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Psychopathology associated to attention deficit hyperactivity disorder in school age children

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Introduction. Attention Deficit Hyperactivity Disorder (ADHD) represents a frequent and highly comorbid disorder in children and adolescents. Comorbidity differs according to ADHD subtype and gender and has been reported to have a direct effect on the severity of ADHD.

Methods. A descriptive, cross-sectional study was designed to determine the patterns of ADHD comorbidity in 102 children, aged 6 to 12 years, who attend the outpatient services of a child psychiatric hospital in Mexico City. The evaluation was performed using the Child Behavior Checklist (CBCL).

Results. The sample had about five comorbid disorders. The hyperactive-impulsive subtype had more severe externalizing symptoms, while the combined subtype had a higher severity of anxious depressive symptoms, delinquent behavior and internalized symptoms. Somatic complaints were more frequent in boys. A linear regression analysis showed that the severity of attention problems was influenced by the severity of aggressive behavior.

Conclusions. School age children who came to psychiatric attention services with ADHD are highly comorbid. The comorbidity increases the severity of attention problems, particularly in patients with the hyperactive-impulsive or combined subtypes.

Key words:
Attention déficit and hyperactivity disorder. Comorbidity. CBCL. School age children.

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Psicopatología asociada al trastorno por déficit de atención e hiperactividad en niños de edad escolar

Introducción. El trastorno por déficit de atención con hiperactividad (TDAH) es una de las patologías más frecuentes y con mayor comorbilidad en niños y adolescentes. La comorbilidad difiere de acuerdo al subtipo de TDAH y el género y puede tener un efecto directo sobre la severidad del TDAH.

Método. Se diseñó un estudio descriptivo y transversal con el objetivo de determinar la comorbilidad del TDAH en 102 niños de 6 a 12 años que acudieron a consulta externa de un hospital psiquiátrico infantil utilizando como principal instrumento de cribado el cuestionario *Child Behavior Checklist* (CBCL).

Resultados. La población estudiada presentó en promedio cinco problemas comórbidos. El subtipo hiperactivo-impulsivo presentó mayor severidad de síntomas externalizados. El subtipo combinado presentó mayor severidad de síntomas ansiosodepresivos, conducta delictiva y trastornos internalizados. Los niños presentaron mayor frecuencia y severidad de quejas somáticas que las niñas. El análisis de regresión lineal mostró que la severidad de problemas de agresividad fue el principal determinante para la severidad de los problemas de inatención.

Conclusiones. La población en edad escolar con TDAH que acude a los servicios de atención psiquiátrica presenta numerosos síntomas comórbidos que inciden en la severidad del TDAH, en particular aquellos pacientes con subtipos hiperactivo-impulsivo y combinado.

Palabras clave:
Trastorno por déficit de atención con hiperactividad. Comorbilidad. CBCL. Escolares.

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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a combination of neuropsychological phenomena whose main symptoms according to the DSM-IV are inattention and hyperactivity-impulsivity that have persisted for at least 6 months with an intensity that is maladaptive and incoherent in relationship with the development level. The symptoms should be present before 7 years of age, in 2 or more settings and there should be clear evidence of a clinically significant deterioration of social, academic and work activity[1]. It is the most common psychiatric disorder in the pediatric age. It has been reported that its prevalence in the

general population is 3 % to 5 %[2], and in the clinical population in Latin American countries, it is 32.8 %[3].

Comorbidity is present in at least two thirds of the patients with ADHD who come to the mental health attention services and has implications in severity, course, response to treatment and prognosis of the patients. Thus, the timely detection of the comorbid disorders is an essential determinant to establish intervention strategies and thus modify the long term disorder prognosis[4].

The most commonly comorbid disorders of ADHD include oppositional defiant disorder (50 %), conduct disorder (30 % to 50 %), mood disorders (15 % to 20 %) and anxious disorders (20 % to 25 %)[5]. Other disorders that are frequently comorbid with ADHD are chronic tic disorders and Gilles de la Tourette syndrome, learning disorders[6] and language disorders[7]. Comorbidity frequency and type vary according to the population studied[8,9,10]. In the Latin American population the most frequently reported comorbidity is oppositional defiant disorder (ODD) (35 %-44 %)[8,11], affective disorders (39 %- 54 %)[8,12] and dissocial disorder (19 %)[8]. The presence of a second or third comorbid disorder indicates a more severe problem and poorer prognosis[12].

