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SEÇÃO: ARTIGOS

ASD and ADHD in children: a preliminary study

TEA e TDAH em crianças: um estudo preliminar
TEA y TDAH en niños: un estudio preliminar

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Abstract: Early detection of ADHD symptoms in autistic children can significantly impact the course and prognosis of the disorder. The present study aimed to screen the symptoms of ADHD in autistic children using the Brazilian version of Swanson, Nolan and Pelham rating scale – 4th (SNAP-IV) applied to 72 parents of children diagnosed with ASD, as well as to assess whether there was a significant difference between children who used words to communicate of those who did not speak any words. The findings revealed a significant frequency in the presentation of symptoms of inattention and of hyperactivity and / or impulsivity, when comparing children who had diagnosis of ASD, but who did not have the symptoms of ADHD. Regarding language, no significant differences were found in this preliminary study. In general, this finding can be considered clinically worrying, especially when considering that the subclinical symptoms of ADHD may overlap in possible interventions.

Keywords: ADHD; ASD; Children.

Resumo: A detecção precoce dos sintomas de TDAH em crianças com autismo pode impactar significativamente o curso e o prognóstico do transtorno. O presente estudo teve como objetivo rastrear os sintomas de TDAH em crianças autistas usando a versão brasileira do Questionário de Swanson, Nolan e Pelham versão IV (SNAP-IV) aplicada em 72 pais de crianças com diagnóstico de TEA, bem como avaliar se havia diferença significativa entre as crianças que usavam palavras para se comunicar daqueles que não falavam palavra alguma. Os achados revelaram alta frequência na apresentação dos sintomas de desatenção e de hiperatividade e/ou impulsividade, ao comparar crianças que tinham diagnóstico de TEA, mas que não apresentavam os sintomas de TDAH. Em relação à linguagem, não foram encontradas diferenças significativas neste estudo preliminar. Em geral, a alta frequência dos sintomas do TDAH clinicamente preocupante, principalmente quando se considera que os sintomas subclínicos do TDAH podem se sobrepor em possíveis intervenções.

Palavras-chave: TDAH; TEA; Crianças.

Resumen: La detección temprana de los síntomas del TDAH en niños con autismo puede afectar significativamente el curso y el pronóstico del trastorno. El presente estudio tuvo como objetivo evaluar los síntomas del TDAH en niños con autismo utilizando la escala SNAP-IV de la versión brasileña aplicada a 72 padres de niños diagnosticados con TEA, así como evaluar si había una diferencia significativa entre los niños que usaban palabras para comunicarse los que no dijeron ninguna palabra. Los hallazgos revelaron frecuencia significativa en la presentación de síntomas de inatención y de hiperactividad y/o impulsividad, al comparar niños que tenían el diagnóstico del TEA, pero que no presentaba los síntomas del TDAH. En cuanto al lenguaje, no se encontraron diferencias significativas. En general, este hallazgo puede considerarse clínicamente preocupante, especialmente si se considera que los síntomas subclínicos del TDAH pueden superponerse en posibles intervenciones.

Palabras clave: TDAH; TEA; Niños.

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Introduction

Autistic Spectrum Disorder (ASD) and Attention Deficit / Hyperactivity Disorder (ADHD) are neurodevelopmental disorders that begin in childhood and cause significant functional damages in the personal, social, academic, or professional spheres. They involve a polygenic heredity and manifest themselves more frequently in males than in females (American Psychological Association, 2014). Although they have deficits in executive functions and symptoms that can overlap, they are two distinct clinical conditions that can be co-occurring. Regarding this, early diagnosis can significantly impact the course and prognosis of the disease, considering that these disorders generally persist throughout life (Antshel et al., 2016; Mansour et al., 2017; Sadock et al., 2016; Scandurra et al., 2019).

ASD is a condition that integrates a group of qualitative and quantitative deficits in the social aspects of communication and in the patterns of restricted and repetitive behaviors. The severity of the symptoms differs according to the level of support demanded by the individual. It is common for individuals to express idiosyncratic interests, resistance to changes, unusual gestures, avoidance of social interaction and do not react to the actions of their peers (APA, 2014; Volkmar & Wiesner, 2019).

