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Original Research Article

Risk factors of injury among urban adolescent students

Shabnam Imam[1]*, Nadira Begum[1], Farhana Salim[2], Mohammed Mustafizur Rahman[3], Meherunnesa Begum[4]

[1]Department of Community Medicine, Bangladesh Medical College Hospital, Dhaka, Bangladesh
[2]Department of Community Medicine, Shaheed Monsur Ali Medical College, Dhaka, Bangladesh
[3]Department of Pathology, Popular Medical College Hospital, Dhaka, Bangladesh
[4]Department of Community Medicine, Ibn Sina Medical College, Dhaka, Bangladesh

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***Correspondence:**
Dr. Shabnam Imam,
E-mail: imamshabnam49@gmail.com

ABSTRACT

Background: Injuries are a significant public health issue and a leading cause of morbidity and mortality among adolescents. This study aimed to observe the incidence and risk factors of injury among urban adolescent students.
Methods: The study was conducted at Dhanmondi high school in Dhaka, Bangladesh, from January to June 2018. A total of 325 students were purposefully selected for the study. The prevalence of injury, the pattern of injury, the socioeconomic and demographic characteristics, and the proportion of social determinants of injury were estimated.
Results: 60% of the participants reported an injury in the last 6 months, with moderate injuries being the most common (63.59%). Seeking care was through visiting a doctor (28.72%) or hospital (33.33%). Most injuries occurred at home (33.33%) or in an institution of education (31.28%). The most common site of injury was the hand (39.49%) and the most common mode was sudden attack or fighting (28.21%). A significant association was found between injury occurrence and sex, grade of students, and age of students, but not with monthly income, education level of the father, occupation of the mother, or number of family members.
Conclusions: The most prevalent risk factors for injury were fighting, violating traffic laws, and taking risks while getting into a vehicle. These factors were also statistically significant predictors of injury occurrence. The findings suggest a need for targeted injury prevention programs to address these risk factors among urban adolescent students in Bangladesh.

Keywords: Injury, Adolescent, Urban, Student

INTRODUCTION

An injury is defined as any physical damage to the body caused by Road Traffic Accident, sudden attack, fight, fall, falling objects, sharp objects, gunshot, attack with bombs, burn (fire, hot liquids), suffocation(drowning, asphyxiation), poisoning, machine or instruments, electric shock, animals and insects bite(dog, cat, snake, bee), suicide attempts etc.[1] Injury occurs when the amount of energy exceeds the physical threshold of tolerance.[2] Injury is a leading cause of death and disability in the world. For people ages 5-29 years, 3 of the top 5 causes of death are injury-related, namely road traffic injuries, homicide and suicide.[3] Of the 4.4 million injury-related deaths, unintentional injuries take the lives of 3.16 million people every year, and violence-related injuries kill 1.25 million people every year. Intentional injuries such as child abuse and youth violence are also a leading cause of death,

especially among adolescents.[4] Injury is a major but under recognized public health problem in the developing countries including Bangladesh. The majority of disabilities in Bangladesh are caused by injuries resulting from different types of accidents (traffic accidents, burns, electrocution, animal attacks, acts of violence and conflict).[5] The annual prevalence of medically treated injuries among youth aged 11-15 years in a total of 11 industrialized countries has been found to be 41.3%, and among 146440 adolescents in 35 industrialized countries it was found to be 33-64% for boys and 23-51% for girls.[6] Adolescent risk-taking behavior can be seen as a focus for etiological studies. Pickett et al found that "multiple risk behaviors may play an important role in the social etiology of youth injury."[7] The statistics on children's injuries and accidents are astonishing, with an estimated 61 deaths per 100,000 population, causing 97.9 million ER visits every year.[8] Unintentional injuries are the main cause of death in children. These statistics have led investigations by researchers on issues such as pedestrian safety, childhood drowning, bicycling safety, and children's ability to operate motorized vehicles. Although some research has been carried out on the effects of behavioral, emotional, developmental, and physical characteristics on injury risk, there is an absence of studies on the multiple factors that contribute to injury risk, incidence, or prevalence in school-age children. Because of the lack of research in this field, further research is warranted.[9] It has long been recorded in research that environmental factors influence injury risk and prevalence. Environmental factors consist of incidences, which take place at home and school. Children spend the majority of their day at school, so it is expected that most of their injuries will occur at school and more specifically on the playground and during physical education classes. Unintentional injury rates were higher among rural areas and intentional injuries were highest among urban dwellers.[10] Previous research has shown demographic factors such as gender and age can lead to unintentional injuries. In terms of school environment, boys normally are injured during recess, whereas, girls are more likely injured during sports participation. This suggests that types of activities influence injury rates among gender.[11,12] While gender affects the prevalence of injuries, research on injuries show that age differences have been found to greatly affect the severity and prevalence of injuries. Children 4 years and under are more likely to sustain injury than older children due to an overestimation of their physical abilities. Children have yet to find what skill level they are capable of, so they tend to take more risks which accounts for their increased severity of their injuries.[13] Identification of the factors that might contribute to injuries among the children would allow parents and administrators to formulate preventive strategies that mitigate injury risk. There is considerable debate among researchers regarding which factors contribute to injury rates in children and to what extent each factor contributes. So, the present study was conducted with the aim to observe the incidence and risk factors of injury among urban adolescent students.

