Original Article

Road traffic injuries among children in Dakar, Senegal

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ABSTRACT

***Background**:* Road traffic injuries (RTI) are a major public health problem and contribute significantly to the global burden. The aim of this study was to assess the frequency of RTIs in children and to determine their socio-demographic and lesional characteristics.

Patients and methods: This was a retrospective and descriptive study over a two-year period from January 2015 to December 2016 conducted at the Department of Paediatric Surgery at the Aristide Le Dantec Hospital in Dakar. Included were all children under the age of 16 victims of a RTI. We studied various parameters relating to the victims (sex, age, education) and the accident (location and time of occurrence of the accident, circumstances and mechanism, duration of admission to the emergency unit, localization and type of lesion). The data was entered and processed using Microsoft Office Word and Excel 2010 software.

***Results**:* Among the 425 cases received, 62.6% were boys and 37.4% girls. The average age of the children was 7.7 years. RTIs occurred mainly in pedestrian (63.8%) who wanted to cross the road. There were more accidents in the city-center area (64.9%) and during afternoons (61%). Lesions of the soft parts (wounds, contusion and decay) were predominated (89.6%) followed by fractures. The upper limbs were the main locations of trauma.

***Conclusion**:* RTIs are common among children in Dakar. Boys crossing roads are the largest number of victims. Soft tissue trauma predominates and is mainly found on the thoracic limbs.

INTRODUCTION

According to the World Health Organization (WHO), every four minutes a child dies prematurely on roads and hundreds more were injured, many seriously.[1] Road Traffic Injury (RTI) is one of the top four causes of death for all children over five, especially in developing countries where occur 95% of children deaths due to RTIs.[1, 2] Children are exposed to these traumas regardless of age with male predominance.[1,2,3,4,5,6,7,8] In Africa, and Senegal in particular, the phenomenon continues to grow. In the capital city, Dakar, there is a clear increase in the prevalence of these injuries. Ka *et al* reported on 75 cases of RTIs in children from 1997 to 2000 over a period of four years at Principal Hospital of Dakar (HPD).[4] Mohamed *et al* reported on 615 cases in three years (between 2009 and 2011) at the University Hospital Aristide Le Dantec (HALD).[3] Children pedestrians or passengers are the main victims.[3,4,56,8]

Our study aims to assess the frequency of RTIs in children and determine their socio-demographic and

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lesional characteristics in the Paediatric Surgery unit of Aristide Le Dantec University Hospital in Dakar (HLD).

PATIENTS AND METHODS

We conducted a retrospective and descriptive study over a period of 24 months, from January 1, 2015 to December 31, 2016 at the Paediatric Surgery Department of Aristide Le Dantec University Hospital in Dakar. All children under the age of 16 who were victims of a RTI were included in the study. We utilised the register of consultations of the Emergency Unit to collect demographic and lesion parameters. Sociodemographic aspects included sex, age divided into three brackets, 0-5, 6-10, and 11-15; schooling, the accident site (downtown, suburbs, highway, outside Dakar), the time of the accident spread in four tranches (between midnight and 6 am, between 7 am and 12 pm, between 1 pm and 6 pm and between 7 pm and midnight), the circumstances of the accident (crossing the road, during a fun activity on public roads, fall or shock vehicle's), the mechanism (Collision between car or car and pedestrian, between scooters or between scooters and pedestrians, pedestrian or during a jostling) and the type of car involved (taxi, bus, truck or individual); time for admission of children (less than 6 hours, between 6 and 12 hours, between 13 and 24 hours and beyond 24 hours). Lesional aspects studied were the type of lesion and location of the lesions. Data entry and processing was done using Microsoft Office Word and Excel 2010 software.

RESULTS

During our study period, 425 children victims of RTI were enrolled, representing 10.73% of all Paediatric Surgery Emergency Unit visits. There were 266 boys and 159 girls, a sex ratio of 1.6. The average age of the children was 7.7 years with extremes ranging from one year to 15 years. The age group of 6 to 10 years was the most represented (Figure 1). Nearly half of our patients (n=207) were in school, the majority of them in elementary school (66.7%) followed by children in secondary school (29%) and then kindergarten children (4.3%). The majority of accidents (64.9%; n=276) occurred in downtown (Table I). The location of the accident was not specified in 73 patients (17.2%). More than half of RTIs (61%) occurred in the afternoon between 1 pm and 6 pm, time slot followed by morning between 7 am and 12 noon (26.5%) and at night between 19 pm and midnight (12%). Two cases were recorded between midnight and 6 am. In our series, the majority of accidents (63.8%) occurred while the child was crossing the road (Table II). RTIs victims' were mostly pedestrians (Figure 2). Vehicles were criminalized in 61.6% of cases (n=262). This was a particular vehicle in half of cases (52.7%), a taxi in 32.8% of cases, a bus transit in 12.2% of cases and a truck in 2.3% of cases. Three hundred and fifty-eight patients (84.2%) were received in consultation in the first six hours of accidents (Figure 3). In our series, there were 381 cases (89.6%) of soft tissue injuries, of which superficial wounds in half (50.1%) and contusion (36.2%). The skeleton was reached in 52.7% of cases (n=224) with a predominance of fractures (Table III). In the thoracic limb, the clavicle was the preferred seat of fractures (35.5%), followed by the elbow and the forearm with respectively 19.3% and 13% of cases (Figure 4). Regarding the pelvic limb, both bones of the leg were the most affected (65.1%); then the femur (20.5%) and foot bones (14.4%).