On the other hand, ADHD is characterized by the persistent behavioral pattern of attention deficit and / or hyperactivity / impulsivity in a way incompatible with the individual's age or level of development. ADHD symptoms can vary in intensity. It is a chronic condition with damages in the development of cognitive and motor inhibition, expressed, for example, in the reduction of sustained attention and in the difficulty of behavioral self-regulation (APA, 2014).

The American Psychiatric Association (APA, 2014) recognizes that abnormalities in attention and hyperactivity are common in individuals with ASD, just as social dysfunction and difficult-to--manage behavior can be exhibited by people with ADHD. In this context, the social skills of language are closely related to the behavior. Scientific literature (Boo et al., 2021; Hawkins et al., 2016; Salley et al., 2015; Volkmar & Wiesner, 2019) indicates that children with ASD are subject to manifest atypical ways of communicating, which can influence the presentation of inattention and hyperactivity problems and/or impulsivity, that is, some behavioral difficulties may be related to incipient language and poor communication.

A recent literature review (May et al., 2018) points out that studies on language aspects in the overlap of TEA and ADHD are rare, in terms of pragmatic language and structural aspects, suggesting that the mechanisms of language are highly complex in the co-occurrence of disorders. Volkmar and Wiesner (2019) recommend that the limitation in the way of communicating can result in behavior problems, since the social skills of language are essential in social interaction. In view of this, the present study aimed to track the symptoms of ADHD in a sample of autistic children, as well as to assess whether there was a significant difference between children who used words to communicate and those who did not speak any words. The hypothesis was that the symptoms of inattention and hyperactivity would be high in children with ASD, and that the use of words in communication, which is, the difficulty in expressive language, would be related to the frequency of symptoms.

Method

Participants

This is a preliminary study with a quantitative, descriptive, and cross-sectional approach, which integrates a project to assess the comorbidity of TEA and ADHD. Parents of children with a closed diagnosis of ASD were recruited, participating in two independent associations of parents and family members of people with autism, located in the city of São Luís do Maranhão, Brazil.

The sample was sized for convenience, totaling 72 participants. Inclusion criteria were parents of children who met the DSM-5 diagnostic criteria for ASD, who spoke or not; parents of children active in the associations and provided informed

written consent, as well as parents who answered the questionnaire properly. Those who did not meet the pre-established criteria were excluded.

Procedures

This study corresponds to the first stage of the project, which consisted of screening the participants through a questionnaire with questions regarding the child's speech, email, phone, and age of the participants, followed by the internationally recognized public scale, the SNAP-IV - Swanson, Nolan and Pelham Scale - Version IV (Swanson et al., 2001). It should be noted that this research was previously approved by the Research Ethics Committee of the Ceuma University with registration CAAE 10158518.6.0000.5084. Data collection took place between November 2019 and February 2020. The Brazilian version of SNAP-IV (Mattos et al., 2006) was used, which consists of a screening questionnaire based on the diagnostic criteria of the DSM-IV, validated for use in Brazil, consisting of 18 items to assess possible primary symptoms of ADHD. Specific data on socioeconomic status and educational attainment levels were not recorded.

In the current study, parents classified the symptoms of inattention (items 1-9) and hyperactivity and/or impulsivity (items 10-18). The instrument assesses symptoms at four levels of severity: 0 - Not at all; 1 - Just a little; 2 - Enough; 3 - Too much. In the statistical analysis, it was computed 0 for absence of symptoms and 1 for present symptoms (covering the levels only a little, a lot and a lot). Based on the parents' responses, the children were divided into two groups, namely: (1) children who showed ≥6 symptoms of inattention - IN; (2) children who showed ≥6 symptoms of Hyperactivity and / or Impulsivity –H/I.