METHODS

This cross-sectional observational study was conducted at the Dhanmondi High School, Hatirpul, Dhaka-1205 under Kalabagn Thana of Dhaka district, to estimate the prevalence of injury, the pattern of injury, the socioeconomic and demographic characteristics, proportion of social determinants of injury among urban adolescent students. The study was conducted from January 2018 to June 2018, with data collected from a total of 325 adolescents attending the study place. A total of 325 students were selected from the selected high school attending grades 6-10 following their consent. Any student unwilling to participate in the study were excluded from the study. Purposive sampling was done to select the participants of urban adolescent students of the study place who were available at school during data collection. Data were collected by administrations through a written questionnaire. Informed consent was obtained from the participants and their legal guardians before data collection was done. Ethical approval for this study was obtained from the chairman of the education board of Dhanmondi high school. All collected data was analyzed using SPSS V.25 software. Analyzed data was presented as figures and tables in the results section. Pearson's chi-square test was conducted where necessary for observation of significance, and a p value of ≤ 0.05 was considered statistically significant.

RESULTS

The socio-demographic characteristics of 325 participants are shown in the table. The largest age group was those aged 12 or younger (36.62%), followed by those aged 13-14 (38.77%). The average age was 13.29 years. The majority of participants were male (57.23%) and the fathers of most participants were in non-government/private jobs (33.54%). Most fathers were literate (87.69%) and the majority of participants were Muslim (93.23%). The mothers of most participants were housewives (75.38%) and literate (63.08%). The largest group of participants was in Class 6 (27.69%) and most came from families with a monthly income of 10,000 Taka or less (53.85%). The average monthly family income was 13840 Taka. Most participants came from nuclear families (55.69%). Out of 325 participants, 195 (60%) reported having an injury in the last 6 months, while 130 (40%) reported not having an injury. Out of the 195 participants who reported having an injury in the last 6 months, the majority (45.64%) reported having 2 injuries. The degree of injury was moderate for the largest group (63.59%), while 9.23% of the injuries were severe and 27.18% were mild. 18 participants (9.23%) required hospitalization. The most common pattern of seeking care after injury was visiting a doctor (28.72%), followed by visiting a hospital (33.33%). The majority of injuries occurred at home (33.33%) or in an institution of education (31.28%). The most common site of injury was the hand (39.49%), followed by the leg (24.62%).

Table 1: Distribution of participants Socio-demographic characteristics (n=325).

Variable	N	%
Age (years)		
≤12	119	36.62
13-14	126	38.77
≥15	80	24.62
Mean age	13.29±1.46 years	
Gender		
Male	186	57.23
Female	139	42.77
Father occupation		
Unemployed	17	5.23
Government service	44	13.54
Non-government/private job	109	33.54
Business	117	36.00
Day labor	17	5.23
Retired	15	4.62
Others	6	1.85
Father's education		
Illiterate	15	4.62
Can Sign Only	65	20.00
Literate	285	87.69
Religion		
Muslim	303	93.23
Hindu	62	19.08
Mother's occupation		
House wife	245	75.38
Service	63	19.38
Business	17	5.23
Mother's education		
Illiterate	37	11.38
Can sign only	83	25.54
Literate	205	63.08
Respondent's education grade		
Class 6	90	27.69
Class 7	81	24.92
Class 8	53	16.31
Class 9	74	22.77
Class 10	27	8.31
Monthly family income		
≤10000	175	53.85
11000-15000	62	19.08
≥16000	88	27.08
Mean Income	13840.00±7063.14 Tk	
Type of family		
Nuclear	181	55.69
Joint	144	44.31

