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ADHD SYMPTOMS AND BEHAVIOUR DISORDERS OF CHILDREN OF PRIMARY SCHOOL AGE

SIMPTOMI ADHD I POREMEĆAJI PONAŠANJA DJECE OSNOVNOŠKOLSKE DOBI

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ABSTRACT

The main objective of the study was to investigate the prevalence of ADHD and behavioural disorders of children of primary school age. The sample consisted of 500 primary school children from the Tuzla Canton, Bosnia and Herzegovina. ADHD was examined using the Attention Deficit/Hyperactivity Disorder Test (ADHDT) (Gillian, 1996), while the presence of behavioural disorders was examined using the Achenbach System of Empirically Based Assessment-ASEBA (Achenbach and Rescorla, 2001). The results of the study showed that 10.3% of primary school age children have ADHD or belong to the risk group/category. In children with and without ADHD, the presences of behavioural disorders, as well as differences in relation to age and gender have not been established.

Keywords: ADHD, behavioural disorders, children of primary school age.

SAŽETAK

Glavni cilj istraživanja je bio da se ispita prevalenca ADHD i poremećaja ponašanja djece osnovnoškolske dobi. Uzorak ispitanika je obuhvatio 500 djece osnovnoškolske dobi sa područja Tuzlanskog kantona. ADHD je ispitan primjenom Test za deficit pažnje/hiperaktivni poremećaj (ADHDT) (Gillian, 1996), dok je prisustvo poremećaja u ponašanju ispitan primjenom Achenbach sistem na empirijskim zasnovanim procjenama-ASEBA (Achenbach i Rescorla, 2001). Rezultati istraživanja su pokazali da 10,3% djece osnovnoškolske dobi ima ADHD ili spadaju u rizičnu grupu djece. Kod djece sa i bez ADHD nije utvrđeno prisustvo poremećaja u ponašanju, kao ni razlike u odnosu na dob i spol.

Ključne riječi: ADHD, poremećaji u ponašanju, djeca osnovnoškolske dobi

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INTRODUCTION

Attention Deficit/Hyperactivity Disorder (ADHD) is considered to be one of the most commonly investigated neurodevelopmental disorders that affects both the individual and their family and the community as a whole (Ercan et al., 2015). ADHD is a disorder most commonly diagnosed in children during primary school age; however, it is nowadays increasingly being identified during preschool age (Visser et al., 2014). It is defined as a relatively stable pattern of impairment of inattention, hyperactivity, and/or impulsivity (DSM-V: APA, 2013), which affects 2% to 20% of the school population (Biederman and Faraone, 2005; Visser et al., 2014; Wolraich et al., 2014). There is no single test that will confirm the existence of ADHD syndrome with certainty, nor can the chemical or genetic markers that distinguish children with this syndrome be identified (Reid and Johnson, 2012). Diagnosis is subjective, and therefore the diagnosis of ADHD syndrome must be made on a unique and individual basis. With the aim of reducing the possibility of errors in making the final diagnosis, the recommended model in the evaluation of this syndrome is a multidimensional approach, where as much data as possible needs to be collected (Handler and DuPaul, 2005). The diagnosis of ADHD in children is difficult to make before the age of four or five, except that the characteristic behaviour of younger children is more variable, they are also less demanding for more sustained attention and behavioural control (McGoey et al., 2002; Barkley, 2000; Strock, 2003). A diagnosis of ADHD can be made with certainty after the age of seven; however, symptoms must occur before this age. ADHD is most commonly diagnosed during primary school age, more precisely, in the fifth grade of primary school, because during these periods, adjustment requirements in children are greatest and continue to persist in adolescence and adulthood in most people (50-70%) (Bernardi et al., 2012). The disorder is diagnosed according to ICD-10 and DSM-V diagnostic criteria. The symptoms of the disorder are almost identical in both criteria, but differences are expressed in the diagnostic algorithm (Sekušak-Galašev, 2005). The assessment process begins by collecting basic information about the child through interviews. The primary objective of the interview is to define a list of specific child behaviour problems that will be compared with DSM criteria (Anatopoulos and Shelton, 2001). Data is collected from parents, educators and teachers. Parents provide information regarding the medical history of the child, about the time when behavioural problems first arose, about the child's development, about family history information, etc. Educators and teachers are crucial in the assessment process because they monitor behaviours on a daily basis and monitor the academic achievement of children (Reid and Johnson, 2012). Direct observation is the best assessment practice that is not as often represented in practice as it should be (Handler and DuPaul, 2005).

