

Physical Injury Among Children with Attention-Deficit/Hyperactivity Disorder: Situations and Medical Care Needs

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ABSTRACT

Background: Young individuals with attention deficit hyperactivity disorder (ADHD) are renowned for their impulsivity and recklessness, which can lead to serious accidents and even death. Compared to their typically developed peers, children and adolescents with ADHD are at greater risk of sustaining injury in normal life situations (e.g., during sports, in school, and in traffic). These injuries were less prevalent among individuals with ADHD who were compliant with their medication.

Methods: A cross-sectional study with a one-to-one comparative group design was employed. The ADHD group consisted of 50 children who were previously diagnosed with ADHD. The comparative group included 50 typically developed participants from the same age group (7–19 years). A questionnaire was developed for this study to assess the risk and magnitude of injury in different daily life situations by assessing the frequency of each participant's need to visit a doctor.

Results: Members of the ADHD group exhibited a significantly higher rate of injury associated with fights, traffic, and sports participation, and they sustained injuries significantly more often at school and at home. The severity of the injuries was greater in the ADHD group than in the comparative group in three out of the six situations analyzed.

Conclusion: In comparison to their usually developing counterparts, this study stresses the risk and extent of damage in children and adolescents with ADHD. The nature of ADHD in this age range, which is characterized by impulsivity, carelessness, and inattention, is thought to be the reason for the increased risk among children and adolescents with ADHD.

Keywords: ADHD, Bahrain, Children, Physical injuries, Situation.

INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a behavioral disease marked by the persistence of symptoms such as inattention, impulsivity, and hyperactivity. The symptoms should interfere with social, intellectual, or vocational functioning, begin before the age of 12, and be noticed in several settings¹. The association of ADHD with unintentional injury has attracted the interest of clinicians and researchers. Several studies have shown that ADHD is positively associated with accidental injury in proportion to ADHD severity²⁻⁶. In children, adolescents, and adults, ADHD was found to be associated with a higher risk of traumatic brain injury and concussion⁷. Furthermore, ADHD medication use was associated with a reduction in different types of unintentional injury in adolescents and children of both sexes⁸. A meta-analysis found that children and adolescents with ADHD have a greater risk of injury and that ADHD medication, at least in the short term, had a protective effect⁹. Diverse kinds of injury have been reported, including burn injuries¹⁰. A high prevalence and severity of ADHD symptoms were found among children attending accident and emergency departments and ENT clinics^{11,12}. These studies recommended that children with accidental injuries be referred to child psychiatry services for a proper ADHD screening. However, Pittsenger et al. disagree with this recommendation¹³.

The parenting styles to which children with ADHD are exposed may contribute to their risk of injury. Studies have reported that the parents of children with ADHD are more permissive and authoritarian, and their children are at significant risk of being physically abused by them^{14,15}. Moreover, maternal depression is associated with the use of corporal punishment to discipline children with ADHD¹⁶. Unfortunately, there is a clear scarcity of studies measuring potential causal mechanisms and specific risk factors of accidental injury in children diagnosed with ADHD¹⁷.

The relationship between ADHD, parental role, and unintentional injury among Bahraini children and adolescents with ADHD is investigated in this study.

METHODS

Design and Participants: The present study was executed using a cross-sectional, comparative group design with a case comparative group ratio of one to one. The ADHD group consisted of 50 children aged 7–19 years who were previously diagnosed with ADHD in the School Health Department of the Yusuf Engineer Health Center (YEHC) in Bahrain's Ministry of Health and at an authorized private child psychiatric clinic. The YEHC is a national governmental center

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that diagnoses, treats, and rehabilitates children and school-age adolescents who suffer from developmental disorders that cause them to struggle in educational settings. Each member of the ADHD group was diagnosed according to Diagnostic and Statistical Manual Number 5 (DSM-5) criteria and Conner's test for parents and teachers¹⁸. The comparative group consisted of children and adolescents from the same age group who had not previously been diagnosed with any medical or neuropsychiatric disorders. Children with IQs ≤ 70 were excluded.

Sample Size and Data Collection: The sample consisted of 50 ADHD participants and 50 typically developed (TD) participants. The ADHD and TD participants were recruited via convenience sampling. The data were collected via face-to-face interviews with the children, sometimes in the parent's presence, to fill out a questionnaire. It took about 10 minutes to complete the form for each participant. The questionnaire contained questions on child age, sex, and level of education as well as eight questions regarding injuries, including inquiries about the type of injury, the situation in which it was sustained, and whether medical attention was required (Table 2). The answers to most of the questions were yes or no only.