The most common mode of injury was sudden attack or fighting (28.21%), followed by playing games (26.15%). Road traffic accidents accounted for 7.69% of the injuries, while falling down accounted for 9.23%. A small number of injuries were caused by cutting by sharp objects (4.10%) or by electric shock (3.08%). Biting by insects or other animals accounted for only 1.03% of the injuries.

Table 2: Distribution of participants by injury related characteristics (n=195).

Variable	N	%
Total number of injuries in last 6 months		
1	48	24.62
2	89	45.64
3	45	23.08
4	13	6.67
Degree of injury		
Severe	18	9.23
Moderate	124	63.59
Mild	53	27.18
Hospitalization		
Yes	18	9.23
No	177	90.77
Pattern of seeking care after injury		
Nowhere	73	37.44
Doctor	56	28.72
Hospital	65	33.33
Drug-store	1	0.51
Place of injury		
Home	65	33.33
Institution of education	61	31.28
Play ground	54	27.69
Roads	15	7.69
Site of injury		
Head	39	20.00
Face	8	4.10
Chest	6	3.08
Abdomen	2	1.03
Back	15	7.69
Hand	77	39.49
Leg	48	24.62

Table 3: Distribution of respondents by mode of injury (n=195).

Mode of injury	N	%
Road traffic accidents	15	7.69
Sudden attack, fighting	55	28.21
Falling down	18	9.23
Playing game	51	26.15
Hit by falling objects	6	3.08
Cutting by sharp objects	8	4.10
By burning	28	14.36
Hit by machine or instruments	6	3.08
By electric shock	6	3.08
Biting by insects or other animals	2	1.03

The findings showed that there was a significant association between the occurrence of injury and the sex of the respondents (χ^2=5.66, p=0.017). In particular, 62.56% of male respondents reported having suffered an injury, whereas only 37.44% of female respondents reported the same.

Table 4: Distribution of the respondents by socio-demographic characteristics and occurrence of injury (n=325).

Socio-demographic characteristics	Occurrence of injury				Test of Significance
	No (n=130)		Yes (n=195)		
	Frequency	%	Frequency	%	
Sex of the respondents					
Male	64	49.23	122	62.56	χ^2=5.66, p=0.017
Female	66	50.77	73	37.44	
Grade of the students					
Six	26	20.00	64	32.82	χ^2=44.80, p≤0.001
Seven	31	23.85	50	25.64	
Eight	12	9.23	41	21.03	
Nine	36	27.69	38	19.49	
Ten	25	19.23	2	1.03	
Age of the students (in years)					
≤12	44	33.85	75	38.46	χ^2=14.23, p=0.001
13-14	40	30.77	86	44.10	
≥15	46	35.38	34	17.44	
Monthly Income (TK)					
≤10000	71	54.62	104	53.33	χ^2=0.35, p=0.84
11000-15000	26	20.00	36	18.46	
≥16000	33	25.38	55	28.21	
Father education					
Preprimary	65	50.00	85	43.59	χ^2=1.72, p=0.442
Secondary and higher secondary	48	36.92	76	38.97	
Graduate and above	17	13.08	34	17.44	
Mother occupation					
Housewife, retired, others	98	75.38	147	75.38	χ^2=000, p=1.00
Govt, non-govt Job, business, Day labor	32	24.62	48	24.62	
Number of Family members					
≤5	42	32.31	81	41.54	χ^2=2.87, p=0.238
6-8	63	48.46	80	41.03	
≥9	25	19.23	34	17.44	

Furthermore, there was a significant association between the occurrence of injury and the grade of the students (χ^2=44.80, p<0.001), with higher rates of injury reported among students in grades six and seven compared to those in the other grades. Additionally, the results revealed a significant association between the occurrence of injury and the age of the students (χ^2=14.23, p=0.001), with higher rates of injury reported among younger students. However, no significant association was found between the occurrence of injury and monthly income, the education level of the father, the occupation of the mother, or the number of family members. The data shows that a high percentage of respondents engage in activities that carry a risk of injury, such as cooking food (78.15%), ironing clothes (72.92%), chopping vegetables and fruits with sharp objects (64.31%), and using risky objects (61.85%). The data also shows that some activities carry a higher risk of injury than others, such as standing under a risky wall, tree, or building (38.46%) and violating traffic laws (34.15%). A relatively lower percentage of respondents engage in activities that carry a lower risk of injury, such as using self-defense materials during play (20.31%) and finding any leaks or defects in gas lines (22.46%).

