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Epidemiological study on symptoms of Attention Deficit/Hyperactivity Disorder and Behavior Disorders in public schools of Florianopolis/SC using the EDAH

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Abstract

Objective: *attention deficit/hyperactivity disorder (ADHD) is a pathology characterized by inattention, hyperactivity and impulsivity. The purpose of this article is to conduct an epidemiological study on symptoms of ADHA and behavior disorders in public schools of Florianopolis/SC.*

Method: *The study involved 1.898 students (1.001 males and 897 females) enrolled in five public schools of Florianópolis, from the 1st up to the 4th grades, aged 6 to 12. The instrument used was the EDAH, filled out by teachers and parents, which classifies children with predominance of the following symptoms: hyperactivity, attention deficit, conduct disorder, hyperactivity with attention deficit and ADHD associated with conduct disorder (global).*

Results: *Of the 1.898 students, 95 (5%) showed symptoms of ADHA associated with behavioral disorders. Regarding gender, the prevalence was higher in boys, in a 3:1 ratio.*

Conclusion: *Our data is in accordance with the literature. The distribution of the ADHD subtypes by gender is similar to the mentioned literature.*

Keywords: *Attention deficit disorder with hyperactivity; Conduct disorder; Hyperactivity; Prevalence; Scales; School health; Child; Male; Female*

Introduction

Attention deficit/hyperactivity disorder (ADHD) is one of the conduct disorders commonly diagnosed in children. This disorder has appeared, with variations in its nomenclature throughout history, including denominations such as 'Minimal Brain Lesion',[1] 'Hyper kinetic Reaction of Childhood' in the DSM-II,[2] 'Attention Deficit Disorder' in the DSM-III,[3] 'Hyperactivity Disorder with Attention Deficit' in the DSM-III-R,[4] 'Hyper kinetic Disorders' in the ICD-10,[5] and 'Attention Deficit/Hyperactivity Disorder' in the DSM-IV.[6] It is characterized by inattention, trend to distraction, impulsivity and excessive motor activity in levels inadequate to the specific phase of development. Some authors suggest that conduct disorders can also be associated with ADHD.[7]

These symptoms start before the age of seven,[6] although the majority is diagnosed after a number of years of manifestation, being observed in situations such as at home, school or work.[8] Many times the disorder is only recognized when the child enters school, since this is the period where teachers more frequently notice problems with attention and restlessness, when compared to other children of the same age and in the same environment. These children are agitated, frequently change activities, display difficulties in academic organization, and have trouble to maintain friendships with other children of their own age.[9] An excessive level of activity is typically observed, expressed by unnecessary body movements, impulsivity, as well as anticipatory responses and being unable to wait for an event.[10] Learning difficulties, motor disorders (balance, sense of time and space, body scheme, etc.) and academic failure are manifestations that accompany ADHD.[11] The variation in behavior in different environments is another trait of these children.[11] ADHD represents, with dyslexia, the main

cause of school failure[12], and learning difficulties are present in 20% of children with this disorder.[13] The more structured the environment and the greater the demands, the more the conduct deviates from the expected, while in less structured situations and with fewer demands, the harder it is to distinguish these children from their 'normal' schoolmates.[14] It is important to emphasize that these children are also frequently capable of controlling their symptoms with voluntary efforts or in activities of great interest to them.[15]

ADHD is not a disorder observed only in childhood. Its prevalence in adults is estimated in approximately 4%.[16] American researchers state that 2 to 2.5% of adults suffer from sequels of ADHD including inattention, impulsivity, irritability, intolerance to frustrations.[17]

ADHD is a heterogeneous syndrome, and its etiology is multifactorial, depending on genetic factors and biological and psychosocial adversities.[18] Researches have related ADHD to genetic factors in at least 80% of all cases: if parents have the disorder, the morbid risk of their children is 2 to 8 times higher,[18] what also occurs in families with mood disorders, anxiety disorder, alcohol dependence and probably antisocial personality disorder.[17] There are several other neurological etiologies for ADHD, including neurological risk, brain impairment and exposure to neurotoxins.[11]

It is, therefore, an important issue, given the implications that range from low academic performance to psychological and social problems in the individual's life.

Considering the relevance of the theme, this study aims to perform an epidemiological study on symptoms of ADHD and behavior disorders in public schools of Florianópolis/SC using the EDAH.

Methods

The studied population comprised 5 schools from the state public system of Florianópolis. Of the 12 schools, 5 were randomly chosen, amounting to 40% of the state public schools of the continental area of Florianópolis, totaling 1.898 students (1.001 males and 897 females), aged 6 to 12, enrolled from the 1st up to the 4th grade of elementary schools. The study was performed from August to November 2002.

