtype: failure to give close attention to details; difficulty in paying attention to the teacher's explanations; not paying attention to schoolwork/homework; unable to keep attention focused on anything for very long; easily distracted.

Table 1. Characteristics of the children classified as having high probability or as being above expectation for attention deficit disorder (according to school system).

Attention deficit	High probability				Above expectation			
	Public		Private		Public		Private	
	N	%	N	%	N	%	N	%
No hyperactivity	13	41.9	18	58.1	56	69.1	25	30.9
Hyperactivity	1	14.3	6	85.7	37	75	12	25

Table 2. Characteristics of the children classified as having high probability or as being above expectation for hyperactivity-impulsiveness (according to school system).

Hyperactivity-impulsiveness	High probability				Above expectation			
	Public		Private		Public		Private	
	N	%	N	%	N	%	N	%
No attention deficit	8	61.5	5	38.5	42	55.2	34	44.8
Attention deficit	1	14.3	6	85.7	37	75	12	25

With respect to hyperactivity-impulsiveness, 76 children (10%) had more problems than the majority of children and were classified as above expectation. Of these, 42 (5.4%) belonged to the public school system and 34 (4.3%) to the private school system ( $p=0.07$ ). Thirteen children (1.7%) had high probability of predominantly hyperactive disorder, five of whom (0.7%) belonged to the private school system and eight (1%) to the public system ( $p=0.22$ ), (Table 2). Of these 13 children, 5 (38.5%) were boys and 8 (61.5%) were girls. The most intense and severe symptoms of hyperactivity-impulsiveness were: fidgety or squirmy while seated; impulsive; constantly on the go; and restless.

Analysis of the combined subtype showed that 49 children (6.6%) had more problems than the majority and were therefore classified as being above expectation for the disorder. Of these, 37 (5%), were enrolled in public schools and 12 (1.5%) were in private schools ( $p=0.000004$ ). Seven students (1%) had a high probability of the disorder, only one of whom was attending a public school (0.2%), while the remaining 6 (1.5%) were in private schools ( $p=0.19$ ). Of these seven children, 4 were boys (57%) and 3 (43%) were girls. There was no difference in the intensity and frequency of the symptoms of attention deficit and hyperactivity in this group. In fact, the frequency and intensity of symptoms were considered high in all children.

## DISCUSSION

*Differences in estimated prevalence rates* – The mean estimated prevalence rate of ADHD in studies carried out in the community is 10.3%, the general

prevalence being 9.2% in boys and 3.0% in girls<sup>8</sup>. In the United States, the prevalence in the general population has been estimated at 8% of children 3-17 years of age<sup>9</sup>, while in Australia studies have reported estimates of 13.5% for children 6-13 years of age, evaluated using the Parents' Diagnostic Interview for Children<sup>10</sup>. The diagnostic criteria used appear to influence estimated prevalence<sup>8-10</sup>. Studies in which the DSM-III was used as diagnostic criteria estimated a prevalence of 6.8%, while those studies that used DSM-III-R reported an estimated prevalence of 10.3%<sup>8</sup>. A study carried out in Brazil using the DSM-IV as diagnostic criteria estimated a prevalence of ADHD of 18% in primary school pupils<sup>11</sup>. Using the same criteria, a US study estimated a prevalence of ADHD in primary school children of 15.8%, 3.6% for the combined subtype, 2.4% for the hyperactive-impulsive subtype and 9.9% for the inattentive subtype<sup>12</sup>. The high prevalence rates reported with the use of the DSM-IV criteria would appear to be due to the fact that this method takes only current symptoms into consideration, ignoring other essential criteria such as duration, onset of symptoms, severity and degree to which the patient is affected, as well as the exclusion of other disorders. The prevalence of 16%, estimated without evaluating the degree to which the patient is affected, fell to 6.8% when this criterion was used<sup>8</sup>. A study carried out in Australia reported an estimated ADHD prevalence rate of 14.7% when only the DSM-IV list of symptoms was used. In the same study, when the criteria described above were included, the prevalence of ADHD in children 6-12 years of age was 9.4%<sup>13</sup>.

