

Accident Injuries and Related Factors in Iranian Adolescent Girls

Farzaneh Mobasheri¹, PhD candidate;
Gholamhossein Shahraki², PhD;
Roksana Estakhrian Haghighi³, BS;
Mohammad Fararouei⁴, PhD

¹School of Health and Research Center for Health Sciences, Shiraz University of Medical Science, Shiraz, Iran

²Social Determinants of Health Research Center, Yasuj University of Medical Sciences, Shiraz, Iran

³Namazi Hospital, Shiraz University of Medical Science, Shiraz, Iran

⁴HIV/AIDS Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Correspondence:

Mohammad Fararouei, PhD;
HIV/AIDS Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Tel: +98 9357736583

Fax: +98 71 37251001

Email: fararouei@gmail.com

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Abstract

Background: The incidence of accidents, its types and leading causes are largely varied in different communities and within different ages. This survey investigated the incidence and types of injury after accidents in adolescent girls with regard to the parents' socio-economic status, schooling and health-related behaviors.

Methods: This cross-sectional study was conducted among 8159 high school girl aged 11-19 years, using a self-administered questionnaire. Demographic information, parents' socio-economic status, schooling and health-related behaviors, any accident causing the student to seek medical care during the year before the time of completing the questionnaire, the place, the cause and the body area injured in the accident were asked by single item scales.

Results: The annual incidence of injury was about 4.4%. Of the total accidents, the most common type was car accident (45%). The most common affected body sites were legs (25.7%) and hands (18.7%); the most common place besides streets (31%) where the accidents happened was home (19%). Multivariate logistic regression revealed higher chances of injury among urban residences, those with lower school grades, those exposed to second-hand tobacco smoke, and those who spend more time with friends ($P < 0.05$ for all).

Conclusion: The findings suggested that accidents among adolescent girls are affected by different aspects of life, most of which being modifiable. Most accidents can be prevented if appropriate strategies and intervention programs are applied. For example, providing safer streets, homes and environment and public education are possibly the most effective measures.

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Introduction

Accidents and disabilities resulting from them are among the major public health concerns in the world with a growing number in some countries. In fact, a large number of individuals have experienced at least one significant injury during their life.¹ As a result, every year, more than 5 million people die as a result of injury globally.² In addition, for every death due to injury, about 16 cases are admitted to hospitals due to the severity of

their injury and 400 patients require outpatient medical services, some with transient or long lasting activity limitations.³ Injuries also cause considerable loss in the family and public funds.²

An important feature of the epidemiology of accidents and their resultant impairments is the age of the victims.⁴ Although accidents affect all age groups, adolescents experience the highest rate of accidents.⁵ Accidents have a particular impact on younger and older age groups.²

From the public health perspective, the increasing deaths and injuries among young people are serious issues, not only because of the individuals suffering itself, but also because of the pressure on economic growth and public welfare due to the burden of the injuries and declining future workforces.⁶

In recent decades, the highest decline in accidents has been achieved in high-income countries, by applying community-based proven prevention strategies. On the other hand, deaths due to accidents are being steadily increased in many low- and middle-income countries. In the Eastern Mediterranean region, death rates after injuries in low- and middle-income countries are nearly three times that of high income countries.² Nevertheless, few studies have been conducted on the cause and risk factors associated with accidents in these countries.²

As more governments around the world come to recognize that injuries can and must be prevented, many are trying to control the problem and its related factors in their population via designing, implementing and monitoring prevention strategies. However, examining potential prevention strategies in adolescent, we need a good understanding of the extent and features of the problem (epidemiology of accidents) and its related factors. In Iran, the rate of accidents is exceptionally high; yet, a big gap exists in understanding the extent of accidents and the contributing factors among different types of people. As a result, understanding the rate and determinants of accidents among Iranian population is important to be done before accident reduction policy and intervention programs are introduced. In fact, the first step in preventing accidents is to provide and use data to understand the risk and nature of the accidents in different parts of a community and to identify the factors contributing to injuries.² Many studies by Iranian researchers have focused only on car accidents.⁷⁻⁹ Although few studies are conducted on accidents among young individuals, they were especially interested in the patterns of sport injuries with relatively small and non-population-based samples. These studies were also mostly conducted on a particular group, especially young males and focused on injuries in specific body parts.¹⁰⁻¹⁵ However, no study evaluated the pattern of accidents among adolescent girls using a population representative sample. This study was performed to define the rate, nature, and associated factors of accidents and its resulting injuries in Iranian adolescent girls.