EDAH

The instrument used was the EDAH[7] (Table 2) which classifies the child with predominance of the following symptoms: hyperactivity, attention deficit, conduct disorder, hyperactivity with attention deficit or symptoms of attention deficit/hyperactivity disorder associated with global conduct disorder. This scale is composed by 20 multiple-choice questions, with possible answers ranging from 0 to 3 points. The teacher answers according to the subject's frequent behavior in the previous six months. We have chosen to use the same scale with the children's parents, as the literature indicates that the disorder manifestations should occur in at least two different environments .

Based on the experiences with Conners Scale, adapted to the Spanish population, and on successive studies performed after them, Farré and Narbona considered convenient the development of a new scale maintaining the previous scales' qualities, adapted to the new scientific progress.[7] Factorial analysis of the reliability levels of the mentioned Spanish scale was accomplished in the Department of Methodology of the Psychological College of Barcelona University. Different studies performed with the Conners Scale showed item coherence in hyperactivity, inattention and behavior disorder items. As to reliability, correlations of each item with its factor, of each item to its total and of each factor to the total were accomplished.[7] For the validity study, the correlations between this scale and the DSM-III criteria were performed. Thus, this instrument uses as reliability indexes (Cronbach's alpha): for global ADHD questions,/ =0.929; hyperactivity/impulsivity/ =0.849; attention deficit/ =0.898; hyperactivity with attention deficit / =0.874; conduct disorder / =0.899. Validity indexes are 0.677 for global ADHD questions and 0.6761 for hyperactivity/attention deficit questions.

This classification received the 2001 TEA Ediciones award in Spain. As it is an easily-applied instrument, we adapted it to our population. Francisco Rosa Neto, one of the authors of this study, has concluded his M.Sc. and Ph.D. in Spain, and due to his acquaintance with one of the instruments' authors and his mastering of the Spanish language, he translated the scale into Portuguese and performed some scientific trials in the city of Florianópolis.[20] This study was sponsored by a grant for scientific initiative, and, parallelly, two other master theses were developed (M.Sc. in Human Movement Science at the State University of Santa Catarina -UDESC, Brazil, and M.Sc. in Educational Psychology at the South University of Santa Catarina – UNISUL, Brazil), comparing the EDAH to the DSM-IV questionnaire,[6] besides analyzing the motor profile of children with positive screening for ADHD.

Procedures

After being approved by the Committee of Ethics in Research of the State Secretary of Education of Santa Catarina, data were collected through the following procedures: First, schools to take part in the research were randomly selected (5 schools with 1898

Table 1 – Study's population

Schools	Male Students	Female Students	Total
A	158	122	280
B	340	323	663
C	182	158	340
D	125	102	227
E	207	181	388
General	1001	897	1898

Table 2 – Translated Farré and Narbona's scale

Scale for evaluation of attention deficit/hyperactivity disorder							
	NONE 0	LITTLE 1	SUFFICIENT 2	MUCH 3			
01	The child has excessive motor unrest.			0	1	2	3
02	The child has difficulty in learning at school.			0	1	2	3
03	Frequently teases other children.			0	1	2	3
04	Gets easily distracted, displaying inattention.			0	1	2	3
05	Demands immediate fulfillment of desires.			0	1	2	3
06	Has difficulties with team activities.			0	1	2	3
07	Daydreams frequently.			0	1	2	3
08	Leaves tasks unfinished.			0	1	2	3
09	Not well accepted by peers.			0	1	2	3
10	Denies mistakes and blames the others.			0	1	2	3
11	Shouts often in inappropriate situations.			0	1	2	3
12	Talks back. Has bad manners. Arrogant.			0	1	2	3
13	Moves constantly, restless.			0	1	2	3
14	Argues and fights for any reason.			0	1	2	3
15	Blows up due to unstable mood.			0	1	2	3
16	Has no sense of limits and fair-play.			0	1	2	3
17	Impulsive and irritable.			0	1	2	3
18	Does not get along with most classmates.			0	1	2	3
19	Efforts are easily frustrated and is inconstant.			0	1	2	3
20	Does not accept the teacher's directions.			0	1	2	3

