

One-Year Incidence Rate of Injuries among Primary School Pupils in an Iranian Community

*R Vazirinejad¹, A Esmaeili¹, A Sarsangi¹, M Kazemi¹, JM Lilley²

¹Dept. of Social Medicine, Medical School, Rafsanjan University of Medical Sciences, Iran

²Division of Rehabilitation & Ageing, School of Community Health Sciences, University of Nottingham, UK

(Received 15 Oct 2006; accepted 30 Apr 2007)

Abstract

Background: To describe the risk and the patterns of injuries taken place inside the primary schools among pupils in an Iranian community.

Methods: A total population of 11,543 pupils were followed and all injuries were recorded. Information about age, gender, deprivation, time, day and month of injuries, cause and the outcome of injuries were collected using a checklist.

Results: One hundred and twenty five cases were reported giving an overall one-year incidence rate of 10.8 per 1000 person-years-at-risk. Overall incidence rate of injuries among boys was significantly greater than this incidence rate among girls (Relative Risk = 1.6, 95% CI= 1.1 - 2.2). The greatest incidence rate was reported among year five pupils in both genders (18.6 per 1000 boys and 13.2 per 1000 girls). "Fall" was the most common cause of injuries followed by "hit by objects". Majority of injuries were "cured without rest" and only seven pupils were admitted in hospital.

Conclusion: The level of risk calculated in this survey could be used in programs aiming to prevent injuries in primary schools and a nationwide surveillance system in the country is recommended.

Keywords: *Pupil disorders, Incidence, Relative risk*

Introduction

Environmental factors as well as factors related to host and agent should be studied when studying accidents and resulting injuries. Although carelessness, thoughtlessness and over confidence are reported as the cause of injuries, environmental factors play important roles before, during and after a trauma event (1).

Accidents and resulting injuries have been known as one of the most important causes of disabilities and death in both developed (2) and developing (3) countries affecting people at all ages.

Injuries are important not only in terms of bringing psychological stresses for victims and their families but also for its economic disadvantages due to losing productive days of individuals' lives (4). In the area of this study, similar to many other parts of the world, accidents and resulting injuries are of high priority in planning for improving both quantity and quality of life. Injuries in the school environment are serious public health problems (4-5) and it is estimated

that 20% of injuries to school-aged children in United States occur on school premises (6). Injuries are reported as the most common cause of mortality in children and account for considerable childhood morbidity (7). There are many publications representing their results on accidents in general (8-9) as well as road accidents (1, 10). A previously conducted study in the area showed that domestic accidents were more frequently reported among elderly and children less than ten years old than others (11). But fewer studies are specifically conducted to investigate the risk of injuries, in particular among primary schools (PSs) pupils (children under 10 years) in Asian communities.

The present study aimed to estimate one-year age and gender incidence rate of injuries and also to describe the patterns of them and their outcome among pupils studying in primary schools of an urban area in Southeast, Iran, between October 2004 and September 2005.

Materials and Methods

The study took place in Rafsanjan district, Kerman Province, 850 km south of Tehran, in Southeast of Iran. A total population of pupils studying in the PSs of the city were followed for one academic year. In this study, injury denoted the somatic medical consequences of an accident. An accident was defined as 'a sudden, unexpected series of undesired occurrence in the interplay between individual and environment which led to personal injury (12). Information about all accidents which took place among pupils inside their primary schools during the year Oct. 2004 to Sep. 2005 was collected. Accidents taking place outside of the schools (on the road, at home or public places) were excluded from the study.

Study check list was sent to all PSs distributed throughout the city (86 PSs) and their health officers were educated to complete the checklist once an injury was taken place among pupils. They were paid to collect the data about all injuries taking place to pupils during the year. All minor and major injuries serious enough to be reported by injured pupil were included.

