Epidemiology of Fractures in a Tropical Country

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Abstract

Introduction: The increasing number of vehicles and the proliferation of two-wheeled vehicles accentuate the frequency of fractures in our country. The aim of this study is to describe the epidemiology of fractures in Cotonou. Materials and Methods: This prospective two-year study focused on all patients admitted to the emergency department of the National Teaching Hospital of Cotonou for a fracture injury. Results: 1794 fractures were collected in 1432 patients. Fractures accounted for 24.9% of surgical emergencies. The average age was 33.7 years (29 days - 90 years). The dominance was male with a sex ratio of 3.62. Etiological circumstances were dominated by road traffic accidents (75.8%), The etiological circumstances were dominated by road accidents (75.8%), motorcyclists being the most affected (48.5%). The admission average was 27.33 hours (15 minutes - 29 days). Fractures preferentially sat on the lower limbs (64.4%). In descending order of frequency, were distinguished the fractures of leg (32.2%), of the femur (19.8%) and of the forearm (14.8%). Conclusion: fractures are common. The etiologies are dominated by traffic accident. The lesions predominate in the lower limb. The establishment of good road safety policy

(improving track conditions, extension of the highway code ...) would reduce their frequency.

Keywords: Fractures; Epidemiology; Traffic Accident.

Introduction

Fractures are a major health problem. Indeed, with the increasing modernization of means of transport, road traffic and the mechanization of all sectors of the economy, there is an increase in the frequency of fractures. Their world incidence is 9-23/1000/year (Donaldson, 1990; Sahlin, 1990). In our environments, the increase of the car fleet and the proliferation of two-wheeled vehicles (Akomagni, 2011) increase the frequency of traffic accidents and therefore of fractures. However, the epidemiology of fractures is little known. Although in Western countries, numerous studies have been conducted on the subject (Donaldson, 1990; Fife, 1985; Johansen, 1997; Singer, 1998; Van Staa, 2001), in Africa, epidemiological data on fracture are still rare. Studies carried out on the continent have focused mainly on traffic accidents which are the main providers of fractures (Ouattara, 2001; Kaboro, 2008; Abdou Raouf, 2001). Few studies have addressed the issue (Abalo, 2009; Da, 2008). In Benin, data are almost non-existent on the subject. The aim of this work is to establish the epidemiological profile of fractures in Cotonou.

Material and method

Our study was conducted in the Emergency Department of the National Teaching Hospital of Cotonou, the national reference hospital of Benin. This was a prospective, descriptive study that covered the period from January 2012 to December 2013. It included all patients received for fractures during the study period. Diagnosis was based on data from the clinical examination of patients and especially x-ray images. All soft-tissue injuries and other diagnoses without bone lesions were excluded. The variables studied were: gender; age; profession; circumstances of the occurrence; interested bone; site of the fracture. The data collected were processed using Epi info 7 and Excel 2013 software.

Results

Frequency: On 10232 admissions, 5749 subjects present a surgical pathology and 1432 subjects of them had a fracture lesions, representing 14.0% of all admissions and 24,9% of cases of surgery.

Age and sex: The average age was 33.7 years with extremes of 29 days and 90 years. Patients aged 25-34 years, were the majority (30.3%) and 84.8% of patients were under 50 years of age (Figure 1).

The predominance was male (1122 men, 310 women) with a sex ratio of 3.62. This masculine predominance was constant at every age; However, the phenomenon is attenuated at the extreme ages, with sex ratio of 1.82 and 1.45 respectively in patients of less than 15 years and those of more than 75 years. (Figure 2)