APPLICATION RULES AND CORRECTION OF THE SCALE

The score for each subscale is calculated by adding the questions corresponding to each of its items (hyper-activity/impulsivity; attention deficit and conduct disorder):
- Predominance of hyperactivity/impulsivity: Questions 1, 3, 5, 13, 17
Result: sum of answers related to questions on hyperactivity/impulsivity grea-ter than or equal to 10.
- Predominance of attention deficit: Questions 2, 4, 7, 8, 19
Result: sum of answers related to questions on attention deficit greater than or equal to 10.
- Predominance of conduct disorder: Questions 6, 9, 10, 11, 12, 14, 15, 16, 18, 20
Result: sum of answers related to questions on conduct disorder greater or equal to 11.
According to Farré and Narbona,[7] the presence or absence of conduct disorder helps to determine if they are concomitant to ADHD or are related to other type of disorder without the underlying ADHD.
- If the sum of answers to questions on hyperactivity/impulsivity and attention deficit is greater than or equal to 18, the child is considered predominantly hyperactive with attention deficit.
- If the sum of answers to all questions (attention deficit, hyperactivity/impulsivity, conduct disorder) is greater than or equal to 30, the child is considered as having global ADHD.

students from the 1st up to the 4th grades). There was a meeting with the teaching body of each school aiming to explain ADHD symptoms. From this moment onwards, students considered to have the symptoms were pre-selected by the teachers of each division. In the first stage, the EDAH[7] was applied to the teachers of the selected children, in order to obtain a diagnostic confirmation of the child's behavior. One hundred and sixty-eight children had positive results. In the second stage, parents were invited to visit the school and fill out a copy of the same scale to confirm the teachers' answers, thus allowing the obtainment of answers from 149 students' parents. Therefore, the initial screening had 149 students, with their scale filled out by teachers and parents. Of them, 115 showed ADHD according to the opinion of both their teachers and parents. The 19 students whose parents did not came to the school were excluded from the statistic analysis.

Results

To analyze the results, descriptive statistics was used with the distribution of simple and percentage frequencies through the software Epi Info 6.0.21

The use of the scale in the population demonstrated that, of the 1,898 students, 115 (6.0% of the population) showed conduct disorder while 95 (5%) scored 30 or more, displaying ADHD symptoms (global).

As to gender (1001 boys and 897 girls), students with conduct disorder were predominantly male - 89 boys (8.89% of males); 73 boys (7.29%) showed global ADHD symptoms. As for females, 26 girls (2.89% of females) were diagnosed with conduct disorder, being 22 (2.45%) diagnosed with global ADHD symptoms.

Discussion

The present study showed some limitations that should be emphasized: as the sample came from the teachers' identification, this may have underestimated the prevalence of the symptoms; there were sample losses (19 cases) in the prevalence rates, altering the results; the scale was not back-translated , although the

Table 3 – EDAH scale punctuations

Diagnosis	Punctuations
Hyperactivity/impulsivity	10
Attention deficit	10
Conduct disorder	11
Hyperactivity + attention deficit	18
Global	30

Hyperactivity/impulsivity: diagnosis of ADHD with hyperactive/impulsive predominance.
Attention deficit: ADHD diagnosis with predominance of attention deficit.Conduct disorder: diagnosis of conduct disorder.
Hyperactivity + attention deficit: diagnosis of ADHD combined type.
Global: diagnosis of ADHD associated with conduct disorder.

Table 4 – General characteristics of the sample regarding ADHD symptoms

Characteristics	Frequency	%
Global	95	5
Attention deficit	6	.31
Conduct disorder	5	.26
Hyperactivity	2	.1
Hyperactivity + attention deficit	7	.36
TOTAL	115	6%

validity of the translation was performed through scientific trials.[20]

The prevalence of students with ADHD symptoms is in accordance with the majority of studies which allow a 5% prevalence.[6,22-23] Farré and Narbona[24] found a 6% prevalence among students while validating the Conners' questionnaire in the Spanish population. Baumgaertel et al[25] conducted a study in Germany with children and adolescents aged 5 to 12 years, using the DSM-III, DSM-III-R and DSM-IV criteria, finding 9.6%, 10.9% and 17.8% prevalence, respectively. Guardiola et al[26] investigated the prevalence of the disorder among 484 students of elementary schools in Porto Alegre/RS using the DSM-IV and neuropsychological criteria. In this study, there was 18% prevalence according to the DSM-IV criteria and 3.5% considering neuropsychological criteria. Vasconcelos et al[27] assessing children aged 6 to 15 years in a state school of the state of Rio de Janeiro, found 17.1% prevalence using a questionnaire derived from the DSM-IV. In Spain, Benjumea-Pinto and Mojarro-Praxedes[28] studied 868 subjects aged 6 to 15 years applying the Conners Scale for parents and teachers, the questionnaire of the DSM-III-R and a semi-structured interview of the PACS. The disorder had a 6% prevalence according to the instruments used.

