Attention Deficit Hyperactivity Disorder in Children with Intellectual Disability in Bosnia and Herzegovina

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ABSTRACT

Attention deficit hyperactivity disorder (ADHD) is very frequent in children with intellectual disability. The aim of this study was to examine the occurrence of ADHD in children with intellectual disability in Bosnia and Herzegovina with regard to their sex, etiology and level of intellectual disability. The method for data collection was the examination of the children's medical records. The sample consisted of 167 children attending two special education facilities in Sarajevo. Overall occurrence of the disorder was found to be 20.4%, a finding which is in accordance with existing studies. The results in this study revealed different male to female ratio (1.5:1) of the disorder as compared to existing studies. A difference in the prevalence of ADHD was found in relation to the level of intellectual disability. There are many children with dual diagnosis of intellectual disability and ADHD. It is necessary that multidisciplinary team is involved in the creation of behavioral and educational programs for these children.

Key words: *ADHD, intellectual disability, educational intervention*

Introduction

Attention deficit hyperactivity disorder (ADHD) is one of the most frequent neurobehavioral disorders in children with and without intellectual disability[1]. According to the Diagnostic and Statistical Manual of Mental Disorders 4ed (DSM-IV), ADHD is a persistent pattern of inattention and/or hyperactivity more frequent and more severe than is typical of children at a similar level of development[2]. To meet the diagnostic criteria, symptoms of the disorder must be present for at least 6 months and must cause impairment in academic or social functioning and occur before the age of 7 years. DSM-IV also requires that impairment from the symptoms is present in two or more settings (e.g. school and home). There are three subtypes of ADHD-predominantly inattentive type, predominantly hyperactive-impulsive type and combined type. ADHD is considered to be more frequent in boys than in girls and most authors suggest the ratio of 3:1– 5:1, although some authors found the ratio to be as high as 9:1 in favor of boys[3]. Boys were reported to exhibit greater problems with attention span, impulse control and motor activity than girls.

The main features of ADHD include disorders in attention, hyperactivity and impulsivity. Additional features often accompanying the disorder include disorganization, poor social relations, aggressive behavior, poor self-esteem, day-dreaming, poor coordination, cognitive problems etc. These features of ADHD persist over time and are usually present in adulthood. Speech disorders are more frequent in children with ADHD, their vocabulary is more limited than that of their peers, they rarely use a full sentence in expressing their needs, wishes etc. There is also a wide range of socio-emotional problems that are manifested through extreme emotional lability. Stefanos and Baron[4] have found that two thirds (50–70%) of people with ADHD have some problems related to learning, social adjustment and functioning.

In the last ten years there have been major advances in determining the etiology of ADHD. It is now a well-known fact that ADHD arises from multiple causes. Majority of the studies on etiology of ADHD focus on the genetic, neurochemical and neuroanatomical causes of ADHD. It is important to note that most of the children

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with ADHD do not have a major injury of the central nervous system (CNS) and most children who have some neurological impairment due to injury of the CNS do not have the symptoms of ADHD[5]. Neuroimaging studies revealed prefrontal-striatal circuitry to be involved in the pathophysiology of ADHD[6]. Substantial attention was given to genetic factors in the etiology of ADHD through twin studies. ADHD is likely to be poligenically inherited condition caused by many unknown genes with small but cumulative effects on the appearance of behavioral features of ADHD. Polygenic inheritance of ADHD implies genetic as well as enviromental effects[7]. One of the most influential theories of ADHD is the theory elaborated by Barkley[8] who considered behavioral inhibition to be a major impairment in ADHD. Barkley argued that behavioral inhibition controls four neuropsychological executive functions: working memory, speech internalization, self-regulation and reconstitution and ADHD originates because of deficits in these areas. According to Barkley, ADHD in not just an attentional but also an executive disorder. Further research is needed in this area.

Compared to the general studies of ADHD, the number of studies dealing with the prevalence of ADHD in children with intellectual disability is relatively small. There is often a question whether the ADHD can be validly diagnosed in children with intellectual disabilities. The current version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) opens the possibility of diagnosing ADHD in these children. There are some studies that dealt specifically with the issue of validity of diagnosing ADHD to children with intellectual disability and found it to be a valid diagnosis[9]. The risk of having ADHD is higher in children with intellectual disability compared to children without intellectual disability[10].

Diagnosing ADHD in children is a very sensitive process because there is no reliable medical test or method for diagnosing ADHD such as through laboratory testing or through neuroimaging methods. Diagnosis of ADHD is primarily based on reports made by parents (carers), teachers or both on standardized rating scales based on DSM-IV criteria. Some of the most common of these scales are Conners' rating scales for teachers and parents, the SNAP Checklist, the Child Behavior Checklist (CBCL) and Aberrant Behavior Checklist. Frequently the agreement between the raters on checklists is not very high, which additionally raises the question of diagnostic reliability and validity[11].

The goal of the present study was to examine the occurrence of ADHD in Bosnian sample of children with intellectual disability. Further, we wanted to confirm if the ratio between the boys and the girls in the occurrence of the disorder corresponds to similar studies. Another goal was to determine the occurrence of ADHD in relation to the level and etiology of intellectual disability.