Methods

Participants and Procedures

This cross-sectional study was conducted in Kohgiluyeh and Boyer-Ahmad province, which is a

small province located at the middle-south of Iran with seven counties and a population of about 713000. Yasuj is the capital of Kohgiluyeh and Boyer-Ahmad province. This study was conducted to estimate the incidence of accidents and its associated factors among adolescent females, using a self-administered questionnaire. In Iran, any activity involving research in educational fields has to be authorized and supervised by the provincial office of the Ministry of Education. After approval was obtained, a letter from the office was sent to all girls' high schools to introduce the trained local interviewers to the schools' principals with a sample of the questionnaire. Parents' consent for the student's participation in the study was obtained by the principals who sent the consent forms to the students' parents/care givers. In addition to parental consent, only students who were willing to participate were interviewed. This study was approved and supervised by Yasuj University of Medical Sciences Research Committee.

Measures

Any accident causing the student to seek medical care during the year before the time of completing the questionnaire was reported by the students. Also, questions regarding the place and the cause of accident and the body organ that was injured were asked. Frequency of fruit and vegetable consumption and physical activity were measured by single item scales similar to those used by Janssen et al.¹⁶ Demographic information including parents' job and education, place of residency and number of siblings as well as the last grade's school score was obtained from the student's school files. Height and weight were self-reported by the participants. The reported measures were thought to be correct as at the beginning of the current grade, weight and height were measured for each student as a routine procedure.

Data Collection

A brief explanation was provided by a local trained staff and a self-administered questionnaire was distributed among the volunteer female high school students aged 11–19 years old. The questionnaire was designed by a team of an epidemiologist, a public health nurse and a physician. The reliability of the questionnaire was measured using test-retest analysis on 50 samples (Cronbach's alpha=0.71). The methods of the present study including the procedures of making and evaluating the questionnaire were described before.¹⁷ Demographic and educational information, as well as data regarding interested behaviors was provided by the students anonymously.

Sampling

About 9867 high school girls were registered in 67 schools of the province of Kohgiluyeh and

Boyerahmad. Of the registered students, 8159 (82.7%) returned the questionnaire; the rest were either absent on the day that the questionnaire was distributed or did not participate. A post-hoc power analysis suggested that the sample size was adequate for finding a significant OR as much as 1.7 when investigating the association of parents level of education (our main explanatory variable) with the risk of accident in the year prior to the time of interview.

Data Analysis

Simple logistic regression was used to assess the unadjusted associations of the incidence of injury during the last year with the explanatory variables. Multiple logistic regression was used to control for the effect of potential confounding factors. The final model was built with covariates which had a significant effect on the goodness of fitness of the model. The variables used in the final model included student's grade point average for the last educational year, place of residency, mother's and father's level of education, place of residency (rural/urban), existence of any chronic disease, physical activity, exposure to second-hand tobacco smoke, daily fruit consumption, and leisure time activities.

Data were analyzed using SPSS software, version 19.0 (SPSS, Chicago, Illinois).

Results

The mean age of the participants was 15.95 ± 1.34 years. Approximately 4.4% of them had experienced accidents during the past year. Characteristics of the injuries are presented in Table 1. Of the estimated 358 accidents, the most common type was car accident (45%) followed by falling (15.9%). The most frequent body parts which were affected by the accidents were legs (25.7%) and hands (18.7%), and, besides streets (31%) where the accidents happened, the most common place was home (19%).

The results of univariate analysis suggested significant and inverse associations between the accident and student's last year school GPA and being residence of rural areas ($P < 0.05$ for all). However, direct associations were observed between accidents and exposure to second-hand tobacco smoke, suffering from any chronic disease, physical exercise and leisure time activities. The results also suggested that students of mothers and fathers with higher education had a higher chance of accident compared to those of illiterate parents. Compared to those who spent their leisure time with their family, those who spent time with friends or watching television experienced higher chance of accident. No significant association was found between the other factors and injury. The results of multiple regression, after controlling for the effects of other independent variables, suggested that place of residency ($OR_{\text{rural/urban}} = 0.73$, $95\%CI = 0.52-1.01$, $P = 0.050$), school scores ($OR = 0.91$, $95\%CI = 0.86-0.97$,

Table 1: Characteristics of the injuries occurred in high school girls

Characteristic	Number	Percent
Type of injury		
Car accident	161	45.0
Falling	57	15.9
Burning	18	5.0
Poisoning	12	3.4
Fight	11	3.1
Drowning	5	1.4
Other	93	26.0
Affected body site		
Leg	92	25.7
Hand	67	18.7
Body	44	12.3
Head	32	8.9
Face	22	6.1
Back	17	4.7
Neck	2	.6
Unreported	82	22.9
Place of accident		
Street	111	31.0
Home	68	19.0
School	37	10.3
*Other places	62	17.3
Unreported	80	22.3

*Including playgrounds and parks

$P = 0.025$), mothers' education ($OR_{\text{higher/illiterate}} = 1.67$, $95\%CI = 1.04-2.69$, $P = 0.033$), second hand smoking ($OR_{\text{yes/no}} = 1.51$, $95\%CI = 1.17-1.95$, $P = 0.012$) and leisure time activities ($OR_{\text{friends/family}} = 1.70$, $95\%CI = 1.18-2.47$, $P = 0.016$) were significantly associated with accident among the students (Table 2).