As to gender, studies show a predominance of disorder among boys[7,18,29-30] regardless the surveying method or the diagnostic instrument, and the ratio varies from approximately 2:1 in population to 9:1 in clinical studies.[18] It was suggested that the different proportion of boys and girls found by population and clinical studies is probably due to the fact that girls show less behavioral comorbidity symptoms, causing less harm to their families and schools and decreasing their referral to treatment.[25] Such statements agree with our results. Montiel-Nava et al[31] evaluated 1141 students aged 6 to 12 years from municipal schools of Venezuela using the revised version of the Conners Scale for parents and teachers, and found 7.19% prevalence in the total population, being the incidence was higher among females (8.26%) in comparison to males (6.20%), disagreeing with the specialized literature.

The majority of children investigated in our study showed ADHD symptoms with all subtypes related to this disorder, while some displayed predominance of one or another pattern. The DSM-IV[6] subdivides ADHD into three types: ADHD with predominance of symptoms of inattention, predominance of symptoms of hyperactivity/impulsivity, and the combined type. Symptoms related to hyperactivity/impulsivity are more frequent than inattention symptoms in preschoolers with ADHD.[15] However, in this study the frequency of inattention symptoms was more prevalent than hyperactivity/impulsivity symptoms. Predominance of inattention symptoms is more frequent among females,[15] what confirms our results. However, the difference was minimal, and seems to show, together with the combined type, a higher rate of academic failure.[15] Males display attention deficit disorder with hyperactivity more frequently than females, although the prevalence of attention deficit without hyperactivity is equally distributed between genders,[29] what agrees with our findings. Authors such as Barkley[32] discuss whether the type with predominance of inattention (without hyperactivity) truly represents a subtype of ADHD. In the study by Byrne et al[33] with pre-school children, 68% of them showed hyperactive/impulsive ADHD type, 28% combined ADHD, and 4% had predominance of inattention using DSM-IV criteria. As for the sample of Montiel-Nava et al,[31] using the Conners Scale with students aged 6 to 12 years, in Venezuela, there was a 5.7% prevalence of

Table 5 – Characteristics of the sample regarding gender-related ADHD symptoms

Characteristics	Male frequency	% Males	Female frequency	% Females	p
Global	73	7.29	22	2.45	0,6945*
Attention deficit	3	.29	3	.33	
Conduct Disorder	5	.49	0	0	
Hyperactivity	2	.19	0	0	
Hyperactivity + Attention Deficit	6	.59	1	.1	
TOTAL	89	8.89	26	2.89	

'Value statisticly not significant.

combined ADHD,1.14% with predominance of attention deficit and only 0.35% with hyperactive/impulsive predominance.

Besides the impairment associated with symptoms of inattention, hyperactivity and impulsivity, children with ADHD often present comorbidity with other psychiatric disorders, potentially increasing their functional impairment.[34] Souza et al[34] investigated the most common comorbidity in children and adolescents aged 6 to 16 years with ADHD using the DSM-IV and P-CHIPS criteria. In this study, of the 28 youngsters with ADHD, 85.7% had comorbid disorders, being the most common oppositional defiant disorder (20.6%) and conduct disorder (39.2%). Barkley[32] suggests levels from 20 to 56% of conduct disorder in children with ADHD, and according to Korn[35] this disorder is more frequent in males, agreeing with our results.

It is important to emphasize that the incidence of ADHD varies according to the sample (general or clinical), the instrument used and the source of information. The DSM-IV[7] states that the manifestations of the disorder must occur in more than two different environments and last for a minimum of 6 months. As this is a study on the prevalence of the disorder's symptoms, we chose to use the EDAH for its being a recent instrument not yet published in Brazil. This scale is designed for the teachers and offers valuable information, as it allows them to compare the subjects with the rest of the group and evaluate more objectively their behavior.[7] There are many diagnostic protocols for ADHD patients including: the Gilberg Questionnaire,[36] the Conners Scale[37] and the Goyette, Conners and Ulrich Scale;[38] the Conners Scale for teachers which was validated in the Brazilian population;[39] the questionnaire derived from the DSM-III,[3] DSM-III-R[4] and DSM-IV.[6] There are other complementary evaluations, including the neurological evaluation and the psychological testing. Within neuropsychological criteria, the neurological development exam (NDE) evaluates the neurological development of children aged 3 to 7 years.[40] The most popular instruments have been mentioned. However, there are other scales not mentioned here that are used as a diagnostic reference by ADHD researchers.

Conclusion

The results found in this study were similar to other studies accomplished in different countries, and the differences found could be derived mainly from the instruments used. Regarding the scale used in this study, Farré and Narbona[7] affirmed that this should not be the only evaluation instrument, although it may be used in a first stage allowing the evaluator to elaborate diagnostic hypotheses or in a more advanced stage of the diagnosis.

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