Methods

Participants

The sample consisted of 167 students (105 boys, 62 girls) with intellectual disability, aged 7–15 years from two special education school centers is Sarajevo. Demographic data for the sample are presented in Table 1.

TABLE 1
DEMOGRAPHIC DATA ON STUDENTS

	N	%
Students		
Male	105	63
Female	62	37
Categorization		
Mild ID	85	51
Moderate ID	82	49
Etiology		
Down syndrome	34	20
Other genetic cause	22	13
Organic brain injury	35	21
Unknown etiology	76	46

Etiological division was different in children with mild and moderate intellectual disability. Thus, in 85 children with mild intellectual disability, 64 (75.3%) students had unknown etiology, 14 students (16.5%) had organic brain injury, 6 students (7.1%) had other genetic disorders and 1 student (1.2%) had Down syndrome. In 82 children with moderate intellectual disability 33 students (40.2%) had Down syndrome, 21 students (25.6%) had organic brain injury, 16 students (19.5%) had other genetic disorders and 12 students (14.6%) had unknown etiology.

Children with severe and profound intellectual disability were not included in the study.

Procedure

Prior to their enrollment in special education schools, all students needed to have their medical records and certificate of categorization (which was to certify that the child had intellectual disability and was thus eligible for special education treatment). Although there is a multidisciplinary team consisting of psychologist, psychiatrist, occupational therapist and speech therapist involved in diagnosis of the child, the final decision was usually made based on a child's IQ score as measured by the standardized Revision of Wechsler's intelligence scales for children (50–70 mild intellectual disability; 35–50 moderate intellectual disability; 20–35 severe intellectual disability and less than 20 profound intellectual disability). There was relatively little consideration of the child's adaptive behavior in the categorization of the children.

The first step for data collection was the examination of medical records (presence of diagnosis of ADHD) of the students attending the special school centers. The further validation of the ADHD diagnosis was through the semi-structured interview for all 167 children (including few children who were already diagnosed with ADHD), with the special education teachers, occupational therapist and psychologist, using DSM-IV criteria. Only after this validation, children were classified by both authors as having ADHD.

Statistical analysis

In data analysis, chi square was used to determine if there were statistically significant differences between the categories (sex, level of intellectual disability, etiology of intellectual disability) in the occurrence of ADHD. In addition, phi coefficients were calculated to determine the strength of effect. SPSS v13 was used for calculating the statistics. Also, where appropriate an odds ratio was calculated.

Results

Prevalence and gender

Total occurrence of ADHD in this sample was 20.4%. Although, there was a higher occurrence of ADHD in boys, the difference was not statistically significant according to chi square test (χ^2=1.088; p=0.297) (Table 2).

TABLE 2
OCCURRENCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN RELATION TO STUDENTS SEX

Sex	ADHD				Total	
	w/o		with			
	N	%	N	%	N	%
Male	81	77.1	24	22.9	105	100.0
Female	52	83.9	10	16.1	62	100.0
Total	133	79.6	34	20.4	167	100.0

An odds ratio of ADHD with regard to sex was calculated and it is 1.5:1 in favor of occurrence among boys.

Level of intellectual disability

In relation to the level of intellectual disability, children with moderate intellectual disability were more likely to have ADHD according to the results of Chi square test (χ^2=4.159, p=0.041) (Table 3).

Although there is statistical difference in the occurrence of ADHD in children with mild and moderate intellectual disability, phi coefficient was small (0.158). The odds ratio was found to be 2.2:1 in favor of children with moderate intellectual disability having ADHD.

TABLE 3
OCCURRENCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN RELATION TO THE CATEGORY OF INTELLECTUAL DISABILITY

Categorization of child	ADHD				Total	
	w/o		with			
	N	%	N	%	N	%
Mild ID	73	85.9	12	14.1	85	100.0
Moderate ID	60	73.2	22	26.8	82	100.0
Total	133	79.6	34	20.4	167	100.0

Etiology

There was no statistical difference in the prevalence of ADHD in relation to the etiology of intellectual disability (χ^2=3.567, p=0.312) (Table 4).

TABLE 4
OCCURRENCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN RELATION TO THE ETIOLOGY OF INTELLECTUAL DISABILITY

Etiology of MR	ADHD				Total	
	w/o		with			
	N	%	N	%	N	%
Down syndrome	29	85.3	5	14.7	34	100.0
Other genetic cause	15	68.2	7	31.8	22	100.0
Brain injury	26	74.3	9	25.7	35	100.0
Unknown etiology	63	82.9	13	17.1	76	100.0
Total	133	79.6	34	20.4	167	100.0

Discussion

The diagnosis of ADHD is very common in children with intellectual disabilities although some clinicians still have doubts about diagnosing the disorder to these children. This is best shown by the number of studies published in major journals. Most of studies regarding prevalence and etiology of ADHD have excluded children with intellectual disability, which has left a gap in this area.