According to the DSM-V (APA, 2013), there are three basic forms (types) of Attention Deficit/Hyperactivity Disorder (ADHD):

1. Attention Deficit/Hyperactivity Disorder - combined type (six or more symptoms of inattention and six or more symptoms of hyperactivity - impulsivity lasting for at least six months and occurring in the greatest number of children and adolescents);

2. Attention Deficit/Hyperactivity Disorder - predominantly inattentive type (six or more symptoms of inattention, but less than six symptoms of hyperactivity - impulsivity lasting at least six months);
3. Attention Deficit/Hyperactivity Disorder – predominantly hyperactive-impulsive type (six or more symptoms of hyperactivity-impulsivity are represented, but less than six symptoms of inattention lasting at least six months).

Although ADHD is not an educational category but a medical diagnosis, a great number of students with ADHD are just eligible for services and legal protection in the education field. Schools should offer these students a wide range of services for students with ADHD symptoms and behavioural disorders. Services can be academic and non-academic.

Potential differential diagnoses (or comorbidity) diagnoses

- Oppositional defiant disorder or behavioural disorders (may sometimes cause problems in differential diagnosis)

- Pervasive developmental disorders

- Anxiety and mood disorders

- Acute adjustment disorders

- Attachment disorders

- Learning disorders (differential diagnosis to inattention)

- Mental retardation (does not rule out the diagnosis of ADHD)

- Domestic conflict, abuse or child abuse can also occur with symptoms similar to ADHD

- Chromosomal, metabolic, neurological or somatic disorders (e.g. Fragile x syndrome; 22q1 deletion syndrome, pti mal seizure (epilepsy), migraine, hyperthyroidism) may be masked as ADHD

- Medications, especially anticonvulsants, antihistamines, sympathomimetics, steroids (Banaschewski et al., 2015).

According to research, over 90% of students with ADHD in developed countries of the world receive academic services. About two-thirds of these students receive some of the non-academic services at school, such as behaviour management, mental health services or occupation services. Also, social services and/or parental counselling/training should be provided within the school curriculum (Dizdarević, 2013).

ADHD has been the most common diagnosis for school-age children for many years, with prevalence rates ranging from 2% to 16% (Kirby and Kirbi, 1994; Barkley, 2000; Rader, McCauley, & Callen, 2009; Willcutt, 2012), and it is estimated that ADHD is four to five times more frequent in boys than girls (Barkley, 2000), i.e. ratio of 2: 1 to 6: 1 (Biederman et al., 2010).

Attention disorders are more common in boys than girls (3:1). According to some studies, the ratio is as high as 6:1 to 10:1. Western countries statistics show that ADHD accounts for about 70% of the total number of diagnoses of children (Jovanovic et al., 2006). Children with ADHD are at risk for academic and social failure including school failure, grade repetition, low self-esteem, systematic abuse, and early pregnancy (LeFever, Villers, Morrow, & Vaughn, 2002). It is found that more of 30% of children with ADHD repeat grades, 57% are enrolled in special education services, over 46% have dropped out of school, 10% to 20% have been expelled from school and 10% to 35% fail to finish high school (Barkley, DuPaul, & McMurray, 1990; Barkley, Fischer, Smallish, & Fletcher, 2002). Children with ADHD are at least twice as likely to develop depression (Kessler et al., 2006) or 21.6% (Elia et al., 2008). The relatives of children with ADHD are at high risk for ADHD, comorbid psychiatric disorder, school failure, learning disabilities and intellectual impairment (Faraone and Biederman, 1994).

