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ORIGINAL ARTICLE

Attention Deficit Hyperactivity Disorder in adolescence

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Keywords:
Attention deficit disorder with hyperactivity, Adolescent medicine, Patient transfer.

Abstract

Objective: To know the evolution of Attention Deficit Hyperactivity Disorder (ADHD) in adolescence. **Methodology:** Longitudinal study with the data from 50 medical records from patients in follow-up for at least two years. For the statistical analysis we calculated using the Fischers exact, chi-square, and Kruskal-Wallis tests, by the R Core Team 2018 software. **Results:** Of the 50 patients, 80% were male, with an average age of 14.0 years (range 10 to 17 years), 26 (52%) were in initial follow-up with a neurologist for ADHD, the others with com- plaints compatible with ADHD. The mean age of onset symptoms was 8.0 years (range, 5 to 13 years) and age at diagnosis 8.5 years (range, 5 to 13 years). Methylphenidate use occurred in 30 (60%), 48% maintained treatment adherence, and 18% reported no improvement with methylphenidate, with no intention to use another medication. There was an improvement in the group ($p < 0.05$), and the contributing factors were: acquisition of a study routine, improved be-havior at school, more assertive school, more assertive family, fewer daily hours on screens. **Conclusion:** ADHD involves family, school, and health. The control of the symptoms and best results at school need a study routine, improving behavior, an inclusive school (which sees the difficulties of its students as a challenge), family support, and fewer hours on screens. We emphasize the importance of health professionals in the diagnosis and clinical follow-up.

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INTRODUCTION

The Attention Deficit Hyperactivity Disorder (ADHD) is the most prevalent neurodevelopmental disorder. The estimated prevalence is 7% among children and adolescents with great prejudice by society as a whole[1]. The main aspects of the diagnosis involve the difficulty to maintain attention in daily activities and at the school, impulsivity and restlessness. It is classified in three main subtypes: predominantly hyperactive - impulsive, predominantly inattentive and combined presentation[1].

The ADHD complaints can be correlated with other neurodevelopmental processes, such as im- maturity, which can be confused with the condition and increase the number of diagnoses[2]. The changes in ADHD interfere with social interaction with a negative impact on academic and behavioral fields, facilitating addiction to illicit drugs, obesity, professional failure, low self- esteem and interpersonal relationships[1,3,4].

Pharmacological treatment using central nervous system stimulants shows a good response, the most used are Methylphenidate, Dextroamphetamine, mixed amphetamine salts, and Lisdexamphetamine. It should include a comprehensive plan, which includes psychoeducation by the physicians, teachers, parents and patient about the condition and their treatment options, reviewed frequently and readapted if necessary[3,5,6].

Approximately half of childhood ADHD cases are under control in adulthood[7].

The study seeks to understand the evolution of ADHD in adolescence, analyze the impact of behavioral factors during outpatient follow-up and the need for drug treatment.

METHODOLOGY

This is an analytical, observational and longitudinal study with data collection from 50 patients followed up at the Adolescent Outpatient Clinic for at least two years. This service assists adolescents aged 10 to 19 years, referred by primary care and other specialty centers. The follow-up of patients with ADHD by pediatric neurology and/or child psychiatry often does not continue until adulthood, or there is loss of follow-up of patients, which leads to a period without follow-up until the resumption of services for adults. Some of these patients are followed up at this outpatient clinic until they reach adulthood.

This service aims, in addition to the initial complaints, also the integral health of the adolescent, promoting improvement in life habits, quality of food, adequate time for the use of screens and physical activity, adequate sleep and promotion of mental health[8]. With the improvement in lifestyle, an important number of patients showed improvement in the condition of ADHD, resolution or stabilization of the condition without the use of medication.