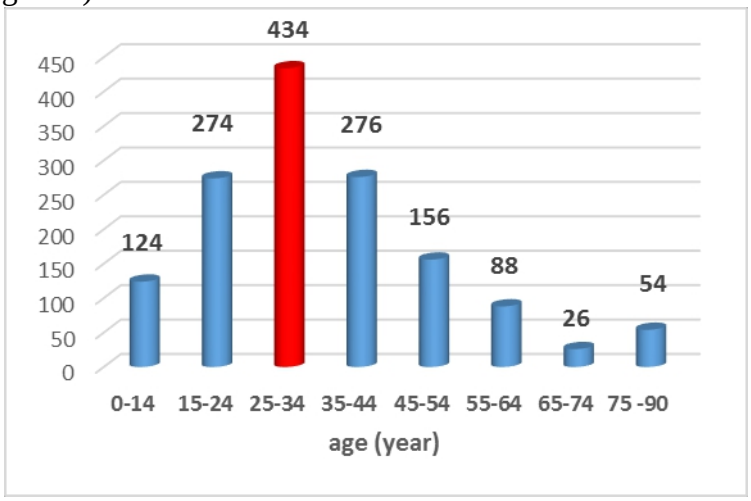

Figure 1: Patient distribution by age

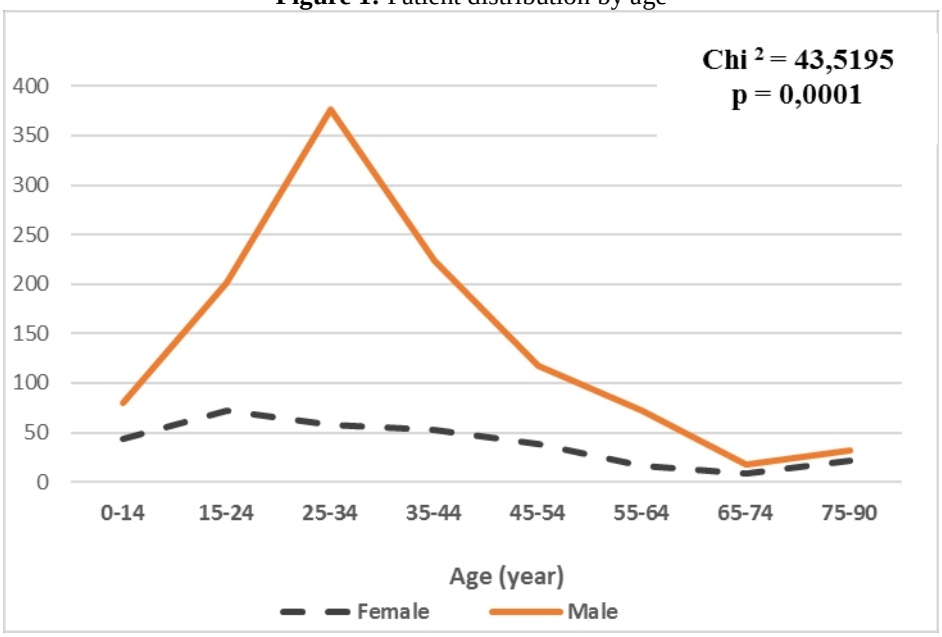

Figure 2: Patient distribution by age and sex

The profession: There were 280 civil servants (19.6%), including 152 lower-level managers (10.6%), 238 students (16.6%), 159 traders / dealers (11.1%), 152 taxi drivers (10.7%), 201 artisans (14.0%), 97 manual workers (6.8%),

41 farmers (2.9%), 19 security officers (1.3% (6.4%), 57 housewives (4.0%) and 96 patients unemployeds (6.7%).

Circumstances of occurrence: They were largely dominated by road traffic accidents with 75.8% of cases (Figure 3). These road traffic accidents were predominant in subjects aged 15 – 64 years. Before 15 years and after 74 years, they balanced with domestic accidents (Table I).

- Traffic accidents were pedestrian-motorcycle (14.4%), pedestrian-car (6.3%), motorcycle-motorcycle (19.3%), motorcycle-car (19.4%), fall from motorcycle (2.9%), car-car (2.9%), car-obstacle (1.7%) or skidding of a car (2.1 %). There were 296 pedestrians (20.7%), 694 motorcyclists (48.5%) and 96 motorists (6.7%).
- Household accidents comprised gambling accidents (2.7%), missteps (2.1%), slides (1.6%) falls on stairs (1.1%), falls from a chair (0.8%), falls from bed (0.4%), falls in height (0.7%) and falls from a high place (0.8%).
- Work accidents were falls of scaffolding or scale (2.5%), the receipt of a weight (1.7%) and accidents in factories (1.5%).
- Sports injuries were: football (1.5%), basketball (0.4%), gymnastics (0.7%), martial arts (0.4%)
- Other etiological circumstances were represented by firearms trauma (1.1%), bladed weapons (1.5%), blunt weapons (2.4%); But also pathological fractures (0.1%) and obstetric fractures (0.1%).