Self-assessment questionnaires, observations, structured interviews, and achievement on specific tests are commonly used to assess behavioural problems. One of the most commonly used scales for assessing child behaviour is the Child Behaviour Checklist (CBCL) (Živčić-Bećirević et al., 2003).

Achenbach's (1993) division classifies internalized and externalized behavioural problems. Koller-Trbovic (2004) describes eight groups of syndromes divided into internalized and externalized syndromes. Anxiety or depression and somatic difficulties belong to the internalized syndrome group, while aggressive and delinquent behaviours belong to the externalized syndrome group. Non-group syndromes are attention problems, social problems, and thinking problems. The difference between the two groups of symptoms of externalized and internalized problems is manifested in the fact that in the first case, the response of children creates problems for others, and in the second case, the response creates problems for the child itself (Koller-Trbović, 2004). Under-controlled behaviour is more common in boys, and over-controlled behaviour is more common in girls (Davison and Neale, 1999).

The importance of early identification is crucial to the child's overall development, overcoming negative feelings and building a positive self-image. At the same time, a child may exhibit a number of different disorders and difficulties, and internalized and externalized problems, although different, are not mutually exclusive (Achenbach and Rescorla, 2001). Symptoms of this disorder affect the child's behaviour and its cognitive, academic, emotional, social and developmental functioning (Rader, McCauley, & Callen, 2009).

In our country, there are no established indicators of early identification of children with behavioural problems, nor identification of given difficulties, including ADHD and its reflections or correlation with variables of school functioning, or influence on academic achievement and primary school age student behaviour, as well as no established recommendations for work related to an established difficulty. Accordingly, this study raises the question of the incidence of ADHD in children of primary school age and the frequency of clinically relevant problem behaviour in children with and without ADHD.

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This study seeks to investigate the prevalence of ADHD and behavioural disorders in children of primary school age, and to determine the difference in behaviour disorders of children with and without ADHD with respect to age and gender.

RESEARCH MATERIAL AND METHODS

Sample of respondents

The sample consists of 500 primary school students aged 6-14 who attend the regular education system in the Tuzla Canton, Bosnia and Herzegovina. The choice of respondents was made randomly. No participants were excluded from the study because of the aetiology of the eventual difficulty, the level of difficulty, the presence of sensory or physical impairment, or the associated psychiatric or behavioural problems.

Measurement instrument and research variables

ADHD was tested using the Attention Deficit/Hyperactivity Disorder Test (ADHDT), (Gillian, 1996). It is a standardized test that contributes to the diagnosis of students with Attention Deficit/Hyperactivity Disorder. ADHDT consists of 36 particles describing the behaviour and characteristics of persons with ADHD and these particles are based on the most common ADHD behaviour problems listed in the DSM-IV and the professional literature. ADHDT consists of three subtests: the hyperactivity subtest, the impulsivity subtest, and the inattention subtest. The hyperactivity subtest measures excessive motor movements, and is illustrated by the particles "excessive running, jumping, climbing" and "excessive speaking". The impulsivity subtest evaluates the problems of inhibiting behaviour and delaying the reaction and is illustrated by the particles "acting before thinking". The inattention subtest evaluates person's problems with focusing attention on important characteristics of a task or job, illustrated by examples/particles "failing to finish what he/she has started" and "having difficulty maintaining attention".

Problem behaviour was examined by applying the Achenbach System of Empirically Based Assessment-ASEBA via the Child Behaviour Checklist-CBCL (Achenbach and Rescorla, 2001). The Achenbach System of Empirical Based Assessment-(Achenbach and Rescorla, 2001) for ages 6-18 is a revised version of the assessment of adaptive behaviour and behavioural problems in a simple and effective way. ASEBA forms can be administered over a period of 15-20 minutes.