The present study was conducted to prove the following hypothesis: *a)* ADHD is a frequently comorbid suffering, both with internalized sufferings (depression and anxiety) and externalized ones (ODD and conduct disorder); *b)* there are differences according to gender and ADHD subtype in the comorbidity, and *c)* the number of comorbid sufferings influences the severity of the attention deficit.

METHOD

Description of the sample

The sample was made up of 102 patients from 6 to 11 years of age with average schooling of 2.9 ± 1.2 years and belonging to middle and low socioeconomic level who came consecutively to the out-patient clinic of the Hospital Psiquiátrico Infantil Dr. Juan N. Navarro in Mexico City and received the clinical diagnosis of ADHD. The patients were recruited in a four-month period. Children with generalized disorders of development or psychotic disorders were not included. Average age of the sample was 8.3 ± 1.4 years, 85 % were boys. Most (n = 62; 61 %) received the diagnosis of combined subtype ADHD (average age 8.3 ± 1.4 years), 31 (30 %) ADHD with predominantly hyperactive-impulsive subtype (average age 8.1 ± 1.5 years) and 9 (9 %) ADHD of predominately inattentive subtype (average age 8.3 ± 1.6 years).

Instrument

The psychopathology evaluation was conducted with the Child Behavior Checklist (CBCL)[13], a self-applicable questionnaire that is made up of 118 items that describe some behaviors and problems of children and adolescents that the parent or guardian grades according to their frequency (0: not applicable; 1: sometimes, and 2: frequently) during the last 6 months. The answers are grouped into 9 syndrome scales: delinquent behavior, aggressive behavior, isolation, somatic complaints, anxiety/depression, social problems, thought problems, attention problems and sexual problems. These scales are grouped into two major syndromes: internalized (isolation, somatic complaints and anxiety/depression) and externalized (criminal behavior and aggressive behavior).

In the CBCL the scale scores are reported according to the *t*-score, that represents the comparison of the data obtained on a patient in particular with those obtained in a sample of general population. Similarly to that reported in previous studies[5,14], a cut-off point of 60 was used in the *t*-score to determine that the severity of the symptoms was clinically significant.

The utility of CBCL in the evaluation of comorbidity has been demonstrated in studies that use this instrument together with diagnostic interviews, in which the CBCL subscales corresponded with the diagnosis of ODD, conduct disorder, depression and anxiety[5,15,16]. The Spanish version of the CBCL was validated in 1991[17]. This questionnaire has been used in clinical population in Mexico[18,19,20,21], Puerto Rico[22] and in the Hispanic population in the United States[11].

Procedure

The study design was descriptive, cross-sectional and comparative. The patients were interviewed by a psychiatrist to confirm the ADHD diagnosis and establish its subtype, using a list of diagnostic criteria of the DSM-IV[1] and then the parents filled out the CBCL.

Data analysis

Descriptive statistics for clinical and demographic variables was used. For comparison between groups, the chi square test, Fisher's exact test (FET) were used, the Student's *t* test for comparison by gender and Kruskal Wallis ANOVA and Mann Whitney U test for comparison between ADHD subtypes. Correlation between the severity of the CBCL scales was evaluated by means of the Pearson's r coefficient and the linear regression analysis was used to determine the syndromes associated to the increase in severity of the inattention symptoms.

All the analyses were two-tailed and statistically significant values were defined as $p < 0,05$.