Ethical Consideration: The Bahraini Ministry of Health's Research Committee Secondary Care provided ethical clearance and approval. Each child and his or her guardians received a permission document, which was read to them. It was made clear that participation or lack of participation in the study would not affect the services provided to the children or their parents, participation was voluntary, and participants could withdraw from the study at any time.

Statistical Analysis: The Statistical Package for the Social Sciences (SPSS) version 25 was used to analyze the data. The demographic data and outcome indicators were summarized using descriptive statistics. Continuous variables' means and standard deviations (SDs) were provided, whereas categorical variables' counts and percentages were reported. To explore the differences between groups, Pearson's chi-squared and independent samples t-tests were employed as needed. All tests were two-tailed, and odds ratios (ORs) and 95 percent confidence intervals (CIs) were computed.

RESULTS

One hundred participants were involved in the study and the sample was divided equally between the two groups. Both groups were predominantly male (78% and 62% in the ADHD and TD groups, respectively). The TD group had a significantly higher mean education level (6.80, SD = 3.356; $p = 0.002$) than the ADHD group (Table 1).

Eighty percent of the ADHD group members had fought with someone at least once, whereas only 40% of the TD group members had been involved in a fight ([OR] = 6.00, 95% CI = 2.453–14.678, $p < 0.0001$). Among ADHD individuals who had been involved in a fight, in the past year 56% had fought five or more times, 46% had been injured in a fight, and 12% had required medical attention after a fight. There were

significant differences between the ADHD and TD groups in terms of all factors related to involvement in fights.

Individuals with ADHD exhibited a higher rate of injury sustained during sports (60.0%) than TD individuals (38.0 %) (OR = 2.447, 95% CI = 1.095–5.468, $p = 0.028$). In addition, ADHD individuals more frequently sustained injuries during sports requiring a doctor's attention; however, this difference was not statistically significant. Furthermore, ADHD individuals reported a higher rate of injury due to parental and self-negligence (42.0%) than members of TD group (8.0%) ($p < 0.001$), with a 10-fold higher number of visits to the doctor to treat injuries.

In terms of injuries caused by hyperactivity, 62.0% and 22.0% ($p < 0.0001$) of ADHD individuals and TD individuals sustained injuries, and 20.0% and 8.0% of ADHD individuals and TD individuals needed to visit a doctor after the injury, respectively. Moreover, none of the TD participants had been injured due to breaking traffic rules, whereas 40% of the ADHD participants had been ($p < 0.0001$); however, only 8.0% of the ADHD participants who were injured due to breaking traffic rules needed to visit a doctor. In addition, within the last year, more ADHD participants reported sustaining injury while at home or school than TD participants (OR = 4.125, 95% CI = 1.792–9.497, $p = 0.001$); however, the ADHD participants and typically developed participants exhibited an equal prevalence in the need for doctor visits to treat these injuries (Table 2).

DISCUSSION

The present research aimed to assess the risk and magnitude of accidental injury in children and adolescents with ADHD and the impact in terms of their need for doctor visits after such injuries. Children and adolescents with ADHD exhibited impulsivity- and carelessness-related self-injuries significantly more frequently than TD children and adolescents of the same age. Compared to their TD peers, those with ADHD exhibited a higher rate of injury during all of the daily life situations analyzed (e.g., traffic-related and sport injuries). In one-half of the given scenarios, the ADHD group reported a need to visit a doctor more frequently for treatment of injuries than the TD group.

ADHD was associated with a six-fold higher rate of participation in one fight ($p < 0.0001$) and in more frequent participation in fights ($p < 0.0001$). These findings support the study hypothesis that children with ADHD are more vulnerable to injuries due to lack of focus and impulsivity. The finding is similar to those reported elsewhere in the literature^{2,3,5}. Children and adolescents with ADHD have a higher risk of involvement in fights and may both bully their peers and be victimized by them¹⁹. Several studies have highlighted impulsivity, poor social skills, and poor emotional regulation as contributors to ADHD students being disliked and therefore being bullied by or bullying their peers^{20,21}. Regarding injuries sustained during sports, the results of a study by Iverson, which analyzed 30,000 adolescent athletes, are consistent with the results of our study. Based on Iverson's study, adolescent athletes with ADHD reported a higher rate of concussion than TD

Table 1: Gender and educational level of the ADHD and TD groups

	Case		Control		p value	OR	CI
	N = 50	%	N = 50	%			
Sex							
Female	11	22	19	38	0.126	0.46	(0.191–1.109)
Male	39	78	31	62			
Educational level (mean \pm SD)	4.92 \pm 2.641		6.80 \pm 3.356		0.002*		

p value: p value of Pearson's chi-squared and Student's t-test as appropriate; OR: odds ratio; CI: confidence interval; SD: standard deviation; *Significance level: $p \leq 0.05$.