The Child Behaviour Checklist (CBCL) consists of 113 assertions where the administrator should rate behaviour, emotional and social problems with 0-not true, 1-somewhat or occasionally true, 2-frequent or constantly true. In order to indicate problems for each child, each assertion and rating scale is entered into a profile. For the purposes of this research, a manual way of creating profiles for CBCL forms of school-age-DSM-5 oriented scales was used, separate profiles for boys and girls showing gender specific norms for ages 6-11 and 12-18, used for the purposes of this research.

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The Child Behaviour Checklist (6-18) is intended to examine parental assessments of children's behavioural and emotional responses on eight different dimensions:

1. Anxiety/Depression
2. Reticence/depression
3. Somatic difficulties
4. Social problems
5. Thinking problems
6. Attention problems
7. Violation of rules
8. Aggressive behaviour and other.

This behaviour assessment checklist was filled out by parents, guardians, or other persons who are very close to the child, that is, teachers or staff involved in direct childcare.

Methods of data collection

Prior to working with the respondents, the researcher informed the representatives of the institutions and the respondents about the goals and objectives of the planned study. The research survey was conducted anonymously and personal data on participants will not be available or used for any purpose other than this research/study.

Data analysis and data processing procedures

Statistical data processing was performed using SPSS 24.0. Prior to the statistical analysis, the collected data was processed and encoded. Statistical data processing included the application of descriptive and inferential statistical methods. Average age equivalents across areas and sub-areas and total points on the Child Behaviour Checklist (CBCL) were compared between two groups of children using a t-test. Using the cross-sectional method, children of different chronological age and gender with the type of behavioural disorders and the prevalence of ADHD were compared.

RESEARCH RESULTS AND DISCUSSION

The prevalence of children with ADHD, the prevalence of primary school age children with behavioural disorders who did not have ADHD were determined in relation to the set objective of the study, and the difference in the behaviour disorders of children with and without ADHD in relation to age and gender was determined. The basic data on the respondents relate to the tabular presentation of data collected by the general part of the questionnaire used in the research, while the presentation of the total survey results included grouping of variables according to the sub-scales of the measuring instrument, descriptive and inferential statistical analysis, as well as their tabular presentation and discussion.

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Sample of respondents

Table 1 shows the sample of respondents by gender.

Table 1. Gender of the respondents

Gender	Number of respondents N	Percentage %
Male	262	52.4
Female	238	47.6
Total	**500**	**100.0**

In relation to the results shown in Table 1, we can see that the sample of respondents was uniform in gender, and that from the total number of respondents (N = 500) 52.4% (N = 262) were boys and 47.6% (N = 238) were girls.

Table 2 shows the sample of respondents by age.

Table 2. Age of the respondents

Age	N	%
7	5	1.0
8	128	25.6
9	77	15.4
10	91	18.2
11	126	25.2
12	73	14.6
Total	**500**	**100.0**

The study included respondents aged 7 to 12, and according to the results shown in Table 2, we can see that the highest number of respondents was 8 years old (25.6%) and 11 years old (25.2%). The smallest number of respondents was 7 years old, or only 1% of respondents.

Results of prevalence of ADHD in children of primary school age and behavioural disorders

Frequencies and percentages of respondents were calculated to determine the prevalence of ADHD and behavioural disorders in children of primary school age, while a t-test for two independent samples and a univariate variance analysis were used to determine differences in behavioural disorders in children of primary school age with and without ADHD in relation to gender and age.

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Table 3. The probability of ADHD in children of primary school age

Probability of ADHD	ADHD quotient	N	%
Very low	<69	353	70.6
Low	70-79	95	19.0
Below average	80-89	38	7.6
Average	90-110	11	2.2
Above average	111-120	3	0.6
Total		**500**	**100.0**

Table 3 presents the results related to the prevalence of children of primary school age with ADHD. Based on the results presented, we can conclude that 2.8% of children of primary school age certainly have ADHD, as 50% of respondents with ADHD achieve results in this range. This includes children who achieved average and above-average scores on the probability assessment of ADHD. For children who achieved below-average results, precisely 7.6% of the respondents, additional data is needed based on other tests, interviews with parents and behavioural observations, and this percentage of children may be considered as a category of children at risk for ADHD.