RESULTS

Table 1 shows the averages of the t scores of the psychopathology scales of all the sample. Most of the CBCL scales

Table 1	*T*-scores of the psychopathology scales of all the sample	
Syndrome scale	***T*-scores (± SD)**	**Inteval**
Isolation	62.9 ± 8.86	50-86
Somatic complaints	62.25 ± 8.59	50-82
Anxious-depressive	65.30 ± 10.28	50-95
Social problems	67.62 ± 8.59	50-87
Thought problems	61.87 ± 9.31	50-88
Attention problems	69.25 ± 9.09	50-91
Criminal behavior	65.13 ± 9.51	50-81
Aggressiveness	68.23 ± 11.23	50-93
Sexual problems	56.53 ± 9.14	50-81

exceeded the score of 60 points, considered as threshold to determine psychopathology.

The population studied had an average of 5.19 ± 2.13 comorbid syndromes. When the psychopathology scales were grouped into internalized and externalized syndromes, average *t*-scores of 63.48 ± 7.46 and 66.67 ± 9.49 respectively were obtained.

Analysis of comorbidity according to the ADHD subtype showed differences in the scales of anxiety/depression (Kruskal-Wallis ANOVA [2.99]: 8.2; p = 0.017), criminal behavior (Kruskal-Wallis ANOVA: 8.2; p = 0.016), internalized disorders (Kruskal-Wallis ANOVA: 6.9; p = 0.03) and externalized disorders (Kruskal-Wallis ANOVA: 7.74; p = 0.021). The *t*-scores of each subscale and post hoc tests of ANOVA are shown in figure 1.

Analysis by gender showed that boys had greater frequency (72.4 % vs 40 %, FET; p = 0,02) and severity (62.94 ± 8.75 vs 58.2 ± 6.46; t = 2.478; 23 gl; p = 0.02) of somatic complains than girls.

Although the score of all the scales, except that of sexual problems, showed a positive correlation with the score on the attention problems scale, the linear regression analysis showed that the variable contributing most to the *t*-score variance of the attention problems subscale was the aggressiveness subscale (R: 0.59; B: 0.481; ES: 0.06; t = 7.38; p > 0.001).

DISCUSSION

The objectives of this study were to examine psychiatric comorbidity present in a clinical population of school aged children with ADHD, compare the frequency of the different comorbid syndromes according to the ADHD subtype and gender, and examine the relationship between ADHD comorbidity and severity.

The population studied showed high levels of psychopathology. Recent studies have shown the impact of the comorbidity (whether as isolated symptoms, subclinical forms or the disorder itself) on the treatment, course, prognosis