Discussion

This is a population-based survey on 11-19 year old female adolescents living in Yasuj province. The study aimed to estimate the incidence of accidents and its association with several demographic, behavioral and nutritional factors among the study population. Several important findings emerged from the analysis of the data. A significant rate of one year incidence of accident was observed among the study participants. Knowing that this figure represents accidents with injuries which needed medical care, we can conclude that accidents, especially car accidents, are a major health issue among Iranian adolescents. The results of the present study are hardly comparable to the findings of other studies. This is because the present study, to the best of our knowledge, is the first large population-based study on accident among adolescent girls. The previous studies mostly investigated the epidemiology of injuries among high school athletes and a wide range of factors associated with the sport-related injuries including age, gender, rules, playing time, playing surface, equipment, etc.^{8, 10, 13-15, 18, 19} Other studies assessed injuries due to violence²⁰ or no suicidal self-harmed injuries among young individuals.²¹

Table 2: Unadjusted and adjusted Odds Ratio for study accident related factors in adolescent girls

Variable	N(%)	Unadjusted OR*	CI _{95%} for OR	P value	Adjusted OR**	CI _{95%} for OR	P value
Age, years	7975(97.7)	1.01	0.94-1.10	0.72	-	-	-
Weight, Kg	7632(93.5)	1.00	0.99-1.01	0.97	-	-	-
Height, Cm	6815(83.5)	1.00	0.99-1.01	0.65	-	-	-
Sibling	8159(100)	1.01	0.96-1.05	0.73	-	-	-
School score	6836(83.8)	0.92	0.87-0.97	0.01	0.91	0.86-0.97	0.02 [†]
Place of Residency							
Urban	1913(23.4)	1.00	-	-	-	-	-
Rural	6207(76.1)	0.67	0.51-0.89	0.01	0.73	0.52-1.01	0.05 [†]
Father's education							
Illiterate	1341(16.4)	1.00	-	-	-	-	-
Primary	1774(21.7)	1.43	0.98-2.07	0.06	1.32	0.84-2.06	0.22
Secondary	1259(15.4)	1.60	1.08-2.37	0.02	1.36	0.84-2.22	0.20
High school	1626(19.9)	1.44	0.99-2.11	0.05	1.29	0.80-2.09	0.29
University	1557(92.6)	1.37	0.93-2.01	0.11	1.18	0.71-1.97	0.52
Mothers education							
Illiterate	2179(26.7)	1.00	-	-	-	-	-
Primary/ Secondary	4647(57.0)	1.31	1.00-1.71	0.05	1.16	0.82-1.64	0.38
Higher	915(11.2)	1.73	1.21-2.48	0.01	1.67	1.04-2.69	0.03
Fathers job							
Unemployed	231(2.8)	1.00	-	-	-	-	-
Employee	2467(30.2)	1.16	0.58-2.32	0.67	-	-	-
Private	4393(53.8)	1.20	0.61-2.37	0.60	-	-	-
Retired	558(6.8)	1.06	0.48-2.33	0.88	-	-	-
Mothers job							
Housekeeper	7681(94.1)	1.00	-	-	-	-	-
Employee	245(3.0)	1.04	0.56-1.92	0.91	-	-	-
Private	192(2.4)	1.34	0.72-2.49	0.35	-	-	-
Retired	41(0.5)	1.74	0.53-2.67	0.35	-	-	-
Disease							
No	7493(91.8)	1.00	-	-	-	-	-
Yes	666(8.2)	1.99	1.47-2.70	0.01	1.29	0.85-1.96	0.22
Exercise							
No	5589(68.5)	1.00	-	-	-	-	-
Sometimes	586(7.2)	1.03	0.69-1.57	0.88	0.85	0.51-1.43	0.55
Regular	1984(24.3)	1.26	0.99-1.59	0.06	1.14	0.85-1.52	0.37
Exposed to second hand smoke							
No	4991(61.2)	1.00	-	-	-	-	-
Yes	2764(33.9)	1.47	1.18-1.83	0.01	1.51	1.17-1.95	0.01 [†]
Fruit consumption							
None	132(1.6)	1.00	-	-	-	-	-
Some days of week	1933(23.7)	0.66	0.30-1.47	0.31	0.61	0.25-1.46	0.27
1-4 portion a day	4827(59.2)	0.81	0.37-1.75	0.59	0.72	0.31-1.71	0.46
More than 4 portion a day	985(12.1)	1.16	0.52-2.60	0.72	1.08	0.44-2.65	0.86
Vegetable consumption							
None	267(3.3)	1.00	-	-	-	-	-
Some days of week	2715(33.3)	0.74	0.43-1.29	0.29	-	-	-
1-4 portion a day	4303(52.7)	0.75	0.44-1.30	0.31	-	-	-
More than 4 portion a day	657(8.1)	0.83	0.44-1.57	0.57	-	-	-
Leisure time spend with							
Family	2231(27.3)	1.00	-	-	-	-	-
Friends	1850(22.7)	1.59	1.17-2.16	0.01	1.70	1.18-2.47	0.01
TV	2658(32.6)	1.39	1.04-1.87	0.02	1.61	1.13-2.28	0.01
Others	1420(17.4)	1.33	0.95-1.88	0.10	1.14	0.74-1.76	0.55

