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EPIDEMIOLOGY OF SCHOOL-RELATED INJURIES AMONG BASIC SCHOOL CHILDREN IN EL-OBEID CITY, SUDAN

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ABSTRACT

This is a descriptive school based study conducted in El-Obeid City, Sudan, to study the characteristics of school injuries in terms of age, sex, , specific location, time of injury, body parts involved, mechanisms of injury, circumstances and outcome and to identify the physical and mechanical factors involved in injury. Morbidity and mortality data involving injuries occurring at schools were collected. The participants were schoolchildren in Grades 1–8; also, 12 headmasters of schools were interviewed. Occurrence of injuries during the school years was included in the study. Data were analyzed using SPSS version 20.0 and presented in the form of mean and percentage. A total of 384 children have participated in this study, 226 (58.9%) of them were injured. Injuries were more common among children aged 10–15 years compared to children of other age groups. Female children 118 (52.2%) had more number of injuries than male children 108(47.8%). Upper limb 89 (39.0%) was the most common body part injured. Bruises accounted for (74.8%) of the injuries. Majority 49 (21.6%) of the injuries occurred due to falls. 97 (42.9%) of the injuries were mild. There were three cases of death occurred due to injury in the schools. The study concluded that more than half of study group were exposed to injuries, and bruises accounted as predominant type of injuries.

Key: Epidemiology, School, Injuries, Children, El-Obeid.

INTRODUCTION

Injuries constitute a major public health problem globally that accounts for more than 5 million deaths annually [(WHO, 2008), (Sethi, 2004)]. Recent projections hold that deaths resulting from injuries will increase from 5 million to over 8 million in 2020. About 10-30% of all injuries to children and adolescents occur at school (Gustafsson, 1975). It has been estimated that the risk of being injured at school is higher per time unit than during the students' leisure time (Nathorst, 1982). In 2003, in China, Li (Li, L.P, Huang, and Luo, 2003) and colleagues have found that injuries at school account for nearly a quarter of the places of injuries. In their paper, published in 2006, about the epidemiology of nonfatal injuries among the 11-, 13- and 15-year-old youth based on the data from 11 countries on 43 which participate to the "Health Behaviour in School-aged Children Study" (HBSC), Molcho (Molcho, et-al, 1998) and colleagues have reported that 21.8% of the observed injuries occurred in the school context. For Belgium, Piette (Piette, et-al, 2003.) and colleagues have reported, based on the data from the 2002 HBSC Study, that one third of young people interviewed had suffered from an injury during the twelve months before the study and that the school environment was involved in 24% for the girls and 20% for the boys.

Frederick P. Rivara et al 1989 in his study showed that the location of injury occurrence varied with the age of the child. Highest proportion of injuries in young children occurred at home (0-4 years of age) and in contrast the majority of injuries in the oldest age group occurred in school or the schoolyard (10-19 years of age). Injuries are a significant cause of absences from school among the school age population and so impinge upon the learning opportunities of a large number of students.

Assessment of the global burden of childhood unintentional injury is challenging as many countries have no or limited means of recording trends in injury occurrence. The World Report on Child Injury Prevention, published by the World Health Organisation in 2008 is a comprehensive attempt to collate and interpret information from all countries. Injury related causes account for three of the top 15 killers of children aged 1-4 years (in order; drowning, road traffic injury and fire related deaths) and four of the top 15 killers for children aged 5-14 years (Road traffic injuries, drowning, fire-related deaths and falls). Non-fatal road traffic injuries and falls are two of the top 15 causes of disability-adjusted life years (DALY's) in children aged 0-14 years. The total burden of all injury deaths under

the age of 18 years (including both intentional and unintentional) is estimated to be 950,000 per year. The commonest types of injury deaths are those related to road traffic injuries, drowning, and fire-related burns (Mytton, 2011).

Injury causation is a multi-factorial phenomenon in which place of injury plays a very significant role (Khan, Bhatti, and Farooq, 2013). Other than homes, schools have been found to be a common place of injuries. Furthermore, children and adolescent students spend a significant amount of their time at schools where many factors predispose them to different types of injuries. For example, the contact of the students amongst themselves during sports-related activities and with the environment can act as possible contributing factors towards injury. The majority of injuries that happen in school are however non-fatal in nature (Khan, Bhatti, and Farooq, 2013).

The magnitude, characteristics and pattern of injury vary considerably from country to country. Yet, school-based injury as a research problem has been largely ignored in developing countries including Sudan. Sudan has been undergoing demographic and social changes that could have a tangible impact on population injury rates. However, reliable estimates of injury epidemiology are lacking (Safa, et-al, 2017) .Few studies have described the pattern of injuries, and associated factors, in Sudan . Overall injury death rate was estimated at 109 (95% UI 83–142) per 100 000 per year, 94 (66–129) per 100 000 in urban populations and 117 (95% UI 86–157) per 100 000 in rural populations. Injuries accounted for 12% of all male deaths and 6% of all female deaths, but more than half of the deaths among young men aged 20–34 years. Urban injury rates were higher among males but lower among females than rural injury rates. Road traffic injuries were the major cause of fatal injury in urban Sudan, but other causes accounted for the majority of non-fatal injuries nationally (Safa, et-al, 2017) However, the majority of these studies provide information about injuries in different field,eg dental schools,household (Tarig, 2014). This means that school injuries are always a public health problem in the world, and in the Sudan, the data available about school injuries are rare.