Information about age, gender, time of injuries, day and month of injuries, deprivation, causes of injuries, injured areas of body and the outcome of injuries were collected. In terms of deprivation, since pupils registered in private PSs should pay for their study, they are normally classified in a higher social class than those pupils who are studying in free national PSs. The latter group of pupils are considered as having a lower level of cultural, social and economic welfare than pupils studying in the other group of PSs. Causes of injuries refer to the type of accident that are classified into five groups listed as "falls (from unspecified level)", "violence", "falls (from height)", "hit by objects" and "other". Outcome of injuries is considered as "cured without rest", "rest at home" and "admitted in hospital".

Although, there was no death and migration in the population of pupils for the duration of study, person-years-at-risk (PYAR) was used as the denominator for injury incidence. Data were entered into SPSS for analysis. Signifi-

cant differences between incidences rates of injuries were noted where the 95% confidence interval of the relative risk (RR) excluded unity. Some other parametric tests (z-test, ANOVA) and non-parametric tests (Chi-square, Fisher-Exact) were also used where appropriate.

The Research Ethics Committee at Rafsanjan University gave approval for the data collection and informed consent for recording the data was obtained from both the district headquarters of school education and all primary schools.

Results

A total population of 11,543 pupils studying in 86 PSs (all PSs of the city) were studied. Gender distribution of primary school pupils of Rafsanjan based on their school type and age in 2004-2005 is presented in Table 1.

There were 125 cases of accidental injuries reported giving an overall incidence rate (IR) of 10.8/1000 person-years-at-risk (PYAR) pupils. Age and gender specific IRs of injuries among PS pupils are presented in Fig. 1. As it shows, the greatest IR was reported among children at 10 and older (year five pupils) in both genders (18.6 per 1000 PYAR boys and 13.2 per 1000 PYAR girls), followed by boys in 7-7.99 yr age (year two pupils) group (14.7 per 1000 PYAR) and girls in 9-9.99 yr age (year four pupils) group (10.0 per 1000 PYAR). The IR of injuries among girls increases as their age increases. The least IR, interestingly, belongs to year 4 boys (4.5 per 1000 PYAR). The figure also shows that among year one to year three pupils, the IR of injuries among boys were more than two times greater than these rates among girls in the same age groups (RRs of 2.5, 2.6, and 2.1, respectively). This trend among year 4 pupils changes and the IR of injuries among girls is more than two times greater than this IR among boys (RR= 2.2). In year 5 pupils, the IR among boys was again greater than this IR among girls (RR= 1.4). Overall, IR of injuries among male PS pupils (13.0 per 1000 PYAR boys) was significantly greater than this IR among females (8.0 per 1000 PYAR girls) (RR=1.6, 95%CI= 1.1-2.2). The mean age of victims was 9.3±1.7 yr (Min= 6, Max=13yrs). Sex ratio (M/F) was 1.6

and there was no significant difference between the mean age of boys (9.1 ± 1.7 yr) and girls (9.6 ± 1.7 yr).

IR of injuries among pupils studying in the two types of PSs (national and private schools) is compared in Table 2. As it shows, IR of injuries in both genders in national PSs were greater than these IRs in private PSs. On the basis of gender, there was a greater risk of injuries among boys than risk of injuries among girls, in both types of national (RR= 1.7) and private (RR= 2.27) PSs. Overall, there was, significantly, a greater risk of injuries (IR= 12.0) among national PS pupils than this risk (IR= 6.7) among private PS pupils (RR= 1.8, 95%CI= 1.16-2.94).

The largest and the smallest proportions of cases were taken place between 10 to 12 am (53,3%, n= 65) and 4 to 6 pm (3,3%, n= 4), respectively. More than a quarter of injuries were taken place in January (n= 34, 27, 2%) and only eight cases were reported in April (n= 4, 3, 2%) and May (n= 4, 3, 2%). There was no significant difference between the numbers of cases taken place on different working days of week.

Analysing data for differences of injured area between the two types of PSs revealed that hands and legs were the most frequent areas that were injured followed by head and neck

in both types of PSs. There was no significant difference between proportions of national and private PSs pupils experiencing injuries in different areas of their body.