Table 4. The probability of ADHD in children of primary school age in relation to gender

Gender of the respondent		Probability of ADHD					Total
		Very low	Low	Below average	Average	Above average	
Male	N	170	61	24	4	3	262
	%	64.9%	23.3%	9.2%	1.5%	1.1%	100.0%
Female	N	183	34	14	7	0	238
	%	76.9%	14.3%	5.9%	2.9%	0.0%	100.0%
Total	**N**	**353**	**95**	**38**	**11**	**3**	**500**
	%	**70.6%**	**19.0%**	**7.6%**	**2.2%**	**0.6%**	**100.0%**

Table 4 shows the results of the probability of ADHD in relation to the gender of the respondents. In relation to the results, we can see from the total sample of children who show symptoms of ADHD that the respondents are gender balanced (i.e. a total of 14 which makes 2.8% of the total sample). However, boys show more pronounced symptoms because out of the total sample, 1.4% were boys with symptoms of ADHD, while 0.6% of them had an above-average probability of ADHD. When it comes to girls, the percentage within the total sample is equal to boys and stands at 1.4%, with girls achieving an ADHD quotient indicating its average probability. When it comes to the sample of children who achieved below-average ADHD quotient scores and who are considered to be a high-risk group for ADHD, the percentage of boys is higher than that of girls and it is 4.8% of the total sample, and 9.2% of the sample of boys included in the study.

Most previous studies confirm a higher prevalence of ADHD in boys than girls, ranging from ratios of 2:1 to as high as 9:1 (Al Azzam et al., 2017), while Joshi and Angolkar (2018) cite conflicting research findings with significantly higher prevalence of ADHD in children of primary school age (5.76%) and higher prevalence of ADHD in girls (3.8%) than boys (1.9%).

Prevalence of behavioural disorders in children of primary school age with ADHD

The prevalence of behavioural disorders in children of primary school age with ADHD included presentation of the prevalence of behavioural disorders in children in relation to the achieved T-score and its qualitative descriptors.

Table 5. Prevalence of behavioural disorders

Rank of behavioural disorder	**t-score**	**N**	**%**
Normal	>63	500	100.0
Marginal	60-63	0	0.0
Clinically significant	<60	0	0.0
Total		**500**	**100.0**

In relation to the results presented in Table 5, it is evident that the respondents did not show the presence of behavioural disorders, that is, they did not achieve values indicating marginal or clinically significant results. The reasons for these results can be explained to some extent by a sample of respondents that mostly included children of primary school aged 6-12 years. In contrast to this research, other authors cite an association between the diagnosis of ADHD and substance use in adolescence. Brooke and William (2003) report that children diagnosed with ADHD (n = 142) prospectively followed in adolescence (13-18 years old) compared to adolescents of the same age without ADHD (n = 100) show higher levels of use of alcohol, tobacco, and illicit drugs abuse than the control group. Within the sample, the severity of ADHD symptoms during childhood predicted multiple results of substance abuse. On the other hand, some authors highlight the importance of parental interaction of children with ADHD and parenting style and their influence on the occurrence of behavioural disorders. Giannotta and Rydell (2016), state that hyperactive/impulsive child behaviour was a predictor of antisocial behaviour in adolescence only in children whose parent-child relationship quality deteriorated from infancy to adolescence.

Table 6. Differences in behaviour disorders of children of primary school age with ADHD in relation to gender

Gender of the respondent	N	AM	SD	SE	t-test	p
M	33	78.78	2.99	.52	.66	.510
F	19	78.26	2.23	.51		

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The results presented in Table 6 show that there is no difference in the behavioural disorders of children of primary school age with ADHD in relation to gender, because the t-test value (t = 0.663; p = 0.510) for two independent samples did not confirm that there was a significant statistical difference between these two groups of respondents.