Cases without comorbidities were included. The analyzed data referring to the school were: failure and behavior; among lifestyle habits, sleep, food, physical exercise time and screen time – which included recreational use of television, video games, tablets, cell phones, desktop computers and laptops – were the factors analyzed. To define the appropriate parameters, the following criteria were adopted: (1) food, according to the Food Guide for the Brazilian Population, and WHO recommendations with an intake of 35 ml/kg of water weight and at least 3 meals a day with foods from all groups, avoiding multi-processed foods; (2) night sleep of eight hours or more; (3) moderate to intense physical exercise of seven hours a week or more – recommended by the World Health Organization; (4) daily screen use for recreational purposes for a maximum of two hours; (5) body mass index (BMI), the result of dividing weight divided by height squared, adopting the cutoff points recommended by the WHO/2007, regarding eutrophy or high. Data were collected during 2019 and 2021. The statistical tests used were Fischer's exact, chi-square, and Kruskall-Walis tests, calculated using the R Core Team 2018 software. The significance level adopted was 5%. The study is approved by the Research Ethics Committee (CAEE: 13011113.0.0000.0096).

RESULTS

Of the 50 patients, 80% were male, with a median age of 14.0 years (range 10 to 17 years), 26 (52%) were in initial follow-up with a neurologist for ADHD, the others had complaints compatible with ADHD[1]. The median age at symptom onset was 8 years (range 5 to 13 years) and age at diagnosis 8.5 years (range 5 to 13 years). Data from the first consultation and the evolution are in Table 1.

The use of methylphenidate occurred in 30 (60%), 48% maintained adherence to treatment and 18% reported not improving with methylphenidate, with no intention of using another medication. There was an improvement in the condition in the group (p<0.05) with previous use and evolution. Other contributing factors were: acquisition of routine studies, improved behavior at school, more functional family, fewer daily hours on screens (Table 2).

DISCUSSION

ADHD is more common in males, at a ratio of 3:1. This study found a ratio of 4:1, which cor- roborates the findings of other studies in which the prevalence in males is more than double in females[1,5,9-11].

The number of children affected is approximately 7% of the population and 3.5% of adults. Specialized follow-up in adolescence is essential, but there is a gap in many Brazilian municipalities, where pediatricians serve up to 12 years of age and clinicians after 18 years of age. The service

Table 1. General data of the study population, before and after.

Variable	**n = 50**	**%**
Sex	Male: 40	80
	Female: 10	20
Age (median)	14	10 a 17 years old
Age of onset of symptoms	8	Interval 8 a 14 years old
Age of diagnosis	8,5	Interval 8 a 14 years old
Before: Variable	**Patients**	**%**
The patient used methylphenidate	30	60
In use	26	48
Frame improvement	22	44
Functional family	34	68
Proper behavior at school	18	36
Study routine at home	13	26
Exercise 7h/week	10	20
Proper food	19	38
Night sleep for 8-9h	30	60
Leisure routine	31	62
Screen use more than 3 hours a day	38	76
No use of alcohol, tobacco and other drugs	45	90
High BMI	22	44
School failure	2	4
After: Variable	**Patients**	**%**
Adherence to the use of methylphenidate	32	64
Frame improvement	31	62
More assertive family	37	74
Better routine at home	34	68
Better behavior at school	37	74
Study routine	23	46
Exercise 7h/week	19	38
Proper food	19	38
Night sleep for 8-9h	32	64
Leisure routine	25	25
Screen use more than 3 hours a day	36	72
High BMI	22	44
School failure	2	4

for adolescents is often decisive in school performance and symptom control, taking advantage of the brain plasticity of this phase[12].

Most adolescents received the diagnosis of ADHD in their second childhood, in the investigation of learning difficulties[1,13,14]. Of these, more than half were already using methylphenidate, which acts as a central nervous system stimulant, with a good improvement effect on ADHD symptoms superior to other available medications, especially in children and adolescents[15-18].

In addition to the difficulty in accessing follow-up with the health team, there are side effects, among which are: inappetence, weight loss, insomnia or headache, which may explain non adherence to treatment[5,19,20].

It should be considered that, as the symptoms of ADHD are nonspecific and there is no biological marker, part of these cases may not actually be ADHD, even if the complaints are compatible with the condition, or even if there has been a spontaneous resolution[2,20,21].