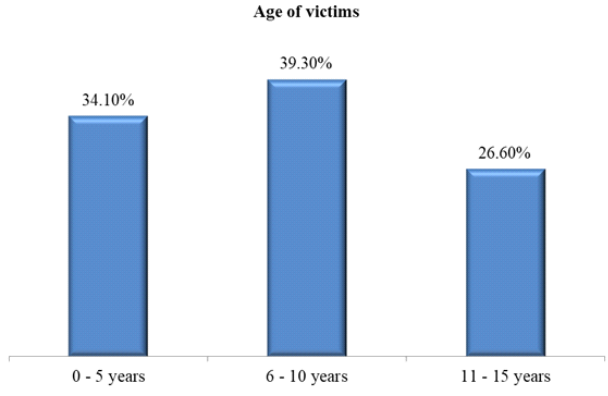

Figure 1: Distribution of RTIs by age group

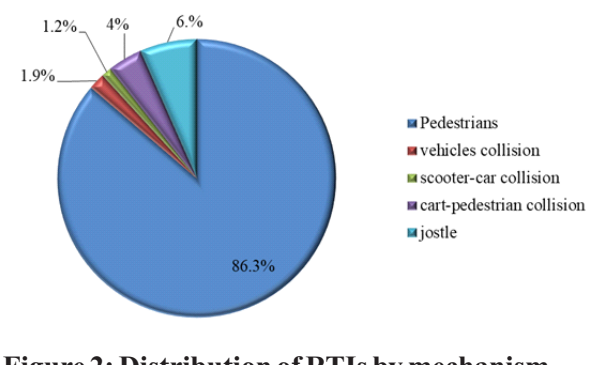

Figure 2: Distribution of RTIs by mechanism

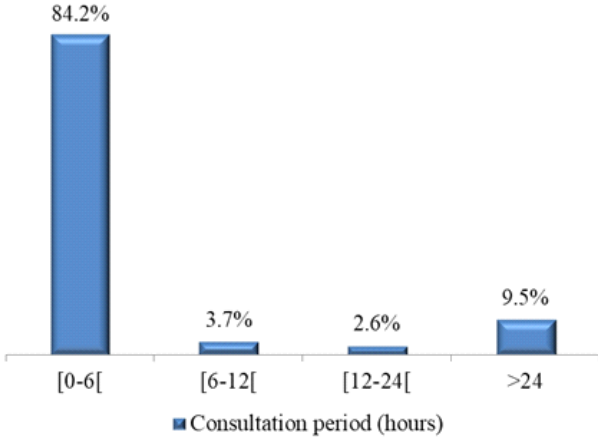

Figure 3: Distribution of patients by the consultation period

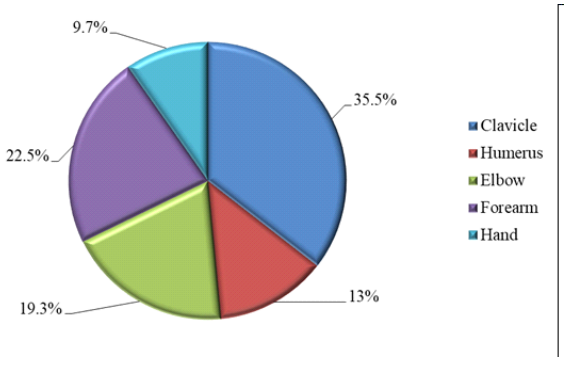

Figure 4: Seat distribution of thoracic limb fractures

Table 1: Distribution of RTIs by place of occurrence

Location of the accident	Effective	Frequency (%)
Downtown	276	64.9
Suburbs	44	10.4
Freeway	25	5.9
Outside-Dakar	7	1.6
Unspecified	73	17.2
Total	425	100

