



Evaluation of the Relationship Between Orthopedic Injuries and Attention Deficit Hyperactivity Disorder in Childhood and Adolescence

Çocukluk ve Ergenlikte Ortopedik Yaralanmalar ve Dikkat Eksikliği Hiperaktivite Bozukluğu Arasındaki İlişkinin Değerlendirilmesi

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ABSTRACT

Aim: Attention deficit hyperactivity disorder (ADHD) is the most neurodevelopmental disorder in childhood, which causes repetitive trauma and extremity injuries. Oppositional defiant disorder (ODD) and conduct disorder (CD) are the most comorbid conditions of ADHD. Our study investigated the correlation between extremity trauma and ADHD's subgroups in pediatric trauma patients and comparison with the control group. Our aim was to detect high-risk patients in pediatric extremity injuries and to prevent possible extremity injuries with early diagnosis.

Materials and Methods: Between September 2018 and February 2019, 60 pediatric patients with extremity injuries (group 1) and non-traumatic reasons (group 2) were included in this prospective study consecutively. Patients were evaluated with the Conner's Parent Rating Scale and Strength and Difficulties Questionnaire for ADHD subgroups, ODD and CD. Patients who received an initial diagnosis were evaluated by the Child and Adolescent Psychiatry Department of Trakya University Medical Hospital.

Results: Patients who were diagnosed as ADHD were significantly higher in the trauma group ($p=0.042$), but no statistical significance was found in any subgroups of ADHD, ODD and CD.

Conclusion: Our results were in accordance with the vast majority of current literature in which ADHD was found to be significantly higher in the trauma group. ADHD must be considered in pediatric trauma patients to prevent possible extremity injuries.

Keywords: Pediatric trauma, extremity injury, attention deficit hyperactivity disorder, inattentive, hyperactive, impulsivity

ÖZ

Amaç: Dikkat eksikliği hiperaktivite bozukluğu (DEHB), çocukluk çağında tekrarlayan travma ve ekstremitte yaralanmalarına en fazla neden olan nörogelişimsel bozukluktur. Karşıt olma karşı gelme bozukluğu (KOKGB) ve davranım bozukluğu (DB) ise DEHB'ye en sık eşlik eden durumlar olarak bilinmektedir. Çalışmamızda pediatrik travma hastalarında, ekstremitte travmaları ve DEHB alt grupları arasındaki korelasyon, kontrol grubu ile karşılaştırılarak araştırılmıştır. Amacımız pediatrik ekstremitte travmaları açısından yüksek riskli olguların saptanması ve erken tanı ile olası ekstremitte yaralanmalarının önlenmesidir.

Gereç ve Yöntem: Eylül 2018-Şubat 2019 tarihleri arasında ekstremitte yaralanması bulunan (grup 1) ve travmatik olmayan nedenlerle başvuran (grup 2) toplam 60 çocuk ardışık olarak çalışmaya dahil edildi. Katılımcılar Connors Ebeveyn Değerlendirme Ölçeği ve Güçler Güçlükler Anketi kullanılarak ön değerlendirmeye tabi tutuldu. Riskli olarak saptanan olgular Trakya Üniversitesi Tıp Fakültesi Hastanesi, Çocuk ve Ergen Ruh Sağlığı ve Hastalıkları Kliniği'ne detaylı değerlendirme için yönlendirildi.

Bulgular: DEHB tanısı alan olguların sayısı travma grubunda anlamlı olarak daha yüksek saptandı ($p=0,042$), ancak DEHB alt grupları arasında ve KOKGB ve DB'yi karşılayan olgular arasında, pediatrik travma açısından anlamlı fark saptanmadı.

Sonuç: Bulgularımız, güncel literatürün büyük çoğunluğu ile uyumlu olup DEHB, travma grubunda anlamlı olarak daha yüksek saptanmıştır. Pediatrik travma hastalarında olası ekstremitte yaralanmalarını önlemek için DEHB'ye dair semptomatoloji dikkate alınmalıdır.

Anahtar Kelimeler: Pediatrik travma, ekstremitte yaralanması, dikkat eksikliği hiperaktivite bozukluğu, dikkatsizlik, hiperaktivite, dürtüsellik

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INTRODUCTION

Extremity injuries are one of the most important hospitalization causes in childhood¹. The causes of pediatric trauma are multiple and psycho-social problems are one of them. Coincidental accidents are seen 1.5 times more in children with behavioral disorders than in others². In the literature, attention deficit hyperactivity disorder (ADHD) is stated as a type of behavioral disorder which is the most common comorbid disease of pediatric trauma³.

ADHD is a neurodevelopmental disease, and it has three main symptoms including attention deficit, hyperactivity, and impulsivity⁴. Its prevalence is increasing and nearly genetic inheritance is seen in 79% of the patients, which has been determined as the main etiological factor⁵. ADHD is the most common neurodevelopmental disorder in childhood and adolescence, which affects 3-5% of this population⁶. ADHD has three main subgroups as inattentive type (type 1), hyperactive-impulsive type (type 2) and the combined type (type 3). Oppositional defiant disorder (ODD) and conduct disorder (CD) are the most common comorbid conditions of ADHD.

ADHD is a chronic condition. The first step, which is very important, should be to develop a shared-care approach with the parents and child or adolescent, based on a shared understanding of identified treatment goals and preferences and accurate information about underlying etiology⁷. ADHD is associated with increased risk of unintentional injuries^{1-3,5,6}. Our aim was to detect high-risk patients in pediatric extremity injuries, to prevent possible extremity injuries with early diagnosis and to ensure access to appropriate treatment options for ADHD.

MATERIALS AND METHODS

This prospective study was carried out at the outpatient clinic of Orthopedics and Traumatology in Turkish Minister of Health, Edirne Sultan 1st Murat State Hospital from September 2018 to June 2019. The study was approved by the Institutional Medical Ethics Committee of the Medical Faculty Hospital of Trakya University (protocol no: TÜTF-BAEK 2018/226).

Patients between the ages of 6 and 15 years, who applied to the outpatient clinic of orthopedics and traumatology with their parents or legal representative, were included in the study. Patients were put into two groups as the trauma group (group 1) and the control (non-trauma) group (group 2) and they were questioned for their demographic data and medical histories (Table 1, 2). The trauma group consisted of patients who were directed by the emergency service and the non-trauma group consisted of patients who applied to the outpatient clinic for non-traumatic reasons (Table 3, 4). Thirty patients at each group,

who had no history of psychiatric diagnosis and treatment, were consecutively included in the study. All patients were questioned and evaluated with the Conner's Parent Rating Scale (CPRS) and Strength and Difficulties Questionnaire (SDQ). The CPRS was developed by Conners et al.⁸ to evaluate the behaviors of the child, and adaptation studies into Turkish were carried out by Kaner et al.⁹. It is seen that as the scores obtained from the scale increase, the severity of the symptoms increases. In our study, the scale was filled by the parent of the case. This scale was used to screen ADHD symptoms, and the group whose scale scores were found to be at risk was referred to the child and adolescent psychiatry outpatient clinic for Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL). The SDQ-Tur is a brief behavioral screening questionnaire developed by Robert Goodman in 1977. The Turkish validity and reliability study was conducted by Güvenir et al.¹⁰. The survey aims to evaluate the behavior, emotions and relationships of children and adolescents. SDQ-Tur contains 25 questions about the positive and negative behavior characteristics. It contains 5 subheadings, each consisting of 5 questions; these subheadings are behavioral problems, emotional problems, attention deficit and hyperactivity, peer problems and social behaviors. In our study, this scale was used for ADHD screening.

Patients who received an initial diagnosis were evaluated by the Child and Adolescent Psychiatry Department of Trakya University Medical Hospital. During our study, patients still under follow-up and treatment with a diagnosis of ADHD were excluded from the study, considering the possible side effects of psychostimulant therapy on bone tissue. The cases who had not received ADHD diagnosis and treatment until that day were included in our study. Written informed consent was obtained from all patients.

Statistical Analysis

Statistical analyses were carried out with SPSS v.21.0 software (SPSS Inc., IBM Corporation, Armonk, New York, USA) and power analysis was carried out with G-Power v.3.1.9.4 software (Franz Faul, Universitat Kiel, Germany). For this study, alpha error was accepted as 5% and p<0.05 values were accepted as statistically significant. Before the study, a power analysis was

Table 1. Demographic data

		Trauma	Non-trauma	p value
Age	Mean	10.70	9.47	0.218 ¹
	SD ²	3.62	4.03	-
Gender	Male	15 (25.0%)	18 (30.0%)	0.604 ³
	Female	15 (25.0%)	12 (20.0%)	-
BMI	Normal	29 (48.3%)	28 (46.7%)	1.000 ³
	Over-weight	1 (1.7%)	2 (3.3%)	

¹: Student's t-test, ²: Standard deviation, ³: Chi-square test, BMI: Body mass index

performed. Due to similar studies in the literature, statistical power (1-β) was accepted as 80% and the total sample size was determined as 60 patients. The groups were compared in terms of their demographic data, using the CPRS and SDQ for ADHD subgroups, ODD, and CD. Data were classified according to the distribution pattern. Parametric data were evaluated with the Student's t-test, non-parametric data were evaluated with the Mann-Whitney U test, and categorical data were evaluated with the chi-square test.

RESULTS

The study was finished with 30 patients in each group. Group 1 consisted of 15 male and 15 female patients with the mean age of 10.70 years (±3.62) and group 2 consisted of 18 male and 12 female patients with the mean age of 9, 47 years (±4.03) (p=0.604, p=0.218). Patients were classified as normal or overweight by using body mass index (BMI) calculations. BMI was calculated by dividing weight (in kilograms) by height (in meters) squared. There are different results in the literature about the relationship between trauma and BMI, and in our study, the groups were compared in terms of this variable¹¹. One patient in group 1 and 2 patients in group 2 were overweight, so no significant difference was found

(p=1.000) in the trauma group, all patients were injured with direct and low-energy trauma and treated conservatively. In the trauma group, 18 patients had upper and 12 patients had lower extremity injuries. Also, the groups were compared for previous trauma history and no significant difference was found (6/30-12/30, p=0.159). In addition to the CPRS and SDQ, patients were questioned for their or families' psychiatric medical histories and no statistical significance was found (p=0.513, p=0.671). In the literature, socio-economic status (SES) and parents' educational levels were inversely proportional to trauma risk, so groups were compared in terms of SES and parents' (especially mother) educational levels. SES was classified as low, medium and high. Educational levels of parents were defined as illiterate, literate, elementary school, middle school, high school, university and postgraduate and no statistical significance was found (p=1.000, p=0.754, p=0.218) (Table 1, 2).

Patients who were diagnosed as ADHD were significantly higher in the trauma group (p=0.025) but no statistical significance was found for any subgroups of ADHD, ODD and CD by the CPRS or SDQ at the initial evaluations (Table 5, 6).

Nineteen patients (31.7%) whose scores were higher than the cut-off value with CPRS and SDQ were examined by the Child

		Trauma	Non-trauma	p value ¹
Former trauma history	No	24 (40.0%)	18 (30.0%)	0.159
	Yes	6 (10.0%)	12 (20.0%)	-
Patients' psychiatric medical history	No	30 (50.0%)	30 (50.0%)	1.000
	Yes (ADHD)	0 (0.0%)	0 (0.0%)	-
	Yes (other)	0 (0.0%)	0 (0.0%)	-
Familial psychiatric medical history	No	26 (43.3%)	28 (46.7%)	0.671
	Yes	4 (6.7%)	2 (3.3%)	-
Socio-economic status	Low	0 (0.0%)	0 (0.0%)	1.000
	Medium	24 (40.0%)	23 (38.3%)	-
	High	6 (10.0%)	7 (11.7%)	-
Mother's educational level	No literate	0 (0.0%)	0 (0.0%)	0.754
	Literate	1 (1.7%)	0 (0.0%)	-
	Elementary school	11 (18.3%)	11 (18.3%)	-
	Middle school	4 (6.7%)	6 (10.0%)	-
	High school	10 (16.7%)	11 (18.3%)	-
	University	3 (5.0%)	2 (3.3%)	-
	Postgraduate	1 (1.7%)	0 (0.0%)	-
Father's educational level	No literate	0 (0.0%)	0 (0.0%)	0.218
	Literate	0 (0.0%)	0 (0.0%)	-
	Elementary school	11 (18.3%)	10 (16.7%)	-
	Middle school	4 (6.7%)	3 (5.0%)	-
	High school	6 (10.0%)	11 (18.3%)	-
	University	5 (8.3%)	6 (10.0%)	-
	Postgraduate	4 (6.7%)	0	-

¹: Chi-square test, ADHD: Attention deficit hyperactivity disorder

and Adolescent Psychiatry Department of Medical Faculty Hospital of Trakya University with clinical assessment and "K-SADS-PL". After final evaluations, 11 patients (18.3%) were diagnosed as ADHD. Patients who were diagnosed as ADHD were significantly higher in the trauma group (p=0.042), but no statistical significance was found for any subgroups of ADHD, OD and CD (Table 7). Also, based on Chou et al.² and Hurtig et al.¹² studies, results were examined by the cut-off value of

7 and the age of 12 years and no statistical significance was found (Table 8).