MATERIALS AND METHODS

Study area

El-Obeid is the capital of North Kordofan State. Its area have been estimated by 81 km^2 and the distance from Khartoum is about 560 km. El Obeid is connected to Khartoum by an asphalt motorway, a railway line and air-flights taking off its airport several times a week.

North Kordofan state located in central Sudan latitude 13˚ 20 N longitude 30˚ 15 E, 570 m above sea level, the semi arid area of north kordofan receive an annual precipitation of about 280 – 450 mm in the months from July to September, temperature is generally high averaging 37˚c in the summer and 18˚c in the winter. [6]

The population of the City estimated by 440483 person. There are 38000 houses, 40000 families.

Study population

Schoolchildren in Grades 1–8 in El-Obeid.

Study design

Facility based cross-sectional study.

Sample size

A total of 384 Schoolchildren were selected as a study subject. The sample size calculated with Cochran's formula; $n= z^2.pq/d^2$. (Cochran, 1963).

Sampling technique

Cluster sample was used through dividing El-Obied, City into four equal quarters (Clusters). The samples were selected from each quarter of El-Obeid City following a process of simple random sample.

Data collection

Data were collected by interviews to schoolchildren and head master of schools.

Data processing & analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version (20).

Ethical consideration

- Approval from the appropriate management authority obtained.
- Head masters of schools provided informed consents.

RESULTS

A total of 384 students participated in the study. Most of the participants were females (50.5%), and (49.5%) were males. The three age groups were distributed with 36.50% of children between 6-9 years, 61.70% of children between 10 years to 15 years and 1.80% of children from 15 years or more (data shown in table 1).

Table 1: Sociodemographic information of the study population.

Variable	n (%)
Age (years)	
6-9	140 (36.50)
10-15	237 (61.70)
More 15	7 (1.80)
Total	384(100)
Gender	
Male	190 (49.5)
Female	194 (50.5)
Total	384 (100)
Level or class	
Level 1	44 (37.5)
Level 2	152 (39.6)
Level3	88 (22.9)
Total	384 (100)

Table 5 show that 226 (58.9 %) of children had experienced injury during school years. Table 5 reveals that the proportion of injuries was high among children aged 10–15 years (66.2%) followed by of more than 15 years of children (57.1%). Proportion of injuries was more in female children (60.8%) compared to male children (56.8%) Table 5.

Table 5: Distribution of injured children based on their age and gender.

Age category (years)	Injured, *n* (%)	No injury, *n* (%)	Total, *n* (%)
6-9	65 (46.4)	75 (53.6)	140 (36)
10-15	157 (66.2)	80 (33 .8)	237 (61)
More 15	4 (57.1)	3 (42.9)	7 (03)
Gender			
Male children	108(56.8)	82 (43.2)	190 (49)
Female children	118(60.8)	76 (39.2)	194 (51)
Total	226(58.9)	158(41.1)	384(100)

Most common body part injured was upper limb 89 (39.0%) followed by injuries in lower limb 77 (34.0%), head 53(23.40%) and 7 (3.6 %) eye injury.Figer1 (table 6).

Table (6): Distribution of injuries based on the body parts injured.

Variable	n (%)
Head and face	53(23.40)
Eye	7 (3.60)
Upper limbs	89 (39.0)
Lower limbs	77 (34.0)
Total	226 (100)

Majority 116(51.3 %) of school injury cases were outdoor injury cases while 48.7% were indoor injury cases. Outdoor injury cases represented 51.0% of all injury cases among 10-15 school age group, 30.0% among 6-9 school age group and there is no outdoor injury among more than 15 school age group, the incidence of indoor injury was high among more than 15 age group 100% followed by (53.8%) for 6-9 age group and 49.0% for 10-15 school age group table 7.

Table 7: School injury cases by location and age group.

Age category (years)	Indoor injury	Outdoor injury	Total, *n* (%)
6-9	35 (15)	30 (14)	65 (29)
10-15	77 (34.0)	80 (35.0)	157 (69)
More than 15	4 (2)	0 (0.0)	4 (2)
Total	116(51)	110 (49)	226(100)

Females had a higher incidence of both indoor (50.9%) and outdoor injuries (53.6%) table 8.

Table 8: School injury cases by location and gender n=226.

Variable	Male	Female	n (%)
Indoor injury 116 (51.3%)	57 (25)	59 (26)	116 (51.3%)
Outdoor injury 110 (48.7%)	51 (23)	59 (26)	110 (48.7%)
Total 226 (100 %)	108 (48)	118 (52)	226 (100%)

From Table 9, it was evident that bruises is the most common type (74.8%) of injuries occurred in the study participants, followed by head injury (9.7%) and buckling (4.4%).