Behavioral changes play an important role in cognitive conditioning, helping to control symptoms, especially

Table 2. List of variables studied in patients at the adolescent outclinic CHC - UFPR (2019-2021).

Variable	P	Test
ADHD improvement	p < 0,001	Fisher exact
The patient used methylphenidate	p < 0,001	Fisher exact
In use	0,004	chi-square
Functional family	0,013	Fisher exact
Better behavior at school	0,016	Fisher exact
Study routine	0,002	Fisher exact
Exercise	0,26	chi-square
Proper food	0,6	chi-square
Night sleep for 8-9h	0,41	chi-square
Leisure routine	0,124	chi-square
Fewer hours per day on screens	p < 0,01	Kruskal Wallis
BMI	1	chi-square

in milder cases[19,22-25]. Our study found that routine study acquisition, improved behavior at school, a more functional family, and less screen time were significantly important factors in improving the condition.

With remote teaching, there was greater exposure to the use of screens, the impossibility of pedagogical support, may also have influenced the result of the study. Despite this, Bobo et al. found an improvement in a proportion of patients during the pandemic precisely due to family proximity caused by confinement in social isolation, with greater presence and action of parents[3,26,27]. This is in line with our finding that families with healthy, functioning relation- ships have improved symptoms of ADHD.

Among the main limitations of the study is the small number of participants, due to the COVID-19 pandemic, which determined the closure of outpatient care for many months with the continuity of telemedicine consultations.

The improvement in behavior at school can be explained, both by drug treatment and by the individual commitment itself, psychoeducation, appreciation of the study and greater interest, resulting from brain development during adolescence[28,29].

The improvement of symptoms with greater flexibility and organization of daily life and parental support. In this way, it is possible to contest the importance of medicalization, especially the use of methylphenidate, to the detriment of changes and adaptations of socio-behavioral factors[30].

The cases with the best results were those in which there was better adherence to medication (if still necessary) and to past guidelines, which include psychoeducation, home study routine, adequate lifestyle, family and school commitment. With this, it is clear that the most appropriate treatment for adolescents with ADHD should prioritize these five elements (Figure 1) in a balanced way without focusing exclusively on just one line of treatment.

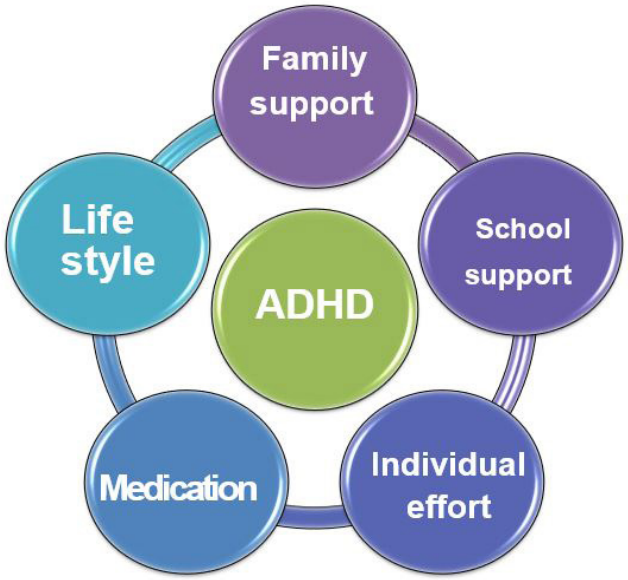


Figure 1. Multicenter treatment model.

Individuals in whom there was improvement in lifestyle, family support, school support, individual commitment, and adherence to drug treatment – when indicated – were the ones who presented the best evolution of the condition.

CONCLUSION

ADHD involves family, school, and health. The control of the symptoms and best results at school need a study routine, improving behavior, an inclusive school (which sees the difficulties of its students as a challenge), family

support, and fewer hours on screens. We emphasize the importance of health professionals in the diagnosis and clinical follow-up.

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