DISCUSSION

Several studies have tried to determine the relationship between ADHD and unintentional injuries in children^{1-3,5,6}. Increased risk due to ADHD was controversial but the risk was statistically higher and there is consensus in the literature¹³⁻¹⁶. Chen et al.¹⁷ concluded that treatment longer than 6 months was associated with a lower risk for fracture among ADHD patients, but the overall risk is still higher than in the healthy population¹⁸ and ADHD treatment does not result in a decrease in the frequency of hospitalization¹⁹.

Brehaut et al.¹⁶ reported that children with behavioral disorders had 1.5 times higher risk of injury compared to those without such disorders. A meta-analysis by Ruiz-Goikoetxea et al.¹³ indicated a significantly higher risk of injuries in ADHD compared to children or adolescents without ADHD [odds ratio (OR): 1.53]. In another study of Maxson et al.¹⁴, they investigated 6 to 12-year-old children who were admitted to the medical center for the treatment of an injury and appendicitis; the injured patient group was 3.25 times more likely to be positive for ADHD than appendicitis group. In another meta-analysis of 35 studies in children by Amiri et al.¹⁵, it was concluded that ADHD patients were injured nearly two times more than others (OR: 1.96). In our study, we calculated the OR as 4.35 at the first evaluation [OR: 4.35, 95% confidence interval (CI): 1.320-14.504] and as 6 (OR: 6, 95% CI: 1.172-30.725) at the final evaluation, which was higher compared to the literature but we concluded that the final evaluation by child and adolescent department eliminated the false-positive results in the non-trauma group and it is important. Also, in our study, no significance was found for any subgroups of ADHD or ODD and patients who diagnosed as ADHD were significantly higher in the trauma group (p=0.042). In discordance with our study,

Table 3. Trauma group

Upper extremity	18
Shoulder contusion	1
Elbow contusion	3
Wrist contusion	5
Distal radius fracture	4
Phalanx contusion	3
Phalanx fracture of hand	2
Lower extremity	12
Knee contusion	2
Ankle contusion	6
Foot contusion	3
Phalanx fracture of foot	1
Total	30

Table 4. Non-trauma group

Posture disorder	6
Pes planovalgus	5
Osgood Schlatter disease	4
Scoliosis	4
Severe disease	3
Gait disturbance	3
Mass in soft tissue	3
Mass in bone	2
Total	30

Table 5. Results of Conner's parent rating scale

		Trauma	Non-trauma	p value ¹
Type 1 ADHD (inattentive type)	Healthy	23 (38.3%)	28 (46.7%)	0.145
	Risky	7 (11.7%)	2 (3.3%)	-
Type 2 ADHD (hyperactive-impulsive type)	Healthy	25 (41.7%)	28 (46.7%)	0.424
	Risky	5 (8.3%)	2 (3.3%)	-
Type 3 ADHD (combined type)	Healthy	28 (46.7%)	29 (48.3%)	1.000
	Risky	2 (3.3%)	1 (1.7%)	-
ADHD	Healthy	16 (26.7%)	25 (41.7%)	0.025
	Risky	14 (23.3%)	5 (8.3%)	-
Oppositional defiant disorder	Healthy	27 (45.0%)	29 (48.3%)	0.612
	Risky	3 (5.0%)	1 (1.7%)	-
Conduct disorder	Healthy	29 (46.7%)	30 (50.0%)	1.000
	Risky	1 (1.7%)	0 (0.0%)	-

¹: Chi-square test, ADHD: Attention deficit hyperactivity disorder

Karayağmurlu et al.²⁰ concluded that all subgroups with ADHD and ODD were significantly increased in the trauma group compared to the control group for otorhinologic trauma.

Some studies concluded that ADHD's injury risk varied by age. Chou et al.² compared 3,640 children with ADHD and 11,496 children without ADHD; no statistical significance was found for the risks of subsequent fracture in older age groups (≥12 years old), but in younger age groups (5-12 years old), ADHD group was significantly associated with increased risk of fractures compared to the non-ADHD group. In a cohort study by Hurtig et al.¹², they investigated 6,111 children who were born in 1986. The risk for hospital-treated injuries was 1.7 times higher in younger age groups (≤7 years old), which was statistically significant. Also, the ADHD group was treated more for injuries than the non-ADHD group considering older age groups, but no statistical significance was found for injuries except intoxication²¹. Contrary to these

studies, we classified our results for cut-off ages of 7 and 12 years between the groups and no statistical significance was found in any subgroups or ADHD (Table 8). Low SES status is associated with high injury rates in children²². In our study, no statistical significance was found for SES (p=1.000, Table 2).

Maxson et al.¹⁴, reported ADHD frequency as 29% in children who were admitted to emergency services due to injuries. Also our trauma group consisted of patients that were directed by the emergency service and our ADHD frequency was found to be 30%, which is similar with that study.

In our study, we calculated the OR as 4.35 at the first evaluation (OR: 4.35, 95% CI: 1.320-14.504) and as 6 (OR: 6, 95% CI: 1.172-30.725) at the final evaluation, which is a higher value compared to the literature. In discordance with Chou et al.² and Hurtig et al.¹² studies, we classified our results for cut-off

Table 6. Results of Strength and Difficulties Questionnaire

		Trauma	Non-trauma	p value
Hyperactivity/inattention	Normal	10 (16.7%)	7 (11.7%)	0.457 ¹
	Borderline	6 (10.0%)	10 (16.7%)	-
	Abnormal	14 (23.3%)	13 (21.7%)	-
Conduct problems	Normal	14 (23.3%)	16 (26.7%)	0.274 ¹
	Borderline	9 (15.0%)	4 (6.7%)	-
	Abnormal	7 (11.7%)	10 (16.7%)	-
Emotional symptoms	Normal	17 (28.3%)	17 (28.3%)	0.734 ¹
	Borderline	7 (11.7%)	5 (8.3%)	-
	Abnormal	6 (10.0%)	8 (13.3%)	-
Peer relationship problems	Normal	0 (0.0%)	1 (1.7%)	1.000 ¹
	Borderline	0 (0.0%)	0 (0.0%)	-
	Abnormal	30 (50.0%)	29 (48.3%)	-
Score	Mean	18.17	18.30	0.920 ²
	SD ³	5.12	5.13	-

¹: Chi-square test, ²: Student's t-test, ³: Standard deviation

Table 7. Final evaluation

		Trauma	Non-trauma	p value ¹
Type 1 ADHD (inattentive type)	Healthy Diagnosed	25 (41.7%) 5 (8.3%)	29 (48.3%) 1 (1.7%)	0.195 -
Type 2 ADHD (hyperactive-impulsive type)	Healthy Diagnosed	27 (45.0%) 3 (5.0%)	29 (48.3%) 1 (1.7%)	0.612 -
Type 3 ADHD (combined type)	Healthy Diagnosed	29 (48.3%) 1 (1.7%)	30 (50.0%) 0 (0.0%)	1.000 -
ADHD	Healthy Diagnosed	21 (35.0%) 9 (15.0%)	28 (46.7%) 2 (3.3%)	0.042 -
Oppositional defiant disorder	Healthy Diagnosed	30 (50.0%) 0 (0.0%)	30 (50.0%) 0 (0.0%)	1.000 -
Conduct disorder	Healthy Diagnosed	30 (50.0%) 0 (0.0%)	30 (50.0%) 0 (0.0%)	1.000 -