*Simple model for each variable; **including only variables with P-Value < 0.25 in simple models.

The results of the present study suggested that several factors might raise the risk of accident among adolescents. These factors include having lower scores in the last school year, having regular physical activity, being residence of urban areas, being exposed to second-hand smoke, suffering from any chronic diseases, and spending leisure time with friends.

Consistent with our results, one study carried out in several African countries suggested that compared with those in the rural areas, participants who lived in urban areas were more likely to experience accident-related injuries.²² However, another community-based study has found a higher risk of injury among rural areas dwellers compared to urban population.²³ The higher rates of injury in urban areas and rate of accidents caused by cars in our study may reflect the closeness of children and other parts of the urban population to traffic.

The results of the current study suggested higher odds of accident among the girls with mothers with higher education. This is possible that mothers with higher education were too busy to take effective care of their girls inside or outside home. In addition, the young girls of more educated mothers (consequently employed) spent more hours alone, which raise the risk of injuries. This is also possible that children of highly educated mothers have more opportunity to take part in sport activities and, therefore, are exposed to higher risk of sport-related injuries. However, it was reported that the mother's lower education can predict a significant percentage of suicidal tendency in the female adolescents.²⁴ In a previous study among injured children, no relationship was reported between the severity of injury and mother's education.²⁵ Other studies have reviewed correlation between the adolescent injury and his/her level of education, rather than mothers' education. Therefore, we can mention further and more detailed studies on the relationship between accident features and maternal education are needed.

This study suggests an inverse association between school scores and accident. Again, better score needs more study and, therefore, less time for other activities including sport and outdoor activities with friends. This reasoning may also explain the positive association between accident and leisure time with friends. These findings raise the point that having more active lifestyle may increase the risk of injuries. On the whole, the studies showed that children involved in accidents were characterized by overactive behavior and aggressive behavior.²⁶

Finally, the significant and direct association between accident-related injuries and exposure to second-hand smoke can potentially be explained by the fact that smoker parents are more negligent, even in parenting and family practices.²² This explanation

needs to be tested further especially designed studies. So far, no study has investigated the relationship between adolescent injury and exposure to second-hand smoke at home. However, several studies have indicated that exposure to second-hand smoke in the workplace is a possible factor increasing the risk of occupational injuries.^{27, 28}

Strengths and limitations: The major strength of this study was using a relatively large population-based sample of adolescent girls. In addition, the study focused on severe accidents, which needed medical care. As a result, our findings can be directly used to reduce accident-induced morbidity and mortality among adolescents. However, all accidents were self-reported by the participants. This may raise the risk of information bias as only non-fatal accidents are reported. Due to time restriction in the procedure of data collection, many important variables were not included in the questionnaire and, therefore, were not considered in the analysis. This may affect the results via confounding variables.

Conclusion and Implications

The outcomes of the current study revealed two important issues with regard to the accident among adolescent girls. Firstly, severe accidents are worryingly common among younger Iranians. Secondly, car and home-based accidents are the major causes of severe accidents. Most accidents can be prevented if appropriate strategies and interventional programs are applied. For example, providing safer streets and homes with low enforcement, environmental corrections and public education are possibly the most effective measures. However, more understanding of the mechanism of action of the causes and factors affecting accidents is needed to achieve such an important goal. As a result, further studies focusing on the evaluation of interventional programs are recommended to be designed and conducted.

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