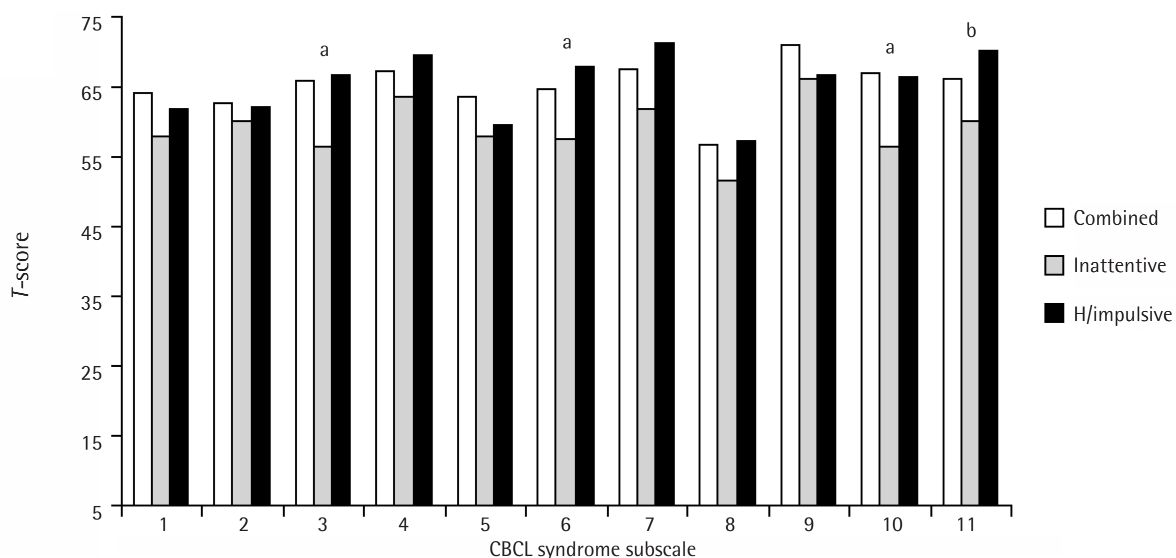

Figura 1 *1: isolation; 2: somatic complaints; 3: anxious depressive; 4: social problems; 5: thought problems; 6: delinquent behavior; 7: aggressive behavior; 8: sexual problems; 9: attention problems; 10: internalized; 11: externalized. a: combined vs inattentive subtype; Mann-Whitney U test p < 0.01. b: hyperactive-impulsive vs inattentive subtype; Mann-Whitney U test p < 0,01. CBCL: Child Behavior Checklist.*

and consequences of ADHD. For example, it was associated with poor school performance, risk behaviors for driving cars or risk for substance abuse and antisocial personality disorder[4,23].

The distribution of frequencies by ADHD subtypes in this population showed that most of the patients had the combined subtype. This has been reported both in open population studies[24,25] and in those of the clinical population[26]. The frequency of the inattentive subtype reported in the present study is similar to the 5 % to 15 % found in the previously mentioned studies. The analysis of the comorbidity patterns according to the ADHD subtype showed that patients with hyperactive-impulsive and combined ADHD had greater severity of both internalized and externalized disorders, confirming previous reports of studies conducted in the clinical population[26,27].

Patients with predominantly inattentive subtype obtained lower *t*-scores in all the scales. This contrasts with some previous reports that mentioned greater tendency of the patients who suffer this subtype to have comorbidity with internalized disorders[28]. In fact, the prospective studies that evaluated comorbidity using standardized instruments reported similar incidence of internalized disorders in inattentive and combined subtypes[29].

In regards to differences by gender, greater frequency of somatic complaints in boys than in girls was only found. This finding had been previously reported[30], although it has been stated that this difference is reversed during adolescence[31,32]. The somatic complaints reported in this sample could be associated to comorbidity with internalized disorders[33].

The results of this study differ from others conducted in clinical samples that report less frequency of comorbidity with externalized disorders in girls with ADHD[34]. This difference could be explained by the severity of the disorder found in this sample and supports the need to conduct epidemiological studies to determine if the differences by gender reported in ADHD subjects are the result of the greater tendency existing in the community to request attention in the mental health services for boys than for girls[34].

The present study confirms the relationship between ADHD comorbidity and severity[35], specifically the effect of the severity of the aggressiveness symptoms on the inattention symptoms. It should be remembered that the ODD and dissocial disorder frequently accompany ADHD and that genetic influences of these disorders are superimposed. In fact, some authors think that these are not comorbid conditions but rather complications of a same suffering[36], given that longitudinal studies indicate that hyperactive behavior in school age children is a risk factor for development of dissocial disorder[37]. This comorbidity in particular can occur as a result of structural and physiological alterations in the limbic system and prefrontal cortex[38]. However, it is also important to consider the effect of the setting in the symptoms of these patients, since children with behavior problems cause problems inside of their home and school, which causes greater rejection from their peers and adults. The stress caused by the rejection in these children may contribute to the lack of adrenomedullary and of the hypothalamic-pituitary adrenocortical system regulation and of the serotoninergic function, which is related with predisposition to aggressive and hostile behaviors. In addition, alterations in the synthesis of norepinephrine that are result of cortisol levels elevated by stress have been related with attention and memory deficits[39].

The findings reported in the present study should be considered taking into account that the data come from a clinical sample and cannot be generalized to the open population. In addition, the cross-sectional design of the study does not make it possible to evaluate the effect of the duration of the different comorbid disorders in the severity of the inattention.

In conclusion, the school-aged population with ADHD that comes to the psychiatric attention services has many comorbid symptoms that affect the ADHD severity. Thus the complete evaluation of these patients so that early identification of the comorbidity and treatment of ADHD and of the comorbid disorders are possible is important.

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