¹: Chi-square test, ADHD: Attention deficit hyperactivity disorder

Table 8. Final evaluation with age

		Trauma	Non-trauma	p value ¹
Type 1 ADHD (inattentive type)	≤7 ² years old	2/7 (28.6%)	0/8 (0.0%)	0.492
	>7 years old	3/23 (13.0%)	1/22 (4.5%)	0.612
	≤12 ³ years old	2/18 (11.1%)	1/20 (5.0%)	1.000
	>12 years old	3/12 (25.0%)	0/10 (0.0%)	0.237
Type 2 ADHD (hyperactive-impulsive type)	≤7 years old	1/7 (14.3%)	0/8 (0.0%)	1.000
	>7 years old	2/23 (8.7%)	1/22 (4.5%)	1.000
	≤12 years old	2/18 (11.1%)	2/20 (10.0%)	1.000
	>12 years old	1/12 (8.3%)	0/10 (0.0%)	1.000
Type 3 ADHD (combined type)	≤7 years old	0/7 (0.0%)	0/8 (0.0%)	1.000
	>7 years old	1/23 (4.3%)	0/22 (0.0%)	1.000
	≤12 years old	1/18 (5.6%)	0/20 (0.0%)	1.000
	>12 years old	0/12 (0.0%)	0/10 (0.0%)	1.000
ADHD	≤7 years old	3/7 (42.9%)	1/8 (12.5%)	0.612
	>7 years old	6/23 (26.1%)	1/22 (4.5%)	0.470
	≤12 years old	5/18 (27.8%)	2/20 (10.0%)	0.424
	>12 years old	4/12 (33.4%)	0/10 (0.0%)	0.112

¹: Chi-square test, ²: Cut-off value in Hurtig et al.¹¹ study, ³: Cut-off value in Chou et al.² study, ADHD: Attention deficit hyperactivity disorder

ages of 7 and 12 years between the groups and no statistical significance was found in any subgroups or ADHD (Table 7). In discordance with Karayağmurlu et al.²⁰ study, no statistical significance was found for any subgroups of ADHD or ODD at the first and final evaluations.

Study Limitations

Pediatric extremity injuries, which have an important place in the daily routine of orthopedic outpatient clinics, affect the functionality of not only the child but the whole family, and it is especially important to evaluate recurrent extremity injuries in terms of etiology. In the planning phase of our study, our aim was to detect ADHD cases, which we considered as one of the possible causes of extremity injuries, to provide access to treatment and to prevent recurrence of extremity injuries. For this reason, the group that we considered as risky in terms of ADHD diagnosis in our study was determined as pediatric extremity injuries. The cases that were found to be at risk according to one of the two scales which we used for screening in our study were referred to the child and adolescent psychiatry outpatient clinic and these cases were evaluated with clinical interview and K-SADS application.

One of the important limitations of our study was that clinical interview and K-SADS could not be applied to each patient. The reason for this was that polyclinic working conditions were unfavorable for applying K-SADS to every patient due to the density. And the motivation of the pediatric patient group with orthopedic injuries and their parents for clinical interviews was insufficient. Another important limitation of our study was that only ADHD, CD and ODD diagnoses were evaluated due to the low number of patients who underwent K-SADS.

CONCLUSION

In the current study, we found that ADHD was diagnosed significantly higher in the trauma group, which is in concordance with the vast majority of literature. ADHD is also associated with a significantly increased risk of unintentional injuries^{1-3,5,6}. Detection of the high-risk group in children examined for different types of traumas and referral of them directly to psychiatric evaluation are essential for the prevention of possible extremity injuries and for early diagnosis of ADHD.

Ethics

Ethics Committee Approval: The study was approved by the Institutional Medical Ethics Committee of the Medical Faculty Hospital of Trakya University (protocol no: TÜTF-BAEK 2018/226).

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: İ.G.Ş., Z.A.Ş., L.B., Concept: İ.G.Ş., L.B., I.G., Design: I.G., Z.A.Ş., L.B., Data Collection or Processing: İ.G.Ş., Z.A.Ş., Analysis or Interpretation: İ.G.Ş., Literature Search: I.G., Z.A.Ş., L.B., Writing: İ.G.Ş., Z.A.Ş., L.B.

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References

1. Uslu M, Uslu R, Eksioğlu F, Ozen NE. Children with fractures show higher levels of impulsive-hyperactive behavior. *Clin Orthop Relat Res*. 2007;460:192-5.
2. Chou IC, Lin CC, Sung FC, Kao CH. Attention-deficit-hyperactivity disorder increases risk of bone fracture: a population-based cohort study. *Dev Med Child Neurol*. 2014;56:1111-6.
3. Ozer K, Gillani S, Williams A, Hak DJ. Psychiatric risk factors in pediatric hand fractures. *J Pediatr Orthop*. 2010;30:324-7.
4. Castellanos FX, Giedd JN, Berquin PC, Walter JM, Sharp W, Tran T, et al. Quantitative brain magnetic resonance imaging in girls with attention-deficit/hyperactivity disorder. *Arch Gen Psychiatry*. 2001;58:289-95.
5. Faraone SV, Larsson H. Genetics of attention deficit hyperactivity disorder. *Mol Psychiatry*. 2019;24:562-75.
6. Centers for Disease Control and Prevention. Mental health in the United States: prevalence of diagnosis and medication treatment for attention-deficit/hyperactivity disorder. United States, 2003. *MMWR*. 2005;54:842-7.
7. Feldman ME, Charach A, Bélanger SA. ADHD in children and youth: Part 2-Treatment. *Paediatr Child Health*. 2018;23:462-72.
8. Conners CK, Sitarenios G, Parker JD, Epstein JN. The revised Conners' Parent Rating Scale (CPRS-R): factor structure, reliability, and criterion validity. *J Abnorm Child Psychol*. 1998;26:257-68.
9. Kaner S, Buyukozturk S, Iseri E. Conners Parent Rating Scale-Revised Short: Turkish Standardization Study. *Archives of Neuropsychiatry*. 2013;50:100-9.
10. Güvenir T, Özbek A, Baykara B, Arkar H, Sentürk B, Incekas S. Psychometric Properties Of The Turkish Version Of The Strengths And Difficulties Questionnaire, Çocuk ve Gençlik Ruh Sağlığı Dergisi. 2008;15:65-74.
11. Campbell J, Alqhatani A, McRae L, Kissoon N, Doan Q. Body mass index and the odds of acute injury in children. *Pediatr Emerg Care*. 2013;29:21-5.
12. Hurtig T, Ebeling H, Jokelainen J, Koivumaa-Honkanen H, Taanila A. The Association Between Hospital-Treated Injuries and ADHD Symptoms in Childhood and Adolescence: A Follow-Up Study in the Northern Finland Birth Cohort 1986. *J Atten Disord*. 2016;20:3-10.
13. Ruiz-Goikoetxea M, Cortese S, Aznarez-Sanado M, Magallón S, Alvarez Zallo N, Luis EO, et al. Risk of unintentional injuries in children and adolescents with ADHD and the impact of ADHD medications: A systematic review and meta-analysis. *Neurosci Biobehav Rev*. 2018;84:63-71.
14. Maxson RT, Lawson KA, Pop R, Yuma-Guerrero P, Johnson KM. Screening for attention-deficit/hyperactivity disorder in a select sample of injured and uninjured pediatric patients. *J Pediatr Surg*. 2009;44:743-8.
15. Amiri S, Sadeghi-Bazargani H, Nazari S, Ranjbar F, Abdi S. Attention deficit/hyperactivity disorder and risk of injuries: A systematic review and meta-analysis. *J Inj Violence Res*. 2017;9:95-105.
16. Brehaut JC, Miller A, Raina P, McGrail KM. Childhood behavior disorders and injuries among children and youth: a population-based study. *Pediatrics*. 2003;111:262-9.
17. Chen VC, Yang YH, Liao YT, Kuo TY, Liang HY, Huang KY, et al. The association between methylphenidate treatment and the risk for fracture among young ADHD patients: a nationwide population-based study in Taiwan. *PLoS One*. 2017;12:1-11.
18. van den Ban E, Souverein P, Meijer W, van Engeland H, Swaab H, Egberts T, et al. Association between ADHD drug use and injuries among children and adolescents. *Eur Child Adolesc Psychiatry*. 2014;23:95-102.
19. Mikolajczyk R, Horn J, Schmedt N, Langner I, Lindemann C, Garbe E. Injury prevention by medication among children with attention-deficit/hyperactivity disorder: a case-only study. *JAMA Pediatr*. 2015;169:391-5.
20. Karayağmurlu A, Aytaç İ, Gülşen S. Relationship between otorhinologic trauma and Attention Deficit Hyperactivity Disorder symptoms in children. *Int J Pediatr Otorhinolaryngol*. 2019;120:89-92.
21. Gautam M, Prabhakar D. Stimulant Formulations for the Treatment of Attention-Deficit/Hyperactivity Disorder. *Prim Care Companion CNS Disord*. 2018;20:18r02345.
22. Marcin JP, Schembri MS, He J, Romano PS. A population-based analysis of socioeconomic status and insurance status and their relationship with pediatric trauma hospitalization and mortality rates. *Am J Public Health*. 2003;93:461-6.