Admission time: It averaged 27.33 hours with extremes of 15 minutes and 29 days. 26.8% of the patients were received within the first two hours and 25.2% were received after 24 hours.

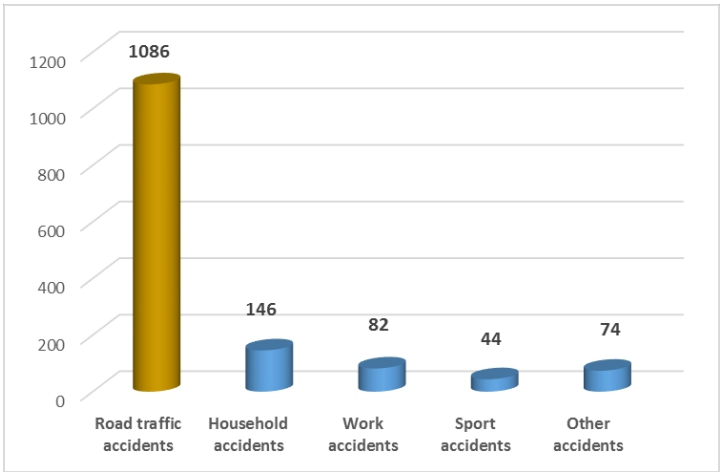

Figure 3 : Distribution of patient according to etiology

Table I : Distribution of circumstances according to age

Age (years)		RTA	HA	WA	SI	OA	Total	
							n	%
0-14		58	**52**	0	10	4	124	8,7
15-24		196	18	16	26	18	274	19,1
25-34		364	12	24	4	30	434	30,3
35-44		230	10	22	4	10	276	19,3
45-54		128	14	6	0	8	156	10,9
55-64		66	6	14	0	2	88	6,1
65-74		20	6	0	0	0	26	1,8
75 -90		24	**28**	0	0	2	54	3,8
	n	1086	146	82	44	74	1432	
Total	%	75,8	10,2	5,7	3,1	5,2	100,0	

RTA : Roads traffic accidents ; HA : Household accidents ; WA : Work accidents ; SI : sport injuries ; OA : Other accidents

The site of the fractures: 296 patients had 2 fractures or more; On a total of 1794, the fractures predominated in the lower limbs with 1156 cases (64.4%), followed by lesions of the upper limbs with 544 cases (30.3%) and then the head-trunk group with 94 cases (5.2%) ;

- In the upper limb, lesions predominated in the forearm with 266 cases (48.9% fractures of the upper limb, and 14.8% of all fractures); Among them, isolated involvement of the radius was the most frequent, 29% of the fracture of the thoracic limb (Table II).
- In the lower limb, fractures of the leg were the most frequent, 578 cases being 49.9% of fractures of the lower limb and 32.2% of all fractures. Simultaneous involvement of the tibia and fibula predominated in this table (29.9% of fractures of the lower limb). The femur comes second with 356 fractures, ie 19.8% of all fractures (Table III).

At the head and trunk, the lesions predominated in the skull (24 cases) and then in the ribs with 22 cases (Table IV).

Table II : Distribution of fractures of the upper limb

		Number	% upper limb	% all fractures
Humerus	Clavicle	60	11,0	3,3
	Scapula	5	0,9	0,3
	Proximal Humerus	28	5,1	1,6
	Humeral diaphysis	49	9,0	2,7
	Distal Humerus	24	4,4	1,3
Forearm	Radius	158	29,0	8,8
	Ulna	32	5,9	1,8

	Radius + ulna	76	14,0	4,2
Hand	Carpus (scaphoïd)	6	1,1	0,3
	Metacarpal	59	10,8	3,3
	Phalanges	47	8,6	2,6
	Total	544	100,0	30,3