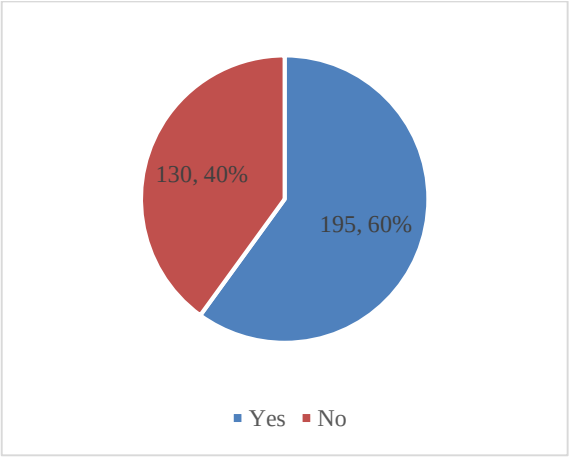

Figure 1: Distribution of participants by occurrence of injury in the last 6 months (n=325).

The results indicate that individuals who engaged in activities such as fighting, violating traffic laws, and taking

risks while getting into a vehicle were more likely to have experienced injury compared to those who did not. The results of the significance tests (χ^2) reveal that these findings were statistically significant ($p<0.05$), with the exception of the use of electric tools or machinery. The results also showed that there was no significant association between playing with risky or sharp objects and occurrence of injury.

Table 5: Distribution of the respondents by presence of risk factors for injury (n=325).

Factors present	N	%
Cook food	254	78.15
Cloth iron	237	72.92
Chop vegetables and fruits with sharp objects	209	64.31
Use any risky objects	201	61.85
Use hot water or objects	198	60.92
Sew anything	194	59.69
Use electric tool or machinery	189	58.15
Cross road alone	182	56.00
Fight anyone	179	55.08
Hurt by anybody	160	49.23
Walk on the wall of any building	159	48.92
Walk besides any building which is under construction	154	47.38
Do not use foot over breeze while crossing the road	144	44.31
Took bath in the pond	144	44.31
Stand under any tree, beside any wall, electric pillar	142	43.69
Any industry near your house	140	43.08
Defective electric connection inside or outside house	136	41.85
Play risky game	134	41.23
Take risk while getting into vehicle	129	39.69
Use defective electric tool	127	39.08
Stand under any risky wall, tree ,building	125	38.46
Violate traffic laws within last 6 months	111	34.15
Climb tree	105	32.31
Play with risky or sharp objects	105	32.31
Play on the roof of any building	104	32.00
Any combustible objects in house	100	30.77
Any pond or canal beside your home or school	80	24.62
In last 6 months find any leak or defect in gas line of house with	73	22.46
Use self -defense materials during playing	66	20.31

Table 6: Distribution of the respondents by occurrence of injury and risk factors of injury (n=325).

Risk factors of injury	Occurrence of injury				Test of significance
	No (n=130)		Yes (n=195)		
	Frequency	%	Frequency	%	
Fight anyone within last 6 months	54	41.54	125	64.10	χ^2=16.05, p=0.000
Hurt anybody within last 6 months	55	42.31	105	53.85	χ^2=4.15, p=0.04
Violate traffic laws	33	25.38	78	40.00	χ^2=7.4, p=0.006
Take risk while getting into vehicle	43	33.08	86	44.10	χ^2=3.96, p=0.04
Used electric tool or machinery	76	58.46	113	57.95	χ^2=0.008, p=0.927
Play with risky or sharp objects	35	26.92	70	35.90	χ^2=2.87, p=0.09