Table 7**.** Differences in behaviour disorders of children with of primary school age with ADHD

	Sum of Squares	**df**	**Mean square**	**F**	**p**
Between Groups	31.305	4	7.826	1.053	.390
Within Groups	349.214	47	7.430		

The results presented in Table 7 show that there is no difference in the behavioural disorders of children of primary school age with ADHD in relation to age because the results of univariate analysis of variance showed that there was no significant statistical difference between the observed groups of respondents (F = 1,053; p = 0,390).

Table 8. Differences in the behavioural disorders of children of primary school age without ADHD in relation to gender

Gender of the respondents	**N**	**AM**	**SD**	**SE**	**t-test**	**p**
M	262	76.16	2.00	.12	.687	.092
F	238	75.85	2.06	.13		

The results presented in Table 8 show that there is no difference in the behavioural disorders of children of primary school age without ADHD in relation to gender, because the t-test values (t = 0.687; p = 0.092) for the two independent samples did not confirm that there was a significant statistical difference.

Table 9. Differences in behaviour disorders of children of primary school age without ADHD in relation to age

	Sum of Squares	**df**	**Mean square**	**F**	**p**
Between Groups	34.181	5	6.836	1.656	.144
Within Groups	2038.721	494	4.127		

The results presented in Table 9 show that there is no difference in the behavioural disorders of children of primary school age without ADHD in relation to age because the results of univariate analysis of variance showed that there was no significant statistical difference between the observed groups of respondents (F = 1,656; p = 0, 144).

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CONCLUSION

The study aimed to determine the prevalence of ADHD and behavioural disorders in children of primary school age, and the differences in behavioural disorders in children with and without ADHD in relation to age and gender. The quantitative method of the study provided data on the percentage of children of primary school age showing symptoms of ADHD and behavioural disorders. The results of this study showed that out of the total number of respondents, 10.4% of them have ADHD, or they belong to the group of children at risk for ADHD. Of this percentage, 2.8% of children of primary school age are diagnosed with ADHD with certainty, while 7.6% of children of primary school age require additional assessment and observation. An assessment of behavioural disorders in children of primary school age found that a significantly higher proportion of children showed symptoms of internalized behavioural disorders, compared to children who exhibited externalized behavioural disorders. When it comes to internalized behavioural disorders, the results show that children of primary school age often show excessive concern and insecurity as well as unfounded fear, while never showing behaviours related to the story of suicide or fear of school. When it comes to externalized behavioural disorders, children of primary school age show no symptoms of sexual problems, they do not steal things outside of home or set things on fire, while very few children feel guilty about doing something wrong and prefer to socialize more with adults than their own peers. Concerning the differences in the prevalence of ADHD in relation to gender, it was found that boys had a higher prevalence than girls, which is in line with previous research. In the sample of children with and without ADHD, no symptoms of behavioural disorders were observed, nor was a difference in T score obtained in relation to age and gender of the respondents. As we said in the introductory part, in our country there are no established indicators of early identification of children with behavioural problems, nor identification of given difficulties, including ADHD and its reflections or correlation with variables of school functioning, that is, influence on academic achievement and behaviour of children of primary school age, as well as no established recommendations for work in relation to the identified difficulty. Accordingly, in the study we determined the incidence of ADHD in children of primary school age and the incidence of clinically significant problem behaviour in children with and without ADHD. Through this research, we made an initial database on the current status of ADHD and behavioural disorders in children of primary school age in the Tuzla Canton, and created implications for future research. Future research should place greater emphasis on the incidence of ADHD and its implications on academic achievement and social goals and, in relation to the results, take appropriate action by introducing appropriate forms of treatment and methods for working with this small population of children in our schools, through a multidisciplinary approach that would advocate a multimodal form of work led by a rehabilitation educator who would be responsible for its implementation.

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