Distribution of cases based on the outcomes of injuries and the injured areas of body is presented in Table 3. There was a significant difference of outcomes for cases who had different injured areas of body ($\chi^2=35.4$, df = 6, $P < 0.001$). A big majority of cases whose head and neck were injured were cured without needing to rest (77.3%).

Causes of injuries among boys and girls are listed in Table 4. As table shows "falls" (53.2%, n= 41 among boys and 66.7%, n= 32 among girls) was the most common cause of injuries followed by "hit by objects" (24,7%, n= 19 among boys and 20,8%, n= 10 among girls) in both genders. There was no significant difference between the proportion of boys and girls who experienced injuries due to different causes. The outcome of injuries among injured boys and girls is also presented in Table 4. Overall, the most common outcome due to injuries at PSs was "cured without rest" reported for 65.6% of cases (n= 82). There was no significant difference of injuries' outcome between boys and girls. Seven pupils (5, 6%) were admitted in hospital and 36 (28, 8%) had rest at home due to injuries.

Table 1: Gender distribution of primary school pupils of Rafsanjan based on their school type and age (2005).

| Age (year) | Type of schools | | | | | | | | Total | |
|---------------|-----------------|------|------|------|---------|------|------|------|--------|------|
| | National | | | | Private | | | | | |
| | Boy | | Girl | | Boy | | Girl | | n | % |
| n | % | n | % | n | % | n | % | n | % | |
| 6 | 783 | 18.9 | 841 | 19.7 | 254 | 24.3 | 414 | 24.4 | 2292 | 20.5 |
| 7 | 817 | 19.7 | 790 | 18.5 | 207 | 19.8 | 378 | 22.3 | 2192 | 19.7 |
| 8 | 812 | 19.6 | 794 | 18.6 | 187 | 17.9 | 307 | 18.1 | 2100 | 18.8 |
| 9 | 837 | 20.2 | 901 | 21.1 | 207 | 19.8 | 303 | 17.9 | 2248 | 20.2 |
| 10+ | 896 | 21.6 | 944 | 22.1 | 190 | 18.2 | 293 | 17.3 | 2323 | 20.8 |
| Total | 4145 | 100 | 4270 | 100 | 1045 | 100 | 1695 | 100 | *11155 | 100 |

*388 cases were missing

Table 2: Incidence rates of injuries (per 1000 person-years-at-risk) among male and female pupils in the two types of schools

| Type of schools | Gender | | | | Total | |
|-----------------|--------------|------|--------------|-----|--------------|------|
| | Boys | | Girls | | No. of cases | IR |
| | No. of cases | IR | No. of cases | IR | | |
| National | 60 | 15.2 | 36 | 8.9 | 96 | 12.0 |
| Private | 12 | 13.4 | 9 | 5.9 | 21 | 6.7 |
| Total | 72 | 12.0 | 45 | 8.0 | 117* | 10.6 |

*Eight cases were missing

Table 3: The outcomes of injuries among cases based on the injured areas of their body

| Injured areas | Outcome of injury | | | | | | Total | |
|----------------|--------------------|------|--------------|------|----------------------|------|-------|-------|
| | Cured without rest | | Rest at home | | Admitted in hospital | | No | % |
| | No | % | No | % | No | % | | |
| Head and neck | 41 | 77.3 | 10 | 18.9 | 2 | 3.8 | 53 | 100.0 |
| Hands and legs | 35 | 56.5 | 23 | 37.1 | 4 | 6.4 | 62 | 100.0 |
| Trunk | 6 | 60.0 | 3 | 30.0 | 1 | 10.0 | 10 | 100.0 |
| Total | 82 | 65.6 | 36 | 28.8 | 7 | 5.6 | 125 | 100.0 |