Table 9: Distribution of injuries based on its type.

Type of injury*	n (%)
Fracture	16 (7.1)
Bruises	169(74.8)
Burns	7(3.1)
Buckling	10(4.4)
Ingestion foreign body	1(0.4)
Bite	1(0.4)
Head injury	22(9.7)
Total	226 (100)

Table 10 shows that most common mechanism of injury in the study participants was falls (21.6%). Handling of sharp objects resulted in injuries among 37 (16.5%) children. Seven children (3.1%) suffered injuries due to scalds,21(%) of them suffer injury due to sport,32 (14.2%) of them suffer injury due to clashing, 28 (12.4%) of them suffer injury due to braw and 44 (19.5%) of them suffer injury due to harming their self.

Table 10: Distribution of injuries based on mode of occurrence 226.

Variable	n (%)
Injuries due to sharp instruments	37 (16.4)
Injuries due to non-sharp instruments	7 (3.1)
Falls	49 (21.6)
Bite	1 (0.4)
Clashing	32 (14.2)
Sport	21 (9.3)
Hurt himself	44 (19.5)
Braw	28 (12.4)
Hot substance	7 (3.1)
Total	226(100)

Disability occur only for 16 (7.10 %) injuries, the others (42.9%) is mild in severity, which did not require admission in a health facility, and (50%) has resulted in scar or cairn, table .11.

Table 11: Distribution of injuries based on severity.

Variable	n (%)
Mild injury	97 (42.9)
Disability	16 (7.10)
Injury with cairn or scar	113 (50)
Total	226(100)

As seen from **table 12**, absenteeism from school due to injury was not common among the study population. For example, 150 (69.3%) of the injured students reported not been absent from school due to injury sustained. However, about 33 (49.3 %) reported been absent from school for less than one week due to injury, while about14 (20.8.0%)of them reported been absent from school for 1- 4 weeks, and 20 (29.9%) absent from school for more than 4 weeks. Table 12

Table 12: Period of absence from school due to injury.

Variable	n (%)
Absence due to injury	
Yes	67 (29.7)
No	159 (70.3)
Period of absence	
Less than one week	33 (49.3)
One-4 week	14 (20.8)
More than4 week	20 (29.9)
Total	67 (100)

DISCUSSION

The study showed that (58.9 %) of children had experienced injury during school which is considered high rate when compared 47.6% were injured in similar previous study (Christine Jildeh, et-al 2013). While this percent was decreased in other similar study, which revealed that 33.9% of students were injured (Mohammed ALBashtawy, et-al 2016). The variation in the incidence of injuries between countries could be attributed to many factors, such as different operational definitions of injuries, the location of injuries, study design, different age-groups, different data collection systems, and different study periods (Jildeh et al., 2013; Ming et al., 2012; Molcho et al., 2006).

The study found that, the proportion of injuries was more in female children (60.8%) compared to male children (56.8%) this finding disagreed with two similar study which found the proportion of injuries in male is higher than female; 53.5% boys versus 42.1% girls, (Christine Jildeh, et-al 2013). While in the second study, the figure for boys was 38.8%, compared with 28.4% for girls (Mohammed ALBashtawy, et-al 2016).

In this study, younger students, aged 10–15, had a higher incidence (66.2%) of injury than their counterparts, aged 16– 18. This agrees with other findings (Chen et al., 2005; Currie et al., 2009; Jildeh et al., 2013). Chen, Smith, Deng, Hostetler, and Xiang (2005) in China found that the rate of injuries decreased from 41.4% among school students aged 11–16 to 20.2% among those aged 17–18.

This current study revealed that most common mechanism of injury among students was falls (21.6%), which is considered lower than 52.1% injured due to fall in similar study, but both study agreed that fall is more mechanism for injuries of school children (Christelle & Michèle, 2014).

Regarding the part of the body injured, this study has shown that the upper limbs injuries were the most observed (39%) followed by the lower limbs injuries (34.0%) and the head injuries (23.40%). These observations disagreed with others studies dedicated to school-related injuries, which found the most observed were head injuries (Senterre, C., Dramaix, M. and Levêque, A. 2014).

This study showed that (33%) of the injury cases had been absent from school for less than one week, while in similar study (40%) of the injury cases had been absent from school for two days or more, including the day of injury (Erik & Ulf, 1991).

In this study, 45.8% of school managers perform first aids to their children after injury, 25% take them to hospital. While in similar study, self-treatment has been reported to be the most common way of treating injury in Vietnam (51.5%), even in severe cases (Hoang, 2004). The findings revealed that almost 69% of the students not received care after the injury occurred, which is considered a high percentage, as compared with 40% of

students not received care after injuries in similar study conducted in Jordan about Epidemiology of Nonfatal Injuries among Schoolchildren (Mohammed ALBashtawy, et-al 2016).

CONCLUSION

The prevalence of injuries was found to be higher among the school children, bruising and head injuries is dominated near half of schools perform first aids first aid to student when injured, while more than half of the students not received care after they injured that may favour occurrence of disability and other complications to students.

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