Data analysis

Descriptive and inferential statistical analysis was performed using the SPSS - 20 program (Statistical Package for the Social Sciences, version 20). To infer the results inferentially, the non-parametric Kolmogorov-Smirnov and Levene tests ($p < 0.05$) were used, to test the assumptions of normality and homogeneity of the variances, and the *student t test* to compare the means. of the two groups. To compare the differences in the groups of those with or without ADHD symptoms, Chi-square (x^2) was applied. In all tests, the level of significance applied was 5%. This project received ethical approval from the Ethics Committee on Human Research of the University CEUMA, as well as by the communities involved in the study.

Results

The sample consisted of 72 participants in the age group of 28 to 62 years old (M = 44.68; SD = 9.95), with 18 fathers and 54 mothers of children aged 6 to 12 years (M = 7.12; SD = 1.75) with the diagnosis of TEA who spoke or not. Regarding children, about gender, the majority were male (9.8%) and the female minority (4.2%), specifically, 1 child. In Table 1 shows the differences in the scores of the groups due to the symptoms of inattention (IN) and hyperactivity and / or impulsivity (H/I).

Table 1 - *Inattention and Hyperactivity in children with ASD*

SNAP-IV	Symptoms	N	Average	DP	t	*p*
≥6 IN Symptoms	Yes	52	19.52	3.12	10.97	0,000*
	No	20	9.85	3,91		
≥6 H/I Symptoms	Yes	38	17.95	3.17	9.03	0,000*
	No	34	10.09	4.19		

Note. * Significant result: p-value <0.05

Regarding the comparison of the presence or absence of symptoms of IN and H/I (Table 1), there was a statistically significant difference between the means of children with ASD who presented

the symptoms of IN of those who did not signal (t = 10.97; p <0.000). Likewise, among the averages of children who reported H/I symptoms of those who did not (t = 9.03; p <0.000), indicating a high frequency of symptoms, as possible associated behaviors.

As well as the parents' responses regarding the behaviors listed in the SNAP-IV were compared between the groups with or without the ADHD combined presentation symptoms. In the analysis of the t-student, of the 18 symptoms, there was a significant difference in 16, as can be seen in the Table. 2. Interestingly, there was no significance in the questions related to expressive language, such as: *speaks in excess* (t = 1,791; p = 0.078) and *Answers the questions in a hasty way before they have been completed* (t = 1,279; p = 0.205).

Table 2 - *Comparison of ADHD combined presentation symptoms in group*

SNAP-IV Scale	Symptoms	Mean	SD	t	*p*
1- Often fails to give close attention to details or makes careless mistakes in schoolwork or tasks	Yes	2.38	0.492	4.627	0,000*
	No	1.66	0.802		
2- Often has difficulty sustaining attention in tasks or play activities	Yes	2.30	0.520	6.229	0,000*
	No	1.40	0.695		
3- Often does not seem to listen when spoken to directly	Yes	1.89	0,737	4.203	0,000*
	No	1.09	0,887		
4- Often does not follow through on instructions and fails to finish schoolwork, chores, or duties	Yes	2.11	0.699	3.325	0,001*
	No	1.46	0.950		
5- Often has difficulty organizing tasks and activities	Yes	2.27	0.608	3.037	0,003*
	No	1.74	0.852		
6- Often avoids, dislikes, or reluctantly engages in tasks requiring sustained mental effort	Yes	2.38	0.639	4.381	0,000*
	No	1.63	0.808		
7- Often loses things necessary for activities (e.g., toys, school assignments, pencils, or books)	Yes	2.19	0.739	3.958	0,000*
	No	1.34	1.056		
8- Often is distracted by extraneous stimuli	Yes	2.43	0.647	4.378	0.000*
	No	1.69	0.796		
9- Often is forgetful in daily activities	Yes	2.03	0.763	2.580	0.012*
	No	1.51	0.919		
10- Often fidgets with hands or feet or squirms in seat	Yes	2.05	0.970	3.912	0,000*
	No	1.23	0.808		
11- Often leaves seat in classroom or in other situations in which remaining seated is expected	Yes	2.59	0.551	5.508	0.000*
	No	1.66	0,802		
12- Often runs about or climbs excessively in situations in which it is inappropriate	Yes	2.59	0.551	7.384	0.000*
	No	1.23	0.973		
13- Often has difficulty playing or engaging in leisure activities quietly	Yes	2.30	0.618	5.566	0.000*
	No	1.31	0.867		
14- Often is "on the go" or often acts as if "driven by a motor"	Yes	2.51	0.559	7.259	0.000*
	No	1.11	1.022		
15- Often talks excessively	Yes	1.00	1.000	1.791	0.078
	No	0.63	0.731		