Table 4: Causes and outcome of injuries among injured pupils based on their gender

| Cause of injury | Gender | | | | Total | |
|--------------------------|--------|-------|-------|-------|-------|-------|
| | Boys | | Girls | | No | % |
| | No | % | No | % | | |
| Falls(unspecified level) | 41 | 53.2 | 32 | 66.7 | 73 | 58.4 |
| Violence | 8 | 10.4 | 4 | 8.3 | 12 | 9.6 |
| Fall from height | 4 | 5.2 | 1 | 2.1 | 5 | 4.0 |
| Hit by objects | 19 | 24.7 | 10 | 20.8 | 29 | 23.2 |
| Other | 5 | 6.5 | 1 | 2.1 | 6 | 4.8 |
| Total | 77 | 100.0 | 48 | 100.0 | 125 | 100.0 |
| Outcome of injury | | | | | | |
| Cured without rest | 53 | 68.8 | 29 | 60.4 | 82 | 65.6 |
| Rest at home | 21 | 27.3 | 15 | 31.3 | 36 | 28.8 |
| Admitted in hospital | 3 | 3.9 | 4 | 8.3 | 7 | 5.6 |
| Total | 77 | 100.0 | 48 | 100.0 | 125 | 100.0 |

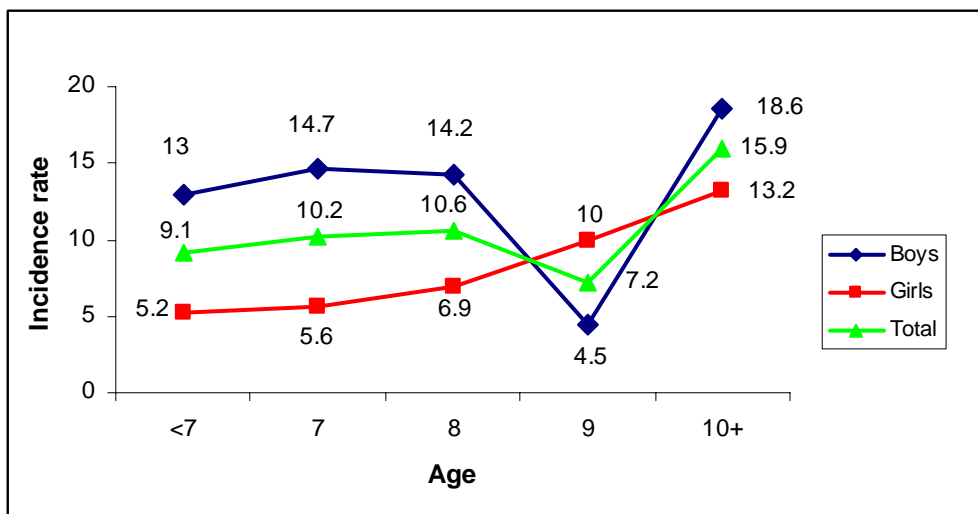


Fig. 1: Age specific incidence rates of injuries (per 1000 person-years-at-risk) among male and female pupils

Discussion

Accidents and resulting injuries in particular related disabilities and death are tragic and have a profound impact on the individuals and their families (9). Epidemiological information about this health problem in a given population of PS pupils, which is a part of the aim of this study, is important not only for planning of resources, but also for adequate treatment, prevention and rehabilitation.

Based on overall incidence rate of injuries in our study, the risk of experiencing an injury for each pupil studying in PSs of the city, during an academic year, is about 0.011. This indicates an overall level of risk for each PS pupil to experience at least one injury during his presence in the school for the duration of an academic year. In a study conducted by Sosnowska and Kostka (13), the overall level of risk for experiencing an injury among 7-15 years old students in an area in Poland was also reported as 0.011 which is identical to what is calculated in our study. In our study, this risk for year five pupils increases to about 0.016. This valuable information can be used for planning in different areas of prevention and treatment as well as for evaluating the effect of health programs aiming to reduce the occurrence of injuries in the PSs.

Greater level of overall IR of injuries among boys than this level among girls obtained from our data is similar to the results of others (6, 14, 15). For instance, Scheidt et al. (6) reported a RR indicating a significantly higher level of risk (RR= 1.56, 95% CI= 1.37-1.68) for experiencing injuries among male PS pupils than this level among female PS pupils. Spady et al (14) also reported a significant odds ratio showing a higher level of risk of injuries (OR= 1.82, 95%CI= 1.76-1.88) among male PS pupils than that among female PS pupils. These similar results collected from different nations around the world show that there is a clear higher risk of experiencing injuries for boys in comparison with this risk for girls in PSs regardless cultural and socio-economic differences. This finding might reflect more risk-taking behaviour of male children than female children and should be noticed while planning

for preventing this health problem in particular in health education programs. However, one exception was observed in our results. Among year four pupils, interestingly, the level of risk of experiencing injury among female group was more than two times greater than this level among male group. More investigations are needed to explain determinants responsible for this diversity.