DISCUSSION

The present study aimed to observe the incidence of injury and various associated risk factors of such injuries among urban adolescent students. Initially, a total of 325 adolescent students attending the study place for education from grades 6-10 were included on the study. The baseline sociodemographic characteristics of the participants were recorded, which provided a base-level understanding of the study area's social structure. The study found that 60% of the participants reported having an injury in the last 6 months. Out of these 195 participants, the majority

reported having 2 injuries (45.64%) and the degree of injury was moderate for the largest group (63.59%). The most common pattern of seeking care after injury was visiting a doctor (28.72%), followed by visiting a hospital (33.33%). The majority of injuries occurred at home (33.33%) or in an institution of education (31.28%). The most common site of injury was the hand (39.49%), followed by the leg (24.62%). The mode of injury among 195 participants was also analyzed in the study. The results showed that the most common mode of injury was sudden attack or fighting (28.21%), followed by playing games (26.15%) and falling down (9.23%). The least common mode of injury was being hit by falling objects (1.03%). Overall, it can be observed that almost all the injuries were caused unintentionally, which was similar to the findings of other similar studies.[14,15] The findings of the present study also suggests that the occurrence of injury among the participants was relatively high, with moderate degree of injury being the most common. The most common mode of injury was sudden attack or fighting, followed by playing games and falling down, highlighting the need for injury prevention strategies in these specific settings. In terms of association with sociodemographic factors, the present study observed a significant association between the occurrence of injury and the sex of the respondents, grade of the students, and age of the students. In particular, the data revealed that male respondents reported a higher rate of injury compared to female respondents. This finding is consistent with previous studies that have reported higher injury rates among males than females.[14] The results also revealed that students in grades six and seven reported a higher rate of injury compared to those in other grades. This is possibly due to factors such as increased physical activity, sports participation, or other school-related activities.[16,17] On a similar note, younger aged students also showed a highly significant association with occurrence of injury. However, no significant association was found between the occurrence of injury and monthly income, the education level of the father, the occupation of the mother, or the number of family members. This suggests that socio-economic status and family background may not play a significant role in the occurrence of injuries. This was contradictory to the findings of other studies where socioeconomic status had a significant impact on the occurrence of injury in adolescents.[18,19] This disparity might be due to the difference of demographics, selection of the study place and location, overall social status of the study area etc. Among the total 325 participants, overlapping risk factors for injury were observed. The highest percentage of respondents reported engaging in activities such as cooking food (78.15%), ironing clothes (72.92%), and chopping vegetables and fruits with sharp objects (64.31%).

It is notable that the use of any risky objects (61.85%) is also relatively high, indicating a broader range of activities that may result in injury. The data also highlights some specific activities that carry a higher risk of injury, such as standing under a risky wall, tree, or building (38.46%) and violating traffic laws (34.15%). It is concerning that a significant percentage of respondents engage in these activities, as they can lead to serious injuries or even fatalities. Association of certain risky activities was made with the occurrence of injury within the last 6 months. It was observed that respondents who had fought someone within the last 6 months (64.10%), violated traffic laws (40.00%), or took risks while getting into a vehicle (44.10%) were more likely to have experienced an injury compared to those who did not engage in these activities. The results of the statistical tests indicated that these associations were significant ($p<0.05$), except for the use of electric tools or machinery. Surprisingly, it was observed that laying with risky or sharp objects was not significantly associated with occurrence of injury.

Limitations

Limitation of current investigation was that the study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

In conclusion, this study aimed to explore the prevalence of injuries and their associated risk factors among adolescents in a rural area of Bangladesh. The results of the study reveal that a high percentage of respondents engage in activities that carry a risk of injury, such as cooking food and ironing clothes, which may indicate a need for safety education and awareness in these areas. The findings also suggest that engaging in certain high-risk activities, such as fighting and violating traffic laws, increases the likelihood of experiencing injury. This highlights the need for interventions and programs that target these specific risk factors to reduce the prevalence of injuries among adolescents. Further research could explore the impact of such interventions and programs on injury rates in this population.

Recommendations

Based on the data presented, it is recommended that measures be taken to reduce the occurrence of injuries resulting from engaging in risky activities. This could involve educating individuals, especially children and young adults, on the potential dangers of such activities, and promoting safer alternatives. Efforts should also be made to enforce traffic laws and discourage risky driving behaviors, as well as promoting safe use of household tools and appliances. By taking these steps, it is possible to help reduce the incidence of injuries and create a safer environment for all.

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