The overall occurrence of ADHD in this study was 20.4%, a finding which is consistent with other studies. However, the ratio in the occurrence of the disorder in relation to the sex of the child was found to be different than in existing studies. Although, there was a greater prevalence of the disorder in boys, the difference was not statistically significant. The odds ratio found in this study was 1.5:1 in favor of boys, a result which is quite different from existing studies with typically-developing children that showed much greater prevalence in boys. This is not the only study that revealed a lack of gender effect on ADHD features in children with intellectual disability. A study by Buckley et al.[12] conducted in a special school in

Ireland also revealed no statistical differences in prevalence of ADHD between girls and boys. A caution should be made in any generalization of these findings due to small sample size. However, it is evident that a gender effect on ADHD features is much smaller in children with intellectual disability, perhaps because of the influence of other factors such as CNS dysfunction. Additional studies are needed to support or refute this gender finding.

With regard to the level of intellectual disability, results revealed that students with moderate intellectual disability were more likely to have ADHD than student with mild intellectual disability. The odds ratio was 2.2:1 in favor of children with moderate intellectual disability. Once again, the likely explanation for this lies in a much greater probability of CNS dysfunction among children with moderate intellectual disability.

There were four etiological categories of intellectual disability in this sample. The greatest occurrence of ADHD was in children with other genetic causes followed by known brain injury, unknown etiology of intellectual disability and Down syndrome, respectively. To the authors best knowledge there are no prior studies that dealt with the occurrence of ADHD in relation to different etiological categories of intellectual disability. It is important to note that some syndromes such as Angelman syndrome have a particular behavioral phenotype consisting of hypermotoric behavior and short attention span meaning that a disproportionate number of children with Angelman syndrome would have ADHD according to the DSM-IV criteria[13].

This study is one of few studies conducted in Bosnia and Herzegovina on the topic of ADHD. It is important to note that this study was confined to special education schools in Sarajevo. Future studies need to examine the prevalence of ADHD in children with intellectual disability who are attending regular schools. Bosnia and Herzegovina is currently in the process of educational reform and implementation of inclusive education. Increasing number of children with intellectual disability are attending regular schools and children with multiple disabilities are the ones who are enrolling in special schools[14]. This might explain why the occurrence of ADHD was so high in this sample.

Children with dual diagnoses (intellectual disability and ADHD) represent a challenge for teachers as well as for the entire school system. Their complex medical, psychological and medical needs must be recognized and responded to. Teachers who are working with these children must be familiar with both educational strategies for individualization and differentiation of the curriculum as well as with behavior modification strategies. Educational strategies are aimed at enhancing the academic achievement of children with dual diagnoses. These strategies are very important because students with ADHD often lag behind their peers academically. Behavioral strategies are aimed at reducing the symptoms of inattention, impulsivity and hyperactivity. Besides these strategies, one of the most effective treatments for ADHD is stimulant medication. Although parents are sometimes reluctant to give medication to their children, studies indicate that use of stimulant medication does not lead to dependence or abuse by adulthood[15]. Stimulant medication, school-based intervention strategies such as behavioral interventions, modification to academic instruction and home-school communication programs are all effective in reducing ADHD symptoms and enhancing school functioning[16]. It is for multidisciplinary teams to be included in the creation of treatment plans for these children. The children involved will benefit greatly if schools can make substantial reforms in order to become multisystemic centers of support. Multisystemic in this context means that these centers are prepared to provide not just educational, but also habilitational support (occupational therapy, speech therapy, psychological and medical support) to its students.

There were several limitations in this study that should be noted. First of all, the question of validity of ADHD diagnosis to children with intellectual disabilities is raised, because of the symptom overlap between the two conditions. Second, it is difficult to determine the representativeness of the present sample of children with intellectual disability and due to relatively small sample, an extra caution should be made in any generalization of the findings.

More research is needed in the field of ADHD in children with intellectual disability. Especially, further studies are needed to validate whether the sex ratio of ADHD in children with intellectual disability is different from that in typically developing children. More attention should be given to what levels of intellectual disability ADHD can be validly diagnosed and whether there should be an IQ cut-off score in determining the eligibility for diagnosis.

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POREMEĆAJ POZORNOSTI S HIPERAKTIVNOŠĆU KOD DJECE SA INTELEKTUALNIM TEŠKOĆAMA U BOSNI I HERCEGOVINI

S A Ž E T A K

Poremećaj pozornosti s hiperaktivnošću (ADHD) je veoma čest kod djece sa intelektualnim teškoćama (IT). Cilj ovog rada je ispitati učestalost ADHD-a kod djece s IT u Bosni i Hercegovini u odnosu na spol, etiologiju i razinu IT. Podaci su prikupljeni kroz pregled medicinske dokumentacije. Uzorak je činilo 167 djece koja pohađaju dvije specijalne škole u Sarajevu. Ukupna učestalost ADHD-a je bila 20,4%, rezultat koji je u skladu sa postojećim studijama. Rezultati ovog rada su pokazali drugačiji omjer poremećaja kod dječaka i djevojčica (1,5:1). Razlika u učestalosti ADHD-a nađena je u odnosu na nivo IT. Veliki broj djece sa intelektualnim teškoćama ima i dijagnozu ADHD-a. Neophodno je uključiti multidisciplinarni tim u izradu ponašajnih i edukacijskih programa za ovu djecu.