The IR of injuries in national PSs (where deprived pupils attend to) was significantly greater than this risk for children in private PSs (where affluent pupils attend to) (RR=1.8, 95%= 1.16-2.94). This result is similar to what was found as the results of Latif et al. (5) who compared PS injury rates in deprived and more affluent wards in one education authority in the UK. They reported that these rates in deprived wards were three times higher than these rates estimated for schools in more affluent wards. The association between school injuries rates and deprivation is complex and there might be many factors that could affect this association. For instance, fewer injuries reported from schools in more affluent wards might be accounted for better and healthier situation (such as a bigger size) of the schools' environment (premises, playground, steps...) where affluent pupils attend. More investigations are needed to clarify how important the economic and social class of students is in the incidence of injuries in PSs. Our results showed that a majority of cases (50%) were taken place between 10 to 12 am. This can be justified as the first break that pupils are able to run and play on the playground, after sitting for more than 60 to 90 min in the class, starts at this time and, therefore, higher risk of having an injury among children in this duration is predictable.

The severity of injuries reported in this study is consistent with what is reported by Miller and Spicer who conducted a study in USA (15). They reported that very big majority of injuries in the schools is mild and approximately 1 in 400 injury-related fatalities among children aged 5-19 yr occurred at school. Our data showed that only 5.6% of cases in our study were admitted in hospital and nobody was died due to injuries.

Occurrence of serious injuries in PS pupils is also important in terms of losing a longer duration of living as a healthy person for the rest of their life. Therefore, investing in preventing injuries can have some extra advantages for this particular age group. The role of schools in this matter is also vital as they can teach students the skills needed to promote safety and prevent injuries while at home, at work, at play, in the community and throughout their lives. The results of this study can help to providing recommendations for preventing injuries among PS pupils in the area. However, as a reference, the level of the risk of injuries in a rural Iranian community of PS pupils estimated in our study could be used for comparing with the level of this risk in PS pupils of the other parts of the world. It is well-known that most of risk factors for childhood injuries are predictable and therefore preventable 15. Investigations like the present study should be conducted to identify these risk factors. The results of our study showed that "falls from unspecified level" was the most common cause of accidents in the PSs followed by "hit by objects". Although less than 10% of injuries were resulted from violence (intentional injuries), it can be realised from our results that in order to decrease the risk of injuries at PSs, health programs should mainly be focussed on reducing "falls" (either falls from unspecified levels or falls from height) and being "hit by objects". Falls are reported as an important cause of accidents and related injuries in all European, African, Australian and American populations (2, 16-18) and are particularly important among older people (19). Although, risk factors for falls among elderly people have been extensively reviewed (19), more investigations are needed for exploring factors related to fall among young people. Schools as the central socialisation institution, plays a key role in the process of continued improvement (20). The present study is the first study conducted to calculate the level of risk of injuries among PS pupils in the area. In the present study, the risk of experiencing an injury due to accidents has been estimated for different age groups of two genders.

The findings of this study provide some new insights into the epidemiology of school-related injuries and can be useful information for the planning of strategies to reduce the risk of injuries in Iranian schools. The results highlighted a need for a nationwide surveillance system for monitoring and preventing injuries among PS pupils. Local studies such as ours can also provide useful clues regarding the aetiology of this public health problem. Health programs, including health education, for preventing PS injuries to ensure safer schools for students must be developed.

Acknowledgements

The authors would like to thank Rafsanjan University of Medical Sciences for financial support of this study. Special thanks are due to all people in Rafsanjan urban primary schools who helped with the process of data collection.

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