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Socio-Demographic and Behavioral Factors Related to Unintentional Injuries in Preschool Children Diagnosed to Have Attention-Deficit/Hyperactivity Disorder

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ABSTRACT:

Socio-demographic and behavioral factors related to unintentional injuries in preschool children diagnosed to have attention-deficit/hyperactivity disorder

Objective: Unintentional injuries are a significant cause of morbidity and mortality in preschool children. The purpose of this study was to investigate the factors related to unintentional injuries in preschool children diagnosed to have attention-deficit/hyperactivity disorder (ADHD).

Method: This study included 237 preschool children diagnosed to have ADHD, aged 4–5 years, recruited from a child psychiatry outpatient clinic. Diagnoses of ADHD in the children were made by child psychiatrists, according to DSM-IV criteria. A form developed by the researchers was completed by receiving information from parents regarding unintentional injury histories of the children, their socio-demographic information, and a family history of psychiatric disorders, developmental problems, and the presence of chronic health conditions. Behavioral problems of the children were assessed using the Child Behavior Checklist/4-18 (CBCL).

Results: Of the preschool children diagnosed to have ADHD examined in this study, 19.8% (n=47) had unintentional injuries; 17% (n=8) of the children who experienced unintentional injuries had multiple unintentional injuries; 68.1% of accidents occurred at home and 32.9% occurred outside of the home. The regression analysis conducted in this research revealed that male gender, higher CBCL externalizing scores, and separation of parents were associated with unintentional injuries in preschool children diagnosed to have ADHD.

Conclusions: The results of this study indicate that prevention activities for unintentional injuries in children with ADHD should be initiated in the preschool period. Early implementation of protective measures regarding accidents may provide benefits for preschool children diagnosed to have ADHD that extend into adolescence and adulthood.

Keywords: injury, preschool children, attention-deficit/hyperactivity disorder

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INTRODUCTION

Unintentional injuries in preschool children are a serious cause of mortality and morbidity[1]. Unintentional injuries may result in mental and physical effects on children, which may last for a lifetime[2,3].

Because motor skills of children are not developed sufficiently during the preschool period, and children have curious and impulsive characteristics, they are prone to unintentional injuries[1]. In studies conducted with preschool children, it has been determined that low socio-economic status[4-6] and male gender[4,7] were related to unintentional injury.

Attention-deficit/hyperactivity disorder (ADHD) is a frequent neuropsychiatric disorder in children[8]. Numerous studies have suggested that

children diagnosed to have ADHD experience unintentional injuries more frequently[9-13]. Although ADHD is most typically diagnosed during the primary school years, there is an increasing tendency for it to be identified in preschoolers[14]. In a limited number of studies, it has been specified that the risk of experiencing an unintentional injury was higher in preschool children diagnosed to have ADHD than preschool children without ADHD[15,16].

Although ADHD affects children from every age group, problems related to establishing diagnoses make studies conducted during the preschool period more difficult. Therefore, the relationship between ADHD and unintentional injury, which has been better studied in older age groups, has not been studied sufficiently in the preschool age group. The purpose of this study was to investigate socio-demographic characteristics, behavioral problems, developmental problems, and chronic health conditions associated with unintentional injuries in preschool children with ADHD.

METHODS

This study was conducted in the Child and Adolescent Psychiatry Clinic at the Sakarya University Training and Research Hospital in Sakarya, Turkey. The study protocol was approved by the Sakarya University Medical Faculty Ethics Committee (71522473.050.01.04/108).

This study included 241 children, aged 4-5 years, who were diagnosed to have attention-deficit/hyperactivity disorder (ADHD) for the first time between 2010 and 2013. Children with a pervasive developmental disorder diagnosis were not included in the study; four children who had injuries due to in-vehicle traffic accidents were excluded from the study. The study group was composed of 47 children, who experienced unintentional injuries, whereas the control group consisted of 190 children who did not experience unintentional injuries.

