

Pattern Of Paediatric Holiday-Related Injuries: An Observational Study From King Abdulaziz Medical City Trauma Registry

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Abstract

The type of injuries that are observed in children vary on a seasonal basis and might, therefore, influence injury patterns. However, very little information is available on the pattern of injuries over the calendar year. This study aims to describe the holiday variations in children's injuries in Saudi Arabia. Using King Abdulaziz Medical City (KAMC) trauma registry records from between 2009-2014, we assessed the pattern of holiday-related injuries. Data were analyzed for the rate of injuries between groups of children who had sustained an injury during holiday and non-holiday seasons in term of age, gender, type of injury, shift hours, and mortality. A total of 1,762 injury-related admissions were included, of these around 531 injury-related admissions occurred during the holiday with an average of 1.6 admissions per day, compared to 1.5 admissions per day during non-holiday periods. There was no difference between the rate of injury-related admission during the holidays and non-holidays in terms of age, gender, and mortality. Traffic-related injuries were the most common among the study population. The purpose of this study was to assess the patterns, mechanisms, demographics, and mortalities of paediatric trauma injuries during school holidays vs. non-school holidays. The results suggests that there were no significant differences between trauma-related admission in holiday and non-holiday periods with the exception of the higher percentage of road-traffic related trauma injuries that presented in the holiday period. This suggests further improvements to the preventive program should be implemented to control certain behavior and activities and to reduce such injuries.

Keywords: paediatric, injuries, holiday, trauma, patterns

INTRODUCTION

Injuries are recognized as constituting a major health problem around the world and continue to be the most common cause of mortality and morbidity among the pediatric population (Anon 2017; Borse and Sleet 2009; Mansuri et al. 2015). Trauma constitutes a significant portion of preventable paediatric emergency department visits (Ansari et al. 2000; Mansuri et al. 2015; Shanks, Ansari, and al-Kalai 1994). Previous studies have found that 16% of trauma patients were less than ten years old, while road traffic accident accounted for 30% of trauma cases in children below the age of 12 years (Ansari et al. 2000; Mansuri et al. 2015; Shanks et al. 1994). Over the past two decades, data has indicated that 7% of the injuries incurred during road traffic accidents in Saudi Arabia result in permanent disabilities and loss of productivity, which contributes to the economic cost of such accidents (Mansuri et al. 2015).

Although many research studies have estimated the prevalence of trauma in children and its associated

risks (D'Ippolito, Collins, and Comstock 2010), little information is available on the child injury patterns that can be observed during occur the calendar year in Saudi Arabia (Alnasser et al. 2013). As such, there is a lack of understanding as to whether external circumstances may increase the risk and severity of child-related trauma. During holidays, in particular, children participate in many indoor and outdoor activities with their friends and family. Previous studies that have assessed patterns of pediatric trauma during holidays in the U.S have recorded an increase in major traumaincidents (Barr 2014; D'Ippolito et al. 2010; Kimia et al. 2009) at this time of year. In Australia, research has also found that falls increase during school summer vacations (Janssen and Burns 2013). In Saudi Arabia, previous studies have found that the fall season was the busiest time of the year for the emergency departments(ED), accounting for 30% of all emergency department visits (Rehmani and Norain 2007). Previous studies have also examined injury variations in the Hijri month of Ramadan, and found no variations between injury prevalence during this period in comparison to the

rest of the year, with the exception of the type of systems involved (Alnasser et al. 2013). To our knowledge, there were no studies have previously evaluated injury patterns in children during specific holidays including school holidays and national holidays in Saudi Arabia despite the presence of reports that support the link between holiday and increase rate of trauma. It is important to determine the impact of holidays on the pattern of pediatric injury locally and internationally to allocate any preventative measures based on evidence. The aim of this study, therefore, was to assess the patterns, mechanisms, demographics, and mortalities of pediatric trauma injuries during school holidays vs. non-school holidays. Such research can drive the development of preventative measurements that minimize the occurrence of such injuries and enhance the care provided in the ED.

METHOD

Data Source and Study Design

A retrospective observational study was carried out at the Emergency Care Centre at the King Abdulaziz Medical City (KAMC) in Riyadh, Saudi Arabia, that spanned a six-year period from January 2009 to April 2014. The KAMC Trauma Center is one of the largest and best trauma care centers in Saudi Arabia. The KAMC Trauma Registry is a prospectively recorded database of all trauma patients admitted to the hospital. The data collected includes demographic patient's information, anatomic and severity of the trauma, and the outcome of the trauma (admission to the hospital or ICU, discharge, death).