Table III : Distribution of fractures of the lower limb

		Number	% lower limb	% all fractures
Femur	Pelvis	72	6,2	4,0
	Proximal femur	101	6,2	4,0
	Femoral diaphysis	191	8,7	5,6
	Distal femur	64	5,5	3,6
	Patella	22	1,9	1,2
Leg	Tibia	176	15,2	9,8
	Fibula	56	4,8	3,1
	Tibia + fibula	346	29,9	19,3
Foot	Calcaneus	12	1,0	0,7
	Talus	8	0,7	0,4
	Cuneiforms	6	0,5	0,3
	Metatarsal	64	5,5	3,6
	Phalanges	38	3,3	2,1
	Total	1156	100,0	64,4

Table IV : Distribution of fractures of Head and trunk

	Number	% Head - trunk	% all fractures
Skull	24	25,5	1,3
Face	18	19,1	1,0
Cervical spine	18	19,1	1,0
Lombar spine	10	10, 6	0,6
Sacrum	2	2,1	0,1
Ribs	22	23,4	1,2
Total	94	100,0	5,2

The most frequent fractures were in the forearm, femur and leg. Their distribution according to age followed roughly the same pace with a first rising part, a peak at 25-34 years and a gradual decrease (Figure 4).

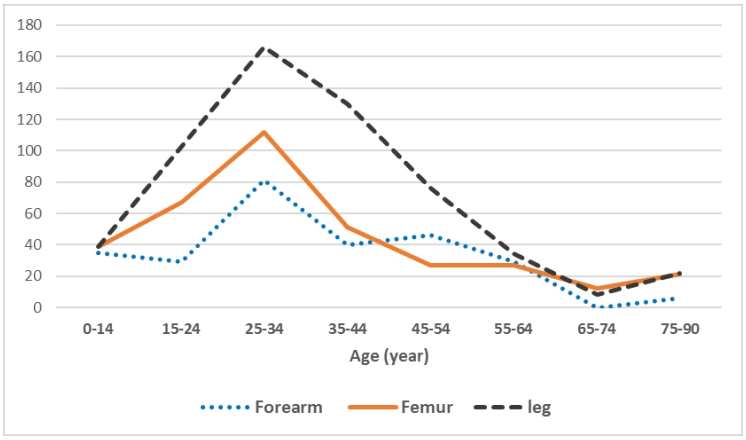

Figure 4: Distribution of frequent fractures by age

Discussion

The National Teaching Hospital of Cotonou is the reference hospital of Benin. Its Emergency Department receives about 70% of traumatized people of the city of Cotonou. Those with a fracture requiring hospitalization are referred to the Traumatology-Orthopedic Department. This Department receives also patients from external surgical consultations of the hospital, the peripheral health structures of Cotonou or the interior of the country. These were not taken into account in our study.

General features of the series

Our study population (1432 subjects) represents 24.9% of surgical emergencies; This rate is lower than the 44.4% found by Abalo (Abalo, 2009) in Togo, however it is higher than the 17.5% of Da (Da, 2008) in Burkina Faso. In general, these rates testify the great influx of traumatological emergencies in our hospitals which can be explained in Cotonou by the increase of the road traffic. Indeed, road traffic accidents are the predominant etiology (75.8%) in our series. Abalo (Abalo, 2009) in Togo, Ouatarra (Ouatarra, 2001) in Côte d'Ivoire and Abdou Raouf (Abdou Raouf, 2001) in Gabon also highlighted the predominance of road traffic accidents in the genesis of these fractures. The average age of our series is 33.7 years and the subjects of 25-34 years were the most concerned. This result is perfectly superimposable to that of Da (Da, 2008) in Bukina-Faso with an average age of 37.3 years. It also confirms that of 28 years found by Abalo (Abalo, 2009) in Togo. It is, however, less than that of Court-Brown's 49.1 years (Court-Brown, 2006) in the West, precisely in England.

The predominance is clearly male with a sex ratio of 3.62. This male predominance is constant at all ages in our series. If this male predominance is found in all African series: (Ouattara, 2001; Kaboro, 2008; Abdou Raouf, 2001; Abalo, 2009; Da, 2008), it tends to reverse with age in Western

countries. Thