Evaluation of the Prevalence of Joint Laxity in Children with Attention Deficit/Hyperactivity Disorder

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Abstract

Objective: The purpose of this study was to assess the prevalence of joint laxity in children with attention deficit hyperactivity disorder (ADHD).

Method: Eighty-six children, 28 girls and 58 boys, with attention deficit hyperactivity disorder were diagnosed at the child psychiatry outpatient clinic of the Mofid Children's Hospital, and 86 controls were assessed for joint laxity using Beighton criteria.

Result: Joint laxity was discovered in 74.4% of children with attention deficit hyperactivity disorder and in 12.8% of healthy controls.

Conclusion: The prevalence of benign joint hypermobility syndrome was high in children with attention deficit hyperactivity disorder, which shows a new basis for further studies.

Key words: Joint laxity, ADHD, Hypermobility syndrome, hyperactivity, attention deficit disorder

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a syndrome characterized by abnormal levels of inattention, hyperactivity, or both. It was first reported by Barkley with a prevalence of 5–10% in school-age children [1,2]. Benign joint hypermobility syndrome (BJHS) is a clinical condition characterized by an increased distensibility of joints during passive movements and hypermobility in dynamic movements. There are several diagnostic criteria suggested by Rotes-Querol, Carter and Wilkinson; however, the Beighton criteria are the most famous [3-6]. Joint laxity may affect many organs, such as cardiovascular system and genitourinary system, as a consequence of involvement of connective tissue [7,8].
There are few published papers concerning children with attention deficit hyperactivity disorder and joint laxity [9-11]. The aim of this study was to determine the association of attention deficit hyperactivity disorder with joint laxity in children.

**Methods**

This study was carried out in Mofid Children’s Hospital, the most famous referral center for pediatric psychiatry & pediatric rheumatology in Iran. Eighty-six children aged 3 to 14 years old with attention deficit hyperactivity disorder and 86 healthy children without any rheumatologic disease were studied in two groups of case and control. Both groups were matched in age and sex. The diagnosis of ADHD was performed by an experienced child psychiatrist using the Schedule for Affective Disorder and Schizophrenia for School-Age Children-Present and Lifetime version (K-SADS-PL) [12].

Beighton criteria were used to diagnose joint laxity. Joint laxity assessment was carried out by a trained general practitioner and was reexamined by a pediatric rheumatologist. Data were analyzed by SPSS ver. 19. A chi-square test was applied to compare girls with boys.

**Results**

In this study, 86 children (28 girls and 58 boys) were studied. The prevalence of joint laxity was 74.4% (64 of 86) in children with ADHD and 12.8% (11 of 86) in healthy controls (p <0.001). The mean Beighton score (range 0–9) was 4.53 (SD=2.33) (Figure 1). Also, joint laxity was found in 85.7% of girls and 69% of boys, but this difference was not statistically significant (P> 0.05). In our study the backward bending of the little finger past 90 degrees was more frequent than the other criteria (82.6%) [thumb touching the forearm = 45.3%, elbow bending backward = 41.9%, knee bending backward = 30.2%, placing flat hand on the floor with straight legs = 20.9%]. The frequency of arthralgia, myalgia, dislocation, and chest pain was 26.7%, 25.6%, 10.5%, and 9.3%, respectively (Table 1). The prevalence of family history of psychiatric disorder in children with ADHD was 45.3%.

**Table 1.** The frequency of musculoskeletal manifestation in children with ADHA.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Joint laxity</th>
<th>Arthralgia</th>
<th>Myalgia</th>
<th>Dislocation</th>
<th>Chest pain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency</strong></td>
<td>74.4%</td>
<td>26.7%</td>
<td>25.6%</td>
<td>10.5%</td>
<td>9.3%</td>
</tr>
</tbody>
</table>

**Discussion**

Attention deficit hyperactivity disorder is a behavioral disease characterized by either significant difficulties of intention or hyperactivity and impulsiveness, or both [1,2,13]. ADHD affects almost 5 to 10% of school-aged children and often occurs before age 4 and regularly before age 7 [2, 13, 14]. For the first time, Harris MJ reported the joint hypermobility in children with ADHD and purposed the association between the development of the central nervous system and connective tissue diseases [9]. In 2001, Faraone SV et al. studied 140 girls with ADHD, 122 non-ADHD, and their 786 first-degree relatives. According to their study, weak evidence between ADHD and bipolar disorder was revealed [10]. However, in our study the prevalence of joint laxity in children with ADHD was 74.4%, while this frequency among the control group was 12.8%. The high prevalence of anxiety disorders (69.3%) among patients with joint laxity had been reported previously [15]. Hofman et al. studied 30 school-age children with Marfan syndrome. Their study showed that 17% of school-age children suffered from ADHD (16). They concluded that learning disabilities are related to joint laxity.

The last study from Turkey revealed that benign joint hypermobility syndrome was accompanied in 31.5% of the patients with ADHD and 13.9% of the individuals in the con-
trol group (11). Our study has indicated a significant prevalence (p-value <0.001) of benign joint hypermobility in Iranian children with ADHD. More than one forth (26.7%) of our patients suffered from arthralgia and 25.6% from myalgia. Therefore, musculoskeletal manifestations were a considerable symptom of children with ADHD. The results of previous studies and our study may support the hypothesis of an association between the development of the central nervous system and connective tissue diseases.

**Conclusion**

We conclude that joint hypermobility and musculoskeletal symptoms amongst Iranian children with ADHD are markedly high.

**Competing interests:** The authors declared no competing interest.

**Funding:** None.

**Provenance and peer review:** Not commissioned; externally peer reviewed.

**References**