

Original Article

Tourette's Syndrome, Chronic Tics, and Comorbid Attention Deficit/Hyperactivity Disorder in Elementary Students

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Abstract

Background: This study estimated the true prevalence of chronic motor and vocal tic disorders, and Tourette's syndrome in students as well as its comorbidity with attention deficit/hyperactivity disorder (ADHD).

Methods: A random clustered sample of elementary students was selected from schools in Tabriz, Iran. Students were screened by Conner's teacher rating scale for ADHD and a detailed history from parents and teachers for the presence of any type of tic was obtained. Next, a clinical interview based on the Kiddie Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version (K-SADS-PL), and an interview with parents lead to the definitive diagnosis.

Results: A total of 1658 children were evaluated. Vocal tic was observed in 3.2% (\pm SD = 0.02) students, and was more prevalent in boys. ADHD was diagnosed in 45.5% of these students. Motor tic was observed in 7.3% (\pm SD = 0.02) of students. Almost half (48.1%) of these students had ADHD. Tourette's syndrome was observed in 1.3% (\pm SD = 0.01), with a male/female ratio of 3.5:1.

Conclusion: This is the first study to provide the prevalence of chronic tics in elementary school students in Iran. ADHD is more common among students with chronic tics and Tourette's syndrome.

Keywords: Attention deficit/hyperactivity disorder, children, epidemiology, chronic tics, tourette's syndrome

Cite the article as: Amiri S, Fakhari A, Golmirzaei J, Mohammadpoorasl A, Abdi S. Tourette's Syndrome, Chronic Tics, and Comorbid Attention Deficit/Hyperactivity Disorder in Elementary Students. *Arch Iran Med.* 2012; **15**(2): 76 - 78.

Introduction

Tics are motor movements or phonic productions that are sudden, rapid, recurrent, non-rhythmic and stereotyped. Tourette's syndrome is defined by multiple motor tics and one or more vocal tics, occurring many times a day for more than 1 year before the age of 18 and with gradual improvement later in life.¹ The disorder causes distress or serious impairment in important areas of functioning. Chronic motor or vocal tic disorder is defined as the presence of either motor tics or vocal tics, but not both for more than 1 year. Tic disorders including Tourette's syndrome are common at a young age. It is reported that 4% to 19% of school-aged children experience tics and the prevalence rate is 0.5% to 4% for Tourette's syndrome.² The estimates are influenced by the wide spectrum of complexity and severity as well as evaluation processes.

Identification of comorbidities is an important step in the treatment plan for chronic tic disorders (CTD). Attention deficit/hyperactivity disorder (ADHD) is one of the most prevalent disorders in children.^{3,4} It is described as the persistent condition of carelessness, hyperactivity, and impulsivity in children and is mostly associated with psychosocial consequences, especially when ignored.⁵ There are increased concerns about comorbidity in ADHD, not only because of clues to a possible etiology but because of defining required changes in treatment strategies as well.⁶

Studies indicate additional psychiatric disturbances in up to 60%–90% of patients with CTD.⁷ The nature of the co-occurrence of CTD and ADHD is unclear, but its comorbidity with ADHD is reported to be very common.⁸ However, there is no information about this in our population.

Apart from the challenging meaning of the term "comorbidity" indicating whether there is the same underlying etiology for a contributory relation between two disorders, this study aims to estimate the co-existence of tic disorders with ADHD in early childhood. There are a few studies about comorbidity of ADHD and tic disorders in Iran.

Materials and Methods

This study was undertaken in elementary schools in Tabriz, a city in north-west Iran with over 1,500,000 inhabitants. A cluster sampling method was used to select 60 classrooms from 30 schools (15 for girls and 15 for boys) as described below. Tabriz is officially divided into five educational districts. Two public and one private elementary schools were randomly selected from each district; both for girls and boys. Then, two classes were randomly selected from each school in different grades. The sample size was estimated to be at least 1330 individuals (665 per gender; $\alpha = 0.05$, $d = 0.03$, $P = 10\%$, estimated 15% missing values).

The protocol was approved by the Institutional Review Board of the Tabriz University of Medical Sciences, and all selected schools agreed to participate in the study. Students and their parents gave written informed consent.

The process for diagnosing ADHD began with the Conner's teacher rating scale (revised)⁹ completed by trained teachers, which is widely used in the Persian language.¹⁰ The cut-off score for this scale was set at 70 and students with a T score more than

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Accepted for publication: 15 June 2011

Table 1. Distribution of the subtypes ADHD in students with chronic tic disorder.

ADHD type	Vocal tics n (%)	Motor tics n (%)	Tourette's syndrome n (%)	Total n (%)
Inattentive	2 (8.30)	7 (13.5)	1 (6.2)	9 (11.8)
Hyperactive/impulsive	3 (12.5)	9 (17.3)	3 (18.7)	12 (15.8)
Combined	19 (79.2)	36 (69.2)	12 (75.1)	55 (72.4)

70 were introduced for psychiatric interviews. Teachers and parents were trained about vocal and motor tics and they introduced eligible students for psychiatric interviews.

Both groups of students participated in face-to-face, semi-structured diagnostic interviews administered by the same child and adolescent psychiatrist, as based on the Kiddie Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version (K-SADS-PL), for which the validity and reliability has already been established in the Persian language.¹¹ In the case of a tic disorder, information about duration of the tics was then obtained from students and their parents to define whether the tic lasted for more than 12 months (e.g., CTD) as previously described.

Clinical ADHD was defined according to DSM-IV-TR criteria and inattentive, hyperactive/impulsive, or combined subtypes were noted.

The prevalence rates were described within a 95% confidence interval. Statistical comparisons were made by the univariate χ^2 - or Fisher's exact tests for nominal variables. The *P*-value was determined to be 0.05 for statistical significance and all comparisons were two-tailed.

Results

In total, we selected 1658 children of which 877 (52.9%) were schoolboys and 781 (47.1%) were schoolgirls as the cluster sample. The mean age of the study sample was 9.5 (SD = 1.5) years.

Following a selection by the Conner's teacher rating scale, a psychiatric interview discovered the prevalence rate of clinical ADHD to be 9.7% \pm 0.01 in our study population.

Chronic vocal tic was observed in 53 (3.2% \pm 0.02) students and was significantly more prevalent in schoolboys ($P < 0.005$). A considerable portion (45.5%) of these students had ADHD. Chronic motor tic was more common than vocal tics and was observed in 108 (7.3% \pm 0.02) students. Almost half (48.1%) of these students had ADHD. Tourette's syndrome (both vocal and motor tics lasting for more than 12 months) was observed in 22 students (1.3% \pm 0.01) with a male/female ratio of 3.5:1. Clinically diagnosed ADHD was confirmed in 72.7% of patients with Tourette's syndrome and was significantly higher than those without Tourette's ($P < 0.001$).

Subtypes of ADHD in students who had CTD are described in Table 1. Although there was not a significant difference in the distribution of subtypes of ADHD in students with vocal tics ($P = 0.329$) or Tourette's syndrome ($P = 0.219$), the presence of a motor tic was significantly more comorbid with ADHD-C and ADHD-IA, while ADHD-HI was less than expected ($P < 0.05$).

Tic disorder in ADHD

A vocal tic was observed in 15% of students with clinical diagnoses of ADHD and 1.6% of students without ADHD. It was more common among students with ADHD ($P < 0.005$). The presence of a motor tic was more common among students with ADHD

($P < 0.005$) as observed in 32.5% of students clinically diagnosed with ADHD and 3.8% of students without ADHD.

Discussion

This study provided a detailed report about prevalence of chronic tic disorder and its most important comorbid condition, ADHD, in a large sample of Iranian school age children. Using both parental reports and clinical interviews, the prevalence rate of chronic vocal tics was 3.2% and motor tics 7.3%, which included 1.3% of all students diagnosed with Tourette's syndrome. This study was compatible with previous findings about the rate of tic disorders that were more common among boys than girls, which has been noted in other populations as well.^{12,13}

Tic disorders are very common in children and this movement disorder is reported in a wide range of schoolchildren depending on differences in the method of research and the study population. The upper end of the estimation is made on population-based studies. A community sample of 553 elementary school children reported that 18% had single transient tics and 6% had multiple or persistent transient tics.¹⁴ A Swedish study reported the prevalence of transient motor tics to be 4.5% and chronic motor tics at 0.7%.¹⁵ All such studies confirm the relative commonness of transient tic disorders in school-age populations. The reason for the difference in prevalence of chronic tics is believed to lie in the verification methods.¹²

Very few studies are available on tic disorders in the Iranian population, and most are limited to Tourette's syndrome. This syndrome is estimated to have occurred in between 10 to 100 per 10 000 school age children since the year 1990.¹² It has been found in all cultures, but to differing degrees. A recent review estimates a prevalence rate of 1% as the overall international figure for this syndrome,¹⁶ which seems to be compatible with our results. However, the more important issue is the professional care which is needed to diagnose and care for the several psychopathology faced by these children.¹⁷

It is believed that clinic-based studies underestimate the frequency of tic disorders and only medical advice is given to a small fraction of these children. We believe this influenced the results of our report as well. Teachers underwent training by a specialist to observe tics in students and to use the screening questionnaire. However it is reasonably predictable that a few students with tics would be missed. This limitation seems to be included in the nature of the study and this report has attempted to overcome it by giving detailed and better instructions to teachers, and by including the reports from parents. However, it should be considered that some cases are probably missed during this procedure, depending on the level of responsiveness from parents and teachers. The fact that the screening process was done by different observers decreases the reliability, yet it was time and cost saving.

Despite the fact that the negative psychological impact of untreated CTD was not evaluated in the current study, the negative impact

of CTD was expected to decrease and be solved by therapeutic interventions. This study failed to provide a reliable measurement of students' school performances to evaluate the effects of CTD. Such evaluation may be more practical with clinical based studies.

The current study, for the first time, provides reliable information about CTD in Iran. Another main finding of the current study is the co-existence rate, or comorbid condition, of CTD with ADHD. It has been previously reported that the most prevalent psychiatric disorder in children with CTD and Tourette's syndrome is ADHD.¹⁸ ADHD was clinically diagnosed in 47.2% of students with any type of CTD (76 out of 161) and 72.7% in students with Tourette's syndrome. These numbers agree with many other reports.^{13,19} This result does not have the limitations of a clinical-based study and is not overestimating the comorbidity rate.

The main clinical implication of the current study is that appropriate treatments may have beneficial effects on the performance of each student with CTD. In most patients comorbid for CTD and ADHD successful treatment of ADHD should be the focal point of therapy. This has been mentioned in previous neuropsychologic studies as well.^{20,21} Evidence supports the fact that more than half of the children with Tourette's syndrome will have behavioral and learning problems during late adolescence, which will have a more intense impact than tics.¹² The observed high prevalence of ADHD in students with CTD strongly supports a call for professional advice in students with CTD, which is achievable by annual medical visits provided for by the Division of School Health or Regional Health Offices.

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