In this study we extracted information on all pediatric patients aged 14 years and below who presented with injury and who have been admitted to the hospital. The following variables were extracted from the KAMC Trauma Registry: age, gender, date and time of presentation, site, and mechanism of the injury. Data regarding the patient's outcome, including death, was also obtained. Age was categorized into five groups: less than 1 year (infant), from 1 year to 2 years (toddler), from 3 to 5 years (preschool), from 6 to 12 years (school), and more than 13 years (adolescents). Injuries were categorized into different categories based on the mechanism of injury as follows: fall, burn, traffic-related injury (include motor vehicle accident, motorcycle, and pedestrian accident), penetrating injury (including gunshot, stab and sharp object), physical injury (injury because of falling or being hit by an object, sports or fighting injury), and drawing.

The time of presenting to the trauma center was categorized using three categories that were based on the shift hours at the center: Morning shift from 8 am to 3:59 pm, afternoon shift from 4 pm to 11:59 pm, and night shift from 12 am to 7:59 am.

To describe the patterns of holiday-related injury, we divided all pediatric trauma patients into two groups based on the date of the injury: those who were injured during holidays and those during non-holidays. A further subdivision was used depending on the type of holiday days: summer, mid-year, spring break and public holiday (Eid Alfeter, Eid Aladha, and National Day). The holiday dates were provided by the Ministry of Education and Ministry of Civil Services (Supplement Table1). However, because there was some overlap between some of the holidays, for example, the Eid Alfeter holiday fell within the summer holiday, those days were recorded as Eid Alfeter holiday.

Statistical Analysis

Means and standard deviation (SD) were used to summarize continuous variables and categorical variables were summarized in the form of proportions and frequency tables. To compare the characteristics of the patient population in terms of age, gender, type of injury, shift hours, and mortality between groups of children who were injured during holiday and non-holiday seasons, a chi-square test statistics was used. The level of significance was set at a P-value of less than 0.05. The average number of injury-related admissions was calculated by dividing the total number of admissions for a given period (either holiday or non-holiday) by the total number of days in the same period. Data analyses were conducted using STATA 12.0 (College Station, TX).

RESULT

During the study period, a total of 1,762 injury-related ER presentations were admitted to KAMC, with an average of 1.5 (SD 0.8) admissions per day. The mean age of the patients was 6 ± 4 years and the majority of the study population was male (68 %). After dividing the time of injury into holiday and non-holiday periods, around 531 injury-related admissions occurred during the holiday season with an average of 1.6 (SD 0.9) admissions per day compared to 1.5 (SD 0.8) admissions per day during the non-holiday period. Holidays were not associated with an increased rate of trauma-related admission compared to the non-holiday period (IRR =1.00, 95% confidence interval 0.90 to 1.10).

The demographic data and baseline characteristics of the children involved in this study are represented in Table 1. The greatest proportion of injuries was sustained by children of school age (41% during holiday season compared to 38% during the non-holiday season). Of all holiday-related injuries admitted to the hospital, an estimated 3% resulted in deaths. There was no statistically significant difference between the children who were admitted during the holidays and the non-holidays in terms of age, gender, and mortality.

However, there was a statistical difference between the types of injury among children who were admitted to the hospital during holidays compared to those who were admitted during non-holidays ($P=0.02$). Thus, traffic-related injuries were the highest type of injury categories among the study population, representing 37% of holiday-related trauma and 31% of non-holiday-related trauma injuries. The separate P value for each pairwise comparison with the baseline category for each type of injury is given in supplementary Table 2. Injured children who were admitted during the holiday period were 33% more likely to have traffic-related injuries than children who were admitted during non-holiday periods compared to the baseline category (burn-related injury). Similarly, there was a statistically significant difference between holiday and non-holiday periods in terms of the working shift (overall P value <0.001) (Table 1). Thus, ER visits were 39% higher during the night shift (between 12 am to 7 am) during the holiday period than the non-holiday period (Figure 1).

Table 2 presents the characteristics of holiday-related injuries by holiday types. These injuries were the cause of 57% of spring break injuries and 41% of public holiday cases. Figure 2 demonstrates the number of injury-related admissions per type of injury during each holiday type. Extremities followed by head injuries were found to be more common during both holiday and non-holiday periods compared to other injury sites (Figure 3). Figure 4-A&B depicts the monthly and daily variation in injury-related admissions. The highest number of injury admissions were in September (169 admissions), while the lowest were in December (112 admissions), which can be explained by the fact that fewer injuries occurred during the winter season.

