ORIGINAL ARTICLE

STATISTICAL ANALYSIS OF INFANTILE-JUVENILE ORTHOPAEDIC TRAUMA IN A TROPICAL METROPOLIS' ORTHOPAEDIC EMERGENCY ROOM

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SUMMARY

Trauma is an important worldwide public health problem due to its high morbidity and mortality rates. This study considered only musculoskeletal traumas in patients under the age of 18 years old, assisted in an emergency room of a hospital in the city of São Paulo, within the period of October 2000 and June 2001, totaling 340 protocols. The objective of the study was to allow a better knowledge about trauma characteristics, providing an appropriate healthcare planning, costs reduction, and the establishment of preventive measures. The injuries found were divided into mild or severe. The scholar age group was the most affected one, totaling 40% of the care provided, with falls being the main trauma mechanism found. The most favorable environment for accidents was home, and the ends were the most affected parts of the body, both in cases of mild and severe trauma. Approximately 64% of the cases were mild. The most common kinds of trauma were contusions, followed by fractures and sprains. Among the infants, the major trauma mechanisms are traction, pressure and aggressions, mostly performed by their own relatives.

It was concluded that even if the child is followed up by an adult, this cannot avoid the occurrence of accidents, or interfere on trauma severity.

Keywords: Trauma; Accidents Prevention; Accidents at Home, Accidental Falls.

INTRODUCTION

Trauma is an important medical-social problem and must be considered as a major concern for public health, both because of the number of deaths it may cause and because of its sequels(1). In American children, trauma accounts for 50% of deaths(2), being the major isolated cause of morbidity-mortality in children, exceeding all other related causes(3,4,5). Statistically, for each dead child, four carry permanent sequels(6). Traumatic injuries affecting only the musculoskeletal system rarely determine a risk of death for a patient, but they can determine important functional damages(7). A better knowledge of the characteristics involving trauma may be useful for an adequate planning for care, costs reduction, and for the establishment of a preventive policy to the infantile-juvenile population in a metropolitan region, such as São Paulo. The objective of this study is to analyze the epidemiological profile of patients younger than 18 years old, victims of trauma uniquely compromising orthopaedic structures.

MATERIALS AND METHODS

Patients assisted during the period of October 2000 to June 2001 at the Central Hospital of the Irmandade da Santa Casa de Misericórdia de São Paulo, had their data collected for filling in the following protocol (Healthcare Service Protocol).

The protocols were attached to healthcare records of patients under the age of 18, and were filled in by in-charge orthopaedic doctors and their data were compiled by the researchers. With the objective of better analyze the kind of injury, they were divided into two subgroups, categorizing them as mild or severe. Mild injuries corresponded to diagnostics of contusion, sprain, arthralgia, scratch, myalgia, foreign body presence, ligament rupture, and erythema or ecchymosis; while severe injuries are: fracture, dislocation, subdislocation tendinous injury, cut-contuse injury, gun shots, peripheral nerve injury, painful pronation, epiphysis detachment, and port-trauma bone necrosis.

RESULTS

Three hundred and forty protocols were duly completed, from which all gathered data could be used.

The distribution of healthcare provided during a week showed to be more often from Tuesday to Thursday, accounting for 56.3% of the cases within those three days, preferably occurring between 10AM to 4PM, with 60.4% of the healthcare provided.

Male gender was predominant, involving 54% of the cases compared to female gender, with 46%. Sixty-six percent of the patients were white, 17% mulattos, 14% black, and a minority of Asian (3%). Most patients were students (72.1%). Most of the accidents occurred at home (45%), followed by school (29%) and streets (22%).

Patients were subdivided by age groups, corresponding to zero to two years old (infants), 3-6 years old (pre-scholar), 7-12 years

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Healthcare Service Protocol for patients from 0 to 17 years old

Irmandade da Santa Casa de Misericórdia de São Paulo
Department of Orthopaedics and Traumatology – Pavilhão "Fernandinho Simonsen" – Emergency Room

1. Number of healthcare provided:
2. 2. Date: _____ 3. Time:_____
4.Name:
5. Birth date: _____/_____/_____
6. Gender: ☐M ☐F
7. Color: ☐White ☐Black ☐Yellow ☐Mulatto
8. Occupation:
9. Site of Accident: ☐Home ☐School ☐Work ☐Street Other
10. Was the patient under supervision of an adult person? ☐No ☐Yes – Who?