A form developed by the researchers was completed by receiving information from parents regarding unintentional injury histories of the children, their socio-demographic information, and a family history of psychiatric disorders, developmental problems, and the presence of chronic health conditions. Developmental delay was considered as delay in acquiring basic skills of walking (>15 months) or speaking (words>18 months or sentences>30 months) which was reported by the parents. The educational levels of the parents were classified as low (illiterate, primary, or secondary school graduate) or high (high school or university graduate). Fractures, soft tissue traumas leaving scar tissue, burning, poisoning, and all traumas that required hospitalization, were defined as unintentional injuries. Accidents, such as scratches and sprains that did not require hospitalization, were excluded from the definition of unintentional injury because reliable data regarding these accidents was unavailable.

Diagnoses of ADHD in the children were determined by child psychiatrists according to DSM-IV criteria[17]. In the diagnostic process of ADHD, the clinical observations of the child psychiatrist, information from the parents, and Child Behavior Checklist/4-18 (CBCL) scores were used. In order to evaluate the behavioral problems of the children, the CBCL was applied to one of the parents. The CBCL was developed by Achenbach and Edenbrock18. The CBCL yields two behavioral symptom scores, i.e., internalizing problems and externalizing problems. The internalizing score is obtained by summing the withdrawn/depressed, somatic complaints, and anxious/depressed subscale scores, whereas the externalizing score is based on the sum of the delinquent behavior and aggressive behavior subscale scores. In addition to internalizing and externalizing symptoms, the scale also assesses social problems, thought problems, sexual problems, and attention problems. The sum of these subscale scores yields an overall problem score.

Data were analyzed using SPSS v.17.0 for Windows (SPSS, Inc. Chicago, IL). While a chi-square test was used for comparison of categorical data, the t test was used to compare continuous data. Binary logistic regression analysis was

performed to identify predictors associated with unintentional injury. Socio-demographic variables (male gender, low educational level of the mother, low educational level of the father, and separation of parents), and CBCL subscale scores (internalizing problems, externalizing behavior, and the inattention subscale) for which statistically significant differences existed between groups, were included in the model. The results were presented as an odds ratio with a confidence interval of 95%. The level of statistical significance was accepted as $p \leq 0.05$.

RESULTS

Of the preschool children diagnosed to have attention-deficit/hyperactivity disorder (ADHD) examined in this study, 19.8% (n=47) had unintentional injuries. Additionally, 17% (n=8) of the children who experienced unintentional injuries had multiple unintentional injuries. While 68.1% of accidents occurred at home, 32.9% occurred outside the home. The types of unintentional injuries observed in this study are listed in Table 1.

Table 1: Frequency of unintentional injuries (n= 47)

Types of unintentional injuries	n	%
Multiple injuries	8	17.0
Fractures	18	38.3
Soft tissue traumas	14	29.8
Burns	6	12.8
Poisoning	5	10.6
Blunt traumas	4	8.5
Head traumas	4	8.5
Other traumas	5	10.6

The socio-demographic characteristics of the children in the study were compared (Table 2). The characteristics found to be higher in the unintentional injury group compared to the control group included: male gender, a low educational level of the mother, a low educational level of the father, and separation of the parents. No statistically significant differences were found between the two groups in terms of a family history of psychiatric disorders, the presence of siblings, chronic health conditions or developmental problems.

The Child Behavior Checklist/4-18 (CBCL) scores were compared between groups (Table 3). In the unintentional injury group, the CBCL scores for overall problems, externalizing problems, internalizing problems, somatic complaints, anxious/depressed, attention problems, and delinquent and aggressive behavior were found to be higher than the control group. No statistically significant differences were found between the two groups in terms of scores for withdrawn/depressed, thought problems, social problems, or sexual problems.

Within the logistic regression analysis conducted for specifying the factors related to unintentional injury; it was determined that male gender, separation of the parents, and scores for CBCL externalizing problems were related to

Table 2: Comparison between the group exhibiting unintentional injuries and the control group in terms of socio-demographic characteristics

	Unintentional injury group (n=47)	Control group (n=190)	χ^2	p*
Age group				
4	20 (42.6%)	94 (49.5%)	0.723	0.395
5	27 (57.4%)	96 (50.5%)		
Male Gender	43 (91.5%)	142 (74.7%)	6.174	**0.013**
Developmental delay	37 (19.5%)	11 (23.4%)	0.360	0.548
Chronic health conditions	27 (14.2%)	5 (10.6%)	0.412	0.521
Low educational level of the mother	36 (76.6%)	107 (56.3%)	6.475	**0.011**
Low educational level of the father	30 (63.8%)	87 (45.8%)	4.906	**0.027**
Togetherness of parents	41(87.2%)	183 (96.3%)	5.994	**0.014**
Presence of a sibling(s)	35 (74.5%)	124 (65.3%)	1.446	0.229
Family history of psychiatric disorders	12 (25.5%)	30 (15.8%)	2.453	0.117

*significant comparisons are denoted in bold font

Table 3: Comparison between the group exhibiting unintentional injuries and the control group in terms of CBCL scores

	Unintentional injury group	Control group	χ^2	p*
Withdrawn/depressed	59.85±9.13	58.81±8.16	-0.768	0.473
Somatic complaints	59.02±7.61	56.59±7.01	-2.092	**0.038**
Anxious/depressed	66.15±8.35	62.38±8.32	-2.779	**0.006**
Social problems	61.62±6.31	59.67±8.19	-1.518	0.130
Thought problems	66.17±7.84	63.97±8.99	-1.540	0.125
Attention problems	67.21±5.86	64.39±7.14	-2.508	**0.013**
Delinquent behavior	68.66±7.71	61.62±9.09	-4.891	**<0.001**
Aggressive behavior	73.27±10.19	65.98±10.38	-4.327	**<0.001**
Sexual problems	60.21±11.78	57.65±10.12	-1.504	0.134
Internalizing problems	65.21±8.50	60.95±9.71	-2.760	**0.006**
Externalizing problems	71.17±6.96	64.29±10.16	-4.388	**<0.001**
Overall problems	71.51±5.45	66.05 ±8.77	-4.071	**<0.001**

CBCL: Child Behavior Checklist/4-18, *significant comparisons are denoted in bold font

Table 4: Variables associated with unintentional injuries in preschool children diagnosed to have ADHD

	OR	95% CI	p*
Male gender	3.656	1.138-11.742	0.029
Low educational level of the father	1.543	0.725-3.281	0.260
Low educational level of the mother	1.957	0.855-4.480	0.112
Togetherness of parents	0.185	0.049-0.705	0.013
CBCL externalizing score	1.082	1.025-1.142	0.005
CBCL internalizing score	1.010	0.964-1.058	0.682
CBCL inattention score	1.027	0.960-1.099	0.436

ADHD: Attention-deficit/hyperactivity disorder, CBCL: Child Behavior Checklist/4-18, OR: odds ratio, 95% CI: 95% confidence interval.
*significant comparisons are denoted in bold font

unintentional injury in children diagnosed to have ADHD. No statistically significant differences were found in terms of a low educational level of the mother, a low educational level of the father, or CBCL internalizing problems (Table 4).

DISCUSSION

In this study, preschool children diagnosed to have ADHD were divided into those who experienced unintentional injuries and those who did not experience unintentional injuries, and these groups were compared in terms of behavioral problems, developmental problems, chronic health conditions, and socio-demographic characteristics. The factors associated with unintentional injuries were investigated.

As is in other age groups, it has been reported that mortality and morbidity caused by unintentional injury are frequent among preschool children[1]. Of the children included in this study, 19.8% experienced unintentional injuries. In a study conducted in children younger than 5 years in Turkey, the rate of unintentional injury was 12.6%[4]. Although in our study children diagnosed to have ADHD were not compared to peers, ADHD may have contributed to a higher rate of unintentional injuries.

The risk of unintentional injury is reportedly higher in boys compared to girls in preschool children[6,7]. In preschool children with a diagnosis of ADHD, insufficient information exists regarding the effect of gender on unintentional injuries. The results of this study related to gender support the opinion asserted in previous studies that boys have a higher risk of experiencing unintentional injuries in children and adolescents with ADHD[9,10,11,19,20].

In studies conducted primarily in children older than 6 years, and in adolescents, it was determined that among children diagnosed to have ADHD, the existence of comorbid mental or

behavioral problems was related to an increase in unintentional injury risk[9,13,21]. Additionally, it was also reported that aggressive behavior and unintentional injury were related in preschool and school age children[5,22,23]. The observation of high levels of externalizing behavior problems, including aggressive behaviors, was related to having experienced unintentional injuries in this study; therefore, externalizing behavioral problems appears to increase the risk of unintentional injury during the preschool period. In the multivariate analyses in this study, although no relationship was determined between internalizing problems and unintentional injuries, internalizing problems, somatic complaints and anxious/depressed problems were found to be higher in the unintentional injury group. The increased scores for these problems may have resulted from the traumatic effects of the unintentional injuries experienced. Further studies are required to investigate this relationship.

In this study, it was determined that the presence of chronic health conditions and developmental problems in children were not related with unintentional injury. Upon literature review, limited information regarding the relationship between chronic health conditions and developmental characteristics of children with unintentional injuries was found. Extra surveillance by parents purportedly may protect children with chronic health conditions from unintentional injuries[12]. However, in this study, the data concerning the surveillance by the parents and the environmental characteristics of the children are insufficient, making it difficult to comment on this subject.

Results of studies conducted on the relationship between the togetherness of the parents and unintentional injuries in children are conflicting. Laursen and Nielsen[24] reported that the togetherness of the parents is not effective in preventing unintentional childhood home injuries, while Readling et al.[25] reported that single parenthood was associated with severe unintentional injuries in preschool children. In this study, severe unintentional injuries were assessed, and similarly it was determined that single parenthood was associated with unintentional injuries in preschool children diagnosed with ADHD. Low educational levels of the parents and low socioeconomic levels were reported to increase the risk of unintentional injuries in preschool children[5,24,26]. Although the educational level of the parents was not related with unintentional injury in the multivariate analysis in this study, the fact that the educational level of the parents in children experiencing unintentional injury was lower compared to the control group in comparison tests was thought to be important in terms of unintentional injury. Although the family history of psychiatric disorders was investigated in this study, parental history of ADHD was not evaluated specifically. Further studies are needed for the effects of parental ADHD on child supervision and unintentional injuries.

Raman et al.[27] and van den Ban et al.[13] have asserted that treatment might decrease the risk of accidents in children diagnosed to have ADHD. However, the effects of ADHD treatments on unintentional injuries have not been clarified sufficiently. Additionally, effects of evaluation and treatment during early childhood development on the risk of unintentional injury in adolescence and adulthood are not known. However, it is believed that despite limited evidence, treatments might have positive effects on decreasing the risk of unintentional injuries. Early implementation of protective measures regarding accidents may provide benefits for preschool children with ADHD that extends into adolescence and adulthood.

Parents, caregivers, and educators must be informed regarding frequent unintentional injuries in preschool children with ADHD. Morbidity and mortality arising from unintentional injuries can be significantly decreased through appropriate measures and necessary precautions. Proper risk evaluation, education, and environmental modification may decrease mortality and morbidity risks related to

unintentional injuries in preschool children with ADHD.

The results of this study should be evaluated by taking some limitations into consideration. Due to problems with health records, unintentional injury histories were elicited only from parental reports, which might result in recall biases. The sample group consisted of children and adolescents applying to a child psychiatry clinic, and did not represent a random sample of the community. The absence of a healthy control group, evaluation of limited environmental factors regarding accidents, the failure to investigate different factors related to different unintentional injury types limited by the small size of the sample group, and the failure to determine the developmental levels of children through testing, were also limitations of this present. It is known that traumas, especially head traumas, have a bidirectional relationship with ADHD[28,29]. ADHD symptoms, other psychiatric symptoms, and behavioral problems arising from traumas in children were not examined in this study.

CONCLUSIONS

In the present study, it was determined that factors such as male gender, externalizing behavioral problems, and separation of the parents were associated with unintentional injuries in preschool children with attention-deficit/hyperactivity disorder (ADHD). The results of the present study emphasize the fact that in preschool children with ADHD, there might be signs heralding severe injuries, which may lead to morbidity.

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