16- Often blurts out answers before questions have been completed	Yes	0.70	0.939	1.279	0.205
	No	0.46	0.657		
17- Often has difficulty awaiting turn	Yes	2.73	0.508	6.531	0.000*
	No	1.71	0.789		
18- Often interrupts or intrudes on others (e.g. butts into conversations/ games)	Yes	1.59	1.235	3.080	0.003*
	No	0.83	0.822		

Note. * Significant result: p-value <0.05

As shown in Table 2, the most outstanding symptoms were: often has difficulty awaiting turn (M = 2.73; t = 6.531; p <0.000); Leaves the place in the classroom or in other situations where are expected to sit (M = 2.59; t = 5.508; p <0.000); Runs back and then or go up too much in things in situations where this is inappropriate (M = 2.59; t = 7.384; p <0.000); Often is on the go or often acts as if driven by a motor (M = 2.51; t = 7.259; p <0.000); Avoids, dislikes or engages against the will in tasks that require prolonged mental effort (M = 2.38; t = 4.381; p <0.000); Can't pay much attention to details or make mistakes by carelessness in school work or chores (M = 2.38; t = 4.627; p <0.000); and, Often has difficulty keeping attention on tasks or leisure activities (M = 2.30; t = 6.229; p <0.000) and Has difficulty keeping attention on tasks or leisure activities (M = 2.30; t = 7 .259; p <0.000). These symptoms denote significant psychomotor activity.

Table 3 - *Chi-square test of independence*

Symptoms Speak		**Makes use of words in communication**					
		Speak	**%**	**Don't speak**	**%**	**÷²**	***p***
≥6 Hyperactivity and / or impulsivity (H/I)	Yes	24	33.3	14	19.4	0.89	0.346
	No	25	34.7	9	12.5		
≥6 Inattention (IN)	Yes	34	47.2	18	25.0	0.61	0.433
	No	15	20.8	5	7.0		
≥12 Combined presentation	Yes	24	33.3	25	34.7	0.35	0.550

Note. * Significant result: p-value <0.05

Table 3 shows the comparison of ADHD symptoms in children who did or did not use words to communicate, which included children who used words to communicate, the chi-square test was applied for comparison between groups. In the analysis, no significant difference was found in relation to the presentation or no of symptoms of HI (÷2 = 0.89; p> 0.346), AD (÷2 = 0.61; p> 0.433), nor in the symptoms of combined ADHD (÷2 = 0.35; p = 0.550), pointing out that the manifestation of symptoms, probably, does not directly depend on this variable.

Discussion

The purpose of this study was to investigate the symptoms of ADHD in children diagnosed with ASD, and the level of significance of their presentation among children who used words to communicate with those who did not. Although preliminary, it provides remarkable data regarding the high frequency of inattention and hyperactivity as behavioral symptoms associated with ASD, in line with a consistent body of research at the global level (Ghirardi et al., 2018; Manohar et al., 2018; Mansour et al., 2017; Rau et al., 2020; Rong et al., 2021).

As an example, a study in the United States

with 4032 children (Stevens et al., 2016), recorded the high estimate of 59%, suggesting that one in two children diagnosed with ASD will also be diagnosed with ADHD. On the other hand, in South India, a prospective study (Manohar et al., 2018) pointed out the prevalence of 40% of ADHD symptoms in children aged two to six years with the diagnosis of ASD.