DISCUSSION

Main Finding

In this observational study, we examined the pattern of admissions due to pediatric injuries during holiday- and non-holiday periods between January 2009 and April 2014 in Saudi Arabia. The data shows that the majority of the children who admitted to the hospital as a result of injury were boys and most of them at school age. There was no differences in the rate of admission related to trauma during holiday and non-holiday periods, however, there was a difference in the type of trauma-related injuries during the holidays, with traffic-related injuries being the most common. This study also shows that ER visits were 39% higher during the night shift during the holiday period than they were during the non-holiday period.

Limitations and Strengths

As with most observational studies, this study has some inherent limitations. The first of these concerns

the fact that the KAMC Trauma Registry Database covers cases that are presented within the KAMC Trauma Centre only and do not account for injuries that may have been untreated or were treated outside this center. The data used in this study, therefore, underestimates the actual incidence of holiday-related injuries in Saudi Arabia. However, KAMC Centre is considered to be the largest emergency center in the capital city, and it does capture the most acute and severe cases of injury. Although the generalizability of our results is limited to those who live in the capital city, we don't anticipate the pattern will be different from that observed in other cities in Saudi Arabia because the characteristics of the population throughout the country are common. Many previous studies have utilized the KAMC Trauma registry database for many injury outcomes (Alghnam et al. 2014; Alnasser et al. 2013; Brown et al. 2006; Gad et al. 2011).

Despite these limitations, the KAMC Trauma Registry Database is considered to represent a complete and reliable source of data from which we could identify and extract a large amount of meaningful information on the type and mechanism of injuries with minimum missing data; as such, it provides a valid source of data that can be employed to assess the patterns of injuries in Saudi Arabia.

Comparison with other Studies

Although this is the first study of its kind to compare the rate of injury-related admission across the holiday- and non-holiday seasons in Saudi Arabia, a previous study has examined the injury prevalence during one month (Ramadan) and compared it to the injury rate during the rest of the year (Alnasser et al. 2013). The author of that study indicated that the findings were limited because the last half of Ramadan is a national holiday during which many people return to their hometown; as such, the actual rate of injury during Ramadan may have been underestimated. As such, in this study, we attempted to minimize such an error in classification by dividing the calendar year into holiday seasons on the basis that this could produce the best estimate of injury rate during each season.

In the present study, we found that boys were more likely to be admitted due to injury than girls. This finding was consistent with previous studies that have been conducted in Saudi Arabia (Alnasser et al. 2013; Gad et al. 2011; Pecllet et al. 1990).

RTA injuries were the most common type of injury in our study population and the highest cause of injury during the holiday season. Previous research has concluded that RTA represent the major cause of trauma in young adults and children in Saudi Arabia as well other countries (Ansari et al. 2000; Brown et al. 2006; Gad et al. 2011; Shanks et al. 1994; Spady

et al. 2004). Other studies have found that falls and burns are also a common cause of injury in children, which is consistent with the finding of the current study (Gari et al. 2012; Spady et al. 2004). The consequences of these trauma injuries can be severe and may lead to permanent disabilities and, subsequently, act as a more economic and personal burden on society (Ansari et al. 2000). In the present study, we were unable to identify the actual cause of death; however, the majority of previous studies indicated that RTAs account for a considerable cause of mortality in children with injuries (Gad et al. 2011; Pecllet et al. 1990).

This variation could be explained by extrinsic risk factors, including time of the season, weather, and the changes in lifestyle that take place during the holiday season (Barr 2014; D'Ippolito et al. 2010). The latter of these, which refers to changes in sleeping patterns whereby many people stay up later at night and sleep for longer in the morning, could also contribute to the high percentage of ED visits during the night shift.

Previous studies from different countries have examined the rate of injuries during holidays. A report from the USA ED described the epidemiology of holiday-related injuries among children and concluded that the majority of injuries that occurred during the holiday period were not holiday-specific but were associated with more general activities (D'Ippolito et al. 2010). On the contrary, alternative studies have indicated that holiday-specific injuries, for example those caused by fireworks, are more frequent and severe than those that occur during non-holiday seasons (Witsaman, Comstock, and Smith 2006).

CONCLUSION

In conclusion, there are no significant differences between trauma-related admission during holiday and non-holiday periods with the exception of the higher percentage of RTA during the holiday period. This has clinical and public health implications in terms of the need to raise awareness of the risk of RTA occurring during the holiday period and the impact the resulting disabilities can have on this younger population and the economy as a whole. More epidemiological studies are required to assess the national incidence of trauma-related injury in pediatric groups, and such research will facilitate planning prevention programs and maximize emergency care resources throughout Saudi Arabia.

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