Table 2: Assessment of impulsiveness and related injuries in ADHD and TD participants

	Case		Control		p value	OR	CI
	N = 50	%	N = 50	%			
Did you fight with someone in the last year?							
Yes	40	80.0	20	40.0	<0.0001*	6.00	(2.453–14.678)
No	10	20.0	30	60.0			
If yes, how many times?							
Five or more	28	56.0	1	2.0	<0.0001*	62.364	(7.972–487.887)
Less than five	22	44.0	49	98.0			
Did it lead to any injuries?							
Yes	23	46.0	2	4.0	<0.0001*	20.444	(4.472–93.466)
No	27	54.0	48	96.0			
Did you need to visit a doctor after you fought?							
Yes	6	12.0	1	2.0	0.050*	6.682	(0.774–57.695)
No	44	88.0	49	98.0			
Have you been injured during sports in the last year?							
Yes	30	60.0	19	38.0	0.028*	2.447	(1.095–5.468)
No	20	40.0	31	62.0			
Did you need to visit a doctor?							
Yes	11	22.0	9	18.0	0.617	1.285	(0.480–3.437)
No	39	78.0	41	82.0			
Have you been injured due to lack of care in the last year?							
Yes	21	42.0	4	8.0	<0.0001*	8.328	(2.595–26.721)
No	29	58.0	46	92.0			
Did you need to visit a doctor?							
Yes	10	20.0	1	2.0	0.004*	12.25	(1.504–99.798)
No	40	80.0	49	98.0			
Have you been injured due to hyperactivity, hurrying, or rushing in the last year?							
Yes	31	62.0	11	22.0	<0.0001*	5.785	(2.400–13.942)
No	19	38.0	39	78.0			
Did you need to visit a doctor?							
Yes	10	20.0	4	8.0	0.084	2.875	(0.837–9.881)
No	40	80.0	46	92.0			
Have you been injured due to not following traffic laws in the last year?							
Yes	20	40.0	0	0.0	<0.0001*	67.885	(3.961–1163.345)
No	30	60.0	50	100.0			
Did you need to visit a doctor?							
Yes	4	8.0	0	0.0	0.041*	9.774	(0.512–186.526)
No	46	92.0	50	100.0			
Have you been injured at home/school while moving/doing your work in the last year?							
Yes	34	68.0	17	34.0	0.001*	4.125	(1.792 - 9.497)
No	16	32.0	33	66.0			
Did you need to visit a doctor?							
Yes	6	12.0	6	12.0	1.00	1.00	(2.99 - 3.341)
No	44	88.0	44	88.0			

p value: p value of Pearson's Chi square; OR: odds ratio; CI: confidence interval; SD: standard deviation; *Significant level: $p \leq 0.05$.

athletes²². In general, among youth involved in accidents, those who were diagnosed with ADHD were 1.6 to 1.89 times more compared to those who were not diagnosed with ADHD²³. Furthermore, our results showed a more frequent need to visit a doctor in the ADHD group in one-half of the daily life situations analyzed. This may be attributed to the degree of severity of their injuries due to their high impulsivity. As Lange revealed in his research, the ADHD group was injured in daily life accidents 16% more often than their non-ADHD peers and were at higher risk of requiring medication to treat their injuries²³.

Future studies should examine the injuries that occur when parents use corporal punishment to discipline their children at home^{15,16} and

examine how many of the parents who use corporal punishment to discipline their ADHD children have ADHD symptoms themselves.

STUDY LIMITATIONS

This is the first study in the Arabic area to look at the link between ADHD and physical injuries in a group of ADHD children and adolescents compared to a normally developing control group; nevertheless, the study has numerous limitations. We were unable to explore associations with other variables such as age, gender, or social class due to the limited sample size. The majority of the incidents we looked at were recalled by participants from recollections that were up

to a year old, thus the descriptions of the events may not be exact or accurate. These limitations will be addressed in another on-going study carried out by authors.

CONCLUSION

This study examines the risk and magnitude of injury in children and adolescents with ADHD which may threaten health or life. The high risk of injury in this population is attributed to higher levels of impulsivity and carelessness than those found in their typically developed peers. Individuals who manage children with ADHD should include an evaluation of unintentional injuries in their assessment. The causal relationship between injuries and ADHD should be studied deeply to discover means of prevention. Potential prevention approaches may include the proper use of medication to treat ADHD symptoms and improvement of parental management of behavioral problems without the use of physical punishment.

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Competing Interest: None.

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