11. Mechanism of Trauma:
Trampling
Car accident
Aggression - Who?
Fall :☐High ☐Bicycle ☐Other
Other
12. Was the patient wearing any protective equipment?
☐ No ☐Yes - Which?
13. How did the patient arrive at the OER?
☐ Rescue ☐Own means ☐Brought by Third Parties Other
14.Diagnosis:
15. Approach: ☐Medication ☐Physical Therapy ☐Immobilization ☐Elective Surgery Emergency Surgery
16. Destination: ☐Outpatient care ☐Hospitalization ☐Dismissal
17. Responsible for healthcare: -
R

old (scholar) and 13-17 years old (adolescents). Based on this subdivision, prevalence (40%) was found among the scholar age group (Figure 1).

Falls were the most frequent mechanism of trauma, occurring in 54.6% of the cases. From these, 49% occurred from ground level (Figure 2). None of the patients assisted was wearing any kind of protective equipment at the moment of accident.

The kinds of injuries found were contusions in 46% of the cases, fractures in 30%, and sprains in 14%. Mild cases were predominant (64%). Regarding the injured body segment, we saw that distal ends of the upper limbs (wrist and hand) and of the lower limbs (foot and ankle) accounted for 54% of the total cases.

Among the approaches adopted, 97% accounted for medication and/or immobilization, 3% were submitted to elective surgery, and 0,3% required emergency surgery.

Proposed conclusion was dismissal in 58% of the cases, while 38% were referred to outpatient care and 3% were hospitalized.

By correlating gender to the kind of injury, we saw that among traumas resulting in severe injuries, 61% were found in male patients, while female patients accounted for 39% of severe injuries.

Falls were the mechanism of trauma most frequently observed in all places, reaching 64% of the cases occurred at home, and 53% of the cases occurred in the streets. In clubs, however, sprains were prevalent (37%). At school, 26% of trauma cases were due to sports activities, and 11% were due to aggressions. At home, 7% of the cases were due to physical aggressions. Trampling and car accidents accounted for one fourth of the trauma cases in the streets (Figure 3).

In all age groups, falls were prevalent as a mechanism of trauma. Infants were the only individuals suffering injuries due to traction (11%), in addition to the high incidence of prehension injuries (8%) and aggression (8%). Direct trauma presented a higher incidence among the pre-scholar age group, occurring in 13% of the cases. In the scholar age group, aggression accounted for 9% of the cases. Among adolescents, sports-related trauma occurred in 19% of the cases, and, in this subgroup, trampling corresponded to 8% as a mechanism of trauma affecting only musculoskeletal structures. Furthermore, this was the only group in which car accidents occurred (Figure 4).

At the moment trauma occurs, we noticed that the greater the age, the little the supervision of a responsible person, being of 77% in the infants subgroup and of 31% in the adolescents group. The presence of a relative (parents, uncles/aunts, grandparents or brothers/sisters) was prevalent in all age groups, except for the adolescents group, in which the supervision by a monitor (teacher, beadle, or other non-relative adult) was more frequent than care

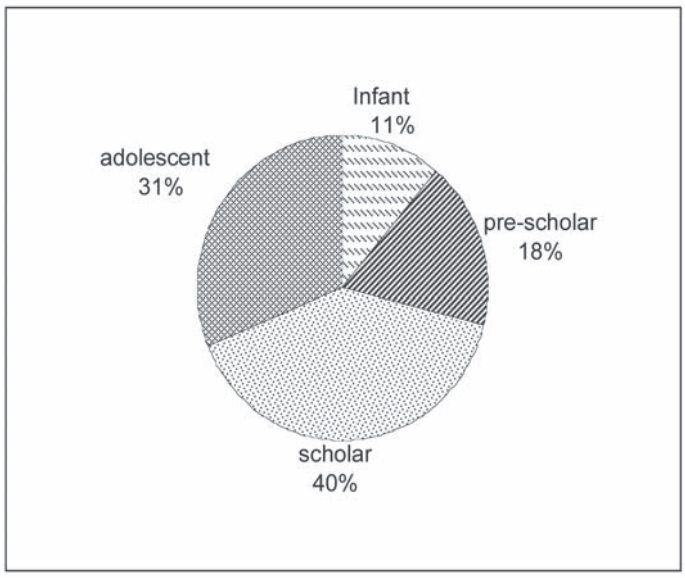

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Figure 1 – *Sample distribution regarding age group:*