Among schoolchildren, the prevalence of ADHD obtained from the mean of various studies is 6.9%<sup>5</sup>. Results from the present study estimate that 6.7% of pupils had a high probability of having ADHD, 4% of whom had the inattentive subtype, 17% the hyperactive-impulsive subtype and 1.0% the combined subtype. These findings are in agreement with results reported from international studies.

The prevalence of the inattentive subtype in this study is in agreement with data reported in the literature, since the majority of children identified as having a high probability of ADHD belonged to this group<sup>12</sup>. Only 7 children with high probability of the disorder belonged to the combined subtype, while 13 children belonged to the predominantly hyperactive subtype. These data conflict with data from other studies in which the combined subtype is more prevalent than the predominantly hyperactive subtype<sup>12</sup>. The prevalence of the combined subtype may be underestimated by the teachers in relation to the hyperactive subtype because, in a hyperactive child, the teachers tend to put greater emphasis on the symptoms of hyperactivity and impulsiveness since these symptoms are more disruptive within the school environment, while the symptoms associated with attention deficit are more easily tolerated socially.

Analysis of the children identified as having more problems than the majority of schoolchildren, i.e. classified by the scale as belonging to the group "above expectation" showed an estimated prevalence of 27.1%, of which 10.5% belonged to the inattentive subtype, 10% to the hyperactive-impulsive subtype and 6.6% to the combined subtype. The same distribution profile of subtypes described for the schoolchildren belonging to the high probability group is also observed for the schoolchildren classified as being above expectation.

*Examining the subtypes according to gender and economic status* – The higher prevalence of ADHD in males that has been reported in other studies was not observed in this study<sup>5,12</sup>. In the general population, behavioral findings consistent with a diagnosis of ADHD are found in 9.2% (5.8-13.6%) of boys and 2.9% (1.9-4.5%) of girls<sup>5,8</sup>.

When the subtypes were analyzed according to gender in the group with high probability of having the disorder, a greater prevalence of the inattentive subtype was seen among boys, while the hyperactive subgroup was more prevalent among girls. These data differ from reports already published in the lit-

erature in which the opposite is described<sup>5,12</sup>. Distribution of the schoolchildren classified as above expectation according to gender is similar to data from previously published studies, the inattentive subtype being greater in girls and the hyperactive subtype being more prevalent among boys<sup>5,12</sup>. It is possible that the greater prevalence of the hyperactive subtype found in girls and the inattentive subtype in boys refers specifically to more severe cases, since the prevalence among children belonging to the above expectation group is in agreement with previously published data. Since girls in our culture are expected to be quieter, while boys are expected to be rowdier, perhaps the more severe cases are more easily identified by teachers in the gender in which this behavior is less expected.

Some authors have suggested that there is evidence of differences in the prevalence of ADHD according to socioeconomic status<sup>12,14</sup>. There was a greater prevalence of children above expectation for the inattentive and combined subtypes among pupils in the public school system (7.2% and 5%, respectively) compared to the private system (3.2% and 1.5%, respectively), this difference being statistically significant. These findings may truly represent a greater prevalence of less severe cases among children of lower socioeconomic level. They may also, however, reflect poorer performance and, consequently, deterioration of these children within the public school system where they may receive less stimulation and attention than children in the private school system.

*Widening the vision of ADHD: the importance of the disorder* – Despite being a common disorder in children, ADHD is being identified with increasing frequency in adolescents and adults<sup>14-16</sup>, meaning that the disease persists following adolescence and is not restricted to infancy. Adults with ADHD incur considerably higher annual costs, not only due to the expenses involved in the treatment of the disorder but also because of higher rates of absenteeism from work<sup>17,18</sup>.

Up to 35% of children with ADHD have some other psychiatric disorder, comorbidity with oppositional defiant disorder being one of the most frequent<sup>5,19,20</sup>. Early recognition of ADHD and adequate management of this condition may redirect the educational and psychosocial development of the majority of these children<sup>14,16,18</sup>. The initial step towards prevention is recognition of the disorder and its early identification in sufferers.

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