Table 2: Distribution of RTIs according to the circumstances of the accident

Circumstances	Effective	Frequency (%)
Crossing the roadway	271	63.8
Street game	115	27
Fall of a device	25	5.9
Collision between two vehicles	14	3.3
Total	425	100

Table 3: Distribution of skeletal lesions

Seat and type of lesions	Effective	Frequency (%)
Fractures		
Thoracic limbs	62	27.7
Pelvic limbs	132	59
Basin	7	3.2
Total	201	89.9
Luxation		
Calcaneus	1	0.4
Elbow	1	0.4
Hip	1	0.4
Total	3	1.2
Sprain		
Ankle	18	8
Multiple seat	2	0.9
TOTAL	**224**	**100**

DISCUSSION

Our study is in addition to those performed in the Paediatric Surgery department of Aristide Le Dantec University Hospital and the Principal Hospital in Dakar (HPD) examining the incidence of RTIs in children, groups at risk, the associated risk factors

and lesional consequences.[3,4] Over a period of two years, our study shows that RTIs taking on disturbing proportions in children in Dakar. Four hundred and twenty-five cases were collected during our study period, an annual incidence of 212.5 cases. This increase is explained by the increasing number of vehicles and traffic in the city of Dakar, but also by speeding driver, the non-respect of traffic rules by drivers and the carelessness of children who use the streets as a playground. WHO implicates, especially in middle-income countries, the construction of road infrastructures that do not take into consideration the needs of communities where these are constructed.[1]

These injuries represent 10.73% of all consultations of the Emergency Unit of the service. Our result is identical with that reported in several series in the literature.[4,5,6] This rate does not accurately reflect the number of child victims of road injuries in Dakar. Indeed, other hospitals take care of child victims of RTIs, in particular, cranio-encephalic trauma.

Male predominance has been reported in several series, which confirms our study.[1,3,4,5,6,7,8,9,10,11,12,13] This male overrepresentation would be linked to physical differences and temperament, predisposing boys to be usually accident victims.[1,3,4,5,6,7,8,9,10,11,12,13,14] In the Senegalese context, it's boys playing on the street while girls are confined to household chores at home, which in some ways explains their low representation. We noted a high frequency among elementary school children. This is also noted in other developing countries such as Côte d'Ivoire and Gabon where the average age is respectively 8 and 9 years.[8,5] Before the age of 5, children are rigorously supervised at school or at home, and are therefore less exposed to RTIs. On the other hand, the older ones escape this surveillance and set up public roads as playgrounds. Some factors such as recklessness, unawareness of danger and the lack of vigilance of the parents makes these children victims of the road. Several series found similar results.[3,4,5,7,8,9] In our series, the majority of RTIs occurs in the busy commercial downtown areas and in the afternoon between 1 pm and 6 pm. The high frequency of these accidents in downtown is linked to the high concentration of road traffic in this area and the proximity to several schools. We report, as in several other series, a frequency of RTIs in the morning and afternoon, corresponding to peak hours and intense activities.[3,6,12,13] Children who are victims of RTIs are most often pedestrians who want to cross the road. Several authors also recorded a large majority of pedestrian RTIs struck by a vehicle or motorbike.[1,3,4,5,6,7,8,9,11,13,15] Almost all of the victims received emergency care soon after their trauma. This is probably related to the high frequency of RTIs in the downtown where most hospital services are located. The pelvis and limbs the common location of the injuries in our patients. This predominance can be attributed to the high number of pedestrians. In the literature, head injuries predominate in RTI trauma followed by the pelvis and limbs.[5,6,7,9,11,12,13] There was a selection bias in our series because children who are victims of head trauma in Dakar are referred to the Neurosurgery Department. According to Abdou Raouf *et al*, a volume ratio of the head to the rest of the body and the lesser development of the axial musculature make the head the point of preferential impact in cases of trauma in children.[5] Lesions of the soft tissues (wounds, contusions) predominate compared to bony lesions in our series. Our results agree with those of several works who place minor lesions as the commonest type.[5,11] In our series, fractures predominate in skeletal lesions and preferentially of the pelvic limbs. Oubeja at Rabat in Morocco, Abdou Raouf at Libreville in Gabon and Törő in three cities of Europa (Budapest, Vilnius and Tallin) reported the same result.[11,5,7] Fractures remain the most common lesions during road injury in several series in the literature.[3,16,17]

CONCLUSION

Pedestrian children are particularly vulnerable to road accidents. This trauma occur as the child crosses the roadway or plays in the street. Lesions occur mainly after a fall and it is most often

superficial lesions and fractures sitting on the pelvic limbs. This descriptive research demonstrates the urgent need for analytical studies on risk and protective factors, to develop monitoring plans, prevention and management of these injuries.

Conflicts of interest: None.

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