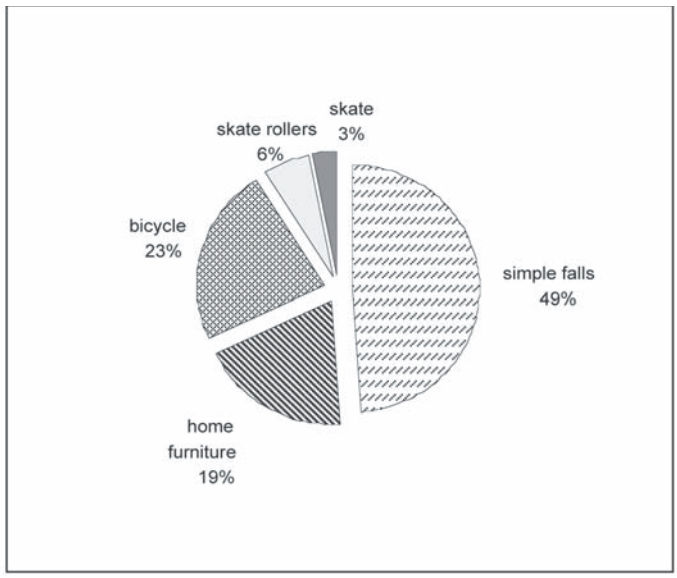

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Figure 2 – *Distribution of patients regarding the kind of fall (in %).*

provided by a relative, also being often the presence of a friend as the only company with the patient at the moment of accident. By correlating the presence of a care provider with the severity of injury, we saw that this person was present in 50% of the severe injuries and in 52% of the mild injuries. This datum has an odds ratio of 1.08.

With age, a reduction of the importance of home trauma occurred, while it increased in the school environment.

Among severe trauma, 50% occurred at home and 29% in the streets.

Falls were subdivided into: wheel-mounted toys (bicycle, skate, and skate rollers), home furniture (bed, TV set, and sofa), as well as high falls and simple falls. Among severe injuries, 45% corresponded to high falls, with 22% of this total being falls from wheel-mounted toys and 18% from home furniture. We noticed that among simple falls, 80% of the cases resulted in mild injuries.

DISCUSSION

The epidemiological study of traumatic affections in children assisted in an orthopaedic-only emergency room imposes an essential need for an adequate planning, prevention and treatment. In literature, not so many studies uniquely on orthopaedic trauma are found. Most of them address only polytraumatism cases in children assisted in general emergency services.

In a great healthcare center for trauma-victim children (The Children's Hospital of Alabama), the ratio of males and females assisted was 1.7:1 with a higher incidence during the Spring, most often from noon to midnight (79%) and among all cases of trauma receiving healthcare, 36% of the children presented with orthopaedic injuries[8]. Fonseca et al.[9], also found that boys are more exposed to risk agents and situations, being involved in a higher number of accidents[10,11]. In this study, a ratio of 1.2:1 was found among boys and girls, showing that even in orthopaedic-only traumas a greater exposition is seen among males. The prevalent assistance time occurred between 10AM and 4PM, especially from Tuesdays to Thursdays. This weekly distribution of healthcare can be explained by the fact that the hospital in which the study was conducted is located in a central area of the city, comprising a vast number of vertical residences, not allowing children to play or practice sports activities in the streets, those being performed at schools and clubs within this region, which are open during the working hours of the week.

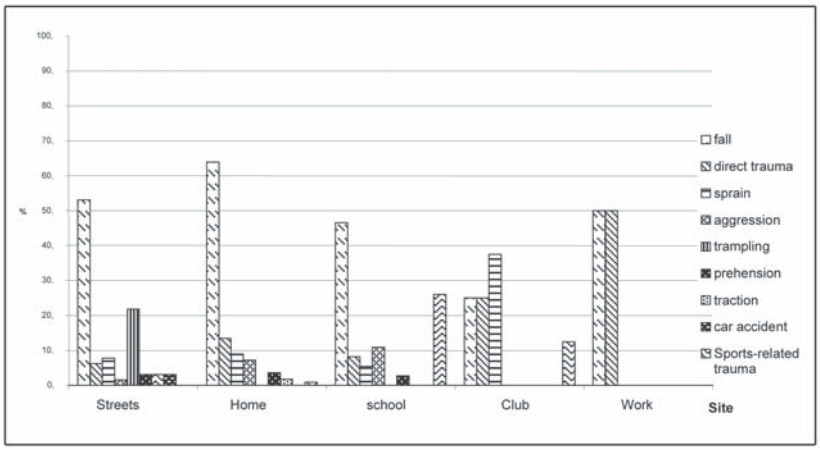
In the scholar age group, children experience a higher independence and integration with the society, tending to be more exposed to trauma[11,12]. This was the age group most frequently affected in our study, with 40% of the total healthcare provided.

Falls correspond to one of the main trauma mechanisms among children, usually following car accidents[11,12,13]. In this study, fall was the major trauma mechanism found, probably due to the fact that car accident-victim children are assisted by a team of multiple professionals, and, thus, for being polytraumatism patients of multiple systems, they were not included in this study.

The environment where most of the accidents occurred was home, as already shown by Ishi et al.[14], and this can be related to the lack of leisure areas within the region near the hospital. Another factor can be due to the false idea of safety at home. By forgetting to take simple care measures to avoid accidents, such as allowing children to play over pieces of furniture, many times high enough to trigger severe accidents in the absence of a care provider supervision[14].

According to Landin[15], a person's risk of suffering a fracture up to 16 years old is of 42% for boys and 27% for girls, with radius distal third being the most common fracture, followed by phalange fractures and hand bones fractures. In general, ends (hands, wrists, ankles and feet) were considered as the most frequently affected parts (54% of the total) in any kind of injury, either mild or severe.

Sports-related trauma accounted for 26% of trauma cases at school, occurring more often than in clubs. This datum is surprising, because one can presume that when a child is practicing a sport there is always a professional supervision, while, in clubs, this kind of supervision not always occur. Variables involved in the explanation of this fact range from the lack of vestments and proper equipment to inadequacy of places improvised for sports practice in the school or they simply reflect that the child is now performing most of sports-related activities at school than at clubs.



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GRAPH 3 – *Correlation between type of trauma mechanism and accident site (in %)*

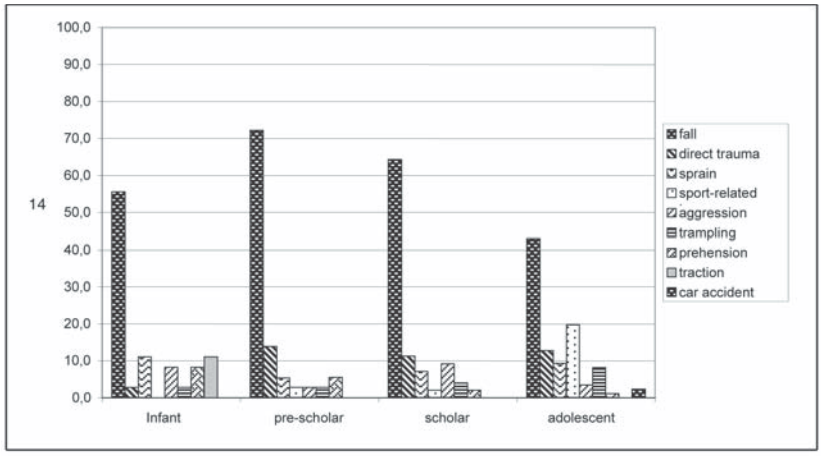

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Figure 4 – *Correlation between trauma mechanism and age (in %)*

Aggression was the second cause of trauma in schools (11%) and may be due to the fact that, in scholar age group, children perform a greater number of contact activities involving trauma, or may even evidence that urban violence begins at school.

Infants suffer traction, prehension and aggression as important mechanisms of trauma. This may occur due to an inappropriate way in which the child is driven (in cases of traction), when the care provider lifts the child by tractioning him/her by the hand in a reckless and undesirable manner; by the exposition and vulnerability resulting from the immaturity and lack of attention in cases of prehension (meaning, compression) deflagrated by the complexity of requirements for taking care of a child, many times leading to emotional breakdown and negligence by a care provider and, finally, in case of aggression, because the child cannot defend him/herself.

Aggression corresponded to 72% of the domestic trauma, which confirms the findings by Pascolat et al.[16], when they state that the child is beaten mostly by parents, who justify their actions as a way to raise them and impose limits. Some cases present association to bone fractures, many times typical and highly suggestive of children aggression, and therefore, an evaluation by an orthopaedist is important. This professional must be qualified to identify those aggressions and even to investigate if there are signs of multiple fractures or not in different stages of union, which may characterize the so-called Battered-Child Syndrome[17], the reporting of which is compulsory for the health professional. For Novkov and Kaneva[17], prognosis is better in children below three years old, since the pediatric and parent's follow-up is done in an attentive manner.

It is also very important to ascertain that even if a child is being cared by an adult this does not interfere on the severity of trauma (odds ratio= 1.08), because, even with their presence, 50% of severe injuries and 52% of mild injuries occurred. That is, being under adult's supervision does not mean being protected against accidents, and it is required to set public campaigns to provide guidelines on care and prevention of accidents.

Trampling is a very common mechanism of trauma among urban population of all ages, with children being affected in 27% of the cases, according to the case series of Kong et al.(18). In this study, trampling occurred only in the adolescents age group, which does not reflect the real population incidence, being probably explained by the previously discussed fact that children with polytraumatism cases were not included in this study.

CONCLUSION

We can conclude that the orthopaedic trauma cases assisted in the Orthopaedics and Traumatology Emergency Room of a major metropolitan Hospital were often mild, mostly affecting limbs ends, with no interference on severity by the presence or absence of a care provider. We also found that there is a great importance of domestic environment as the place occurring accidents, and that falls are the major mechanism of trauma, determining the need of communicating guidelines and prevention programs in order to better protect children.

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