Therefore, a cohort study (Ghirardi et al., 2018) performed in Sweden using data from a national base - National Patient Register (NPR), found information on 1,899,654 individuals born between 1987 and 2006 and found that subjects with ASD had a higher risk of having ADHD when compared to those who did not have the diagnosis. A recent meta-analysis (Rong et al., 2021) of studies on the prevalence of co-occurrence of TEA and ADHD, revealed estimates that ranged from 38.5% to 40.2%. In view of the diversity in the estimates of the studies, it is worth considering the methodological design conducted, the sample selection, diagnostic criteria, the respondents, manifestations of other comorbidities, the age of the participants, among other variables.

Regarding this, it appears that the co-occurrence of disorders is a public health issue. Robust studies have pointed out that the comorbidity of ADHD tends to intensify the deficits of patients with ASD, emerging in worse cognitive, emotional, and functional results when compared to the diagnosis of the isolated disorder (Antshel et al., 2016; Mansour et al., 2017; Scandurra et al., 2019).

Regarding the typical changes identified in the ASD, the language stands out, sometimes absent or marked by changes associated with interactional inflexibility and rigidity in the interpersonal aspects of speech, influencing inattention and hyperactivity behaviors (Dalgalarrondo, 2019; Sadock et al., 2016). Individuals with ASD and ADHD or with the diagnosis of only one of these disorders, may report language difficulties (Dalgalarrondo, 2019). In the present study, there was no significant difference between children.

As an example, to assess impairment in communication, a study in the USA (Salley et al., 2015) investigated 209 children and adolescents between the ages of three and eighteen and found that regardless of the diagnosis ASD or from the co-occurrence of TEA and ADHD, the participants showed impairments in communication and socialization, although with variations in the level of severity.

In order to assess the extent of language deficits, a study (Geurts et al., 2004) conducted with children and adolescents aged five to fourteen, diagnosed with ADHD or autism, recruited from outpatient university clinics in the Netherlands and Belgium, showed that the subjects with both diagnoses presented deficits in language, however, more accentuated in the autistic. Based on the data presented, the high frequency of ADHD symptoms in autistic children, supports the growing assumption that ADHD is the most common comorbidity. Problems in the attentional process and hyperactivity can be common in children with ASD, reflecting on the difficulty of listening to the other, disorganization and impulsive behaviors (Dalgalarrondo, 2019). Testifying this, a study of updating clinical management (Antshel et al., 2016) showed that the prevalence of co-occurrence of ASD and ADHD has increased substantially in the past 10 years. This increase is likely to be related to the DSM-5 recognition of the comorbidity of these disorders, formerly recognized as distinct nosography entities. The co-occurrence of these disorders is a risk factor for the association of other comorbidities, thus, the high frequency of IN and HI, reinforces the assumption that there is a similarity in the shared losses in these disorders, which makes the differential diagnosis difficult (Manohar et al., 2018).

Conclusion

In this preliminary study, there was a high frequency of ADHD symptoms in children diagnosed with ASD, corroborating robust studies in the scientific literature. In general, this finding can be considered clinically worrying, especially when considering that the subclinical symptoms of ADHD may overlap in possible interventions. Likewise, there is a need for screening instruments as facilitators in the diagnostic process and in the

therapeutic plan.

The limitations of this study are the lack of direct clinical observation of ADHD symptoms, due to the restrictive measures to avoid contagion of COVID-19, in the relatively small sample size, without a comparison group with children without the diagnosis of ASD, factor that limits the generalization of the results. Likewise, it was not systematically assessed whether these children had other comorbidities. Regarding the hypothesis about the use of words in communication, against our hypotheses, there was no significant difference between the groups. One of the limitations of this study was the form of screening based on the parents' report, and the social skills of these children's language skills were not measured using standardized tests, nor were measures used to assess the severity of ASD, given that it is a preliminary screening study to carry out the other stages of the larger project.

The study was limited to the parents' perception only. Future studies may also consider the teachers' report, to compare the family and school environment, since the symptoms of ADHD should be considered in two or more environments.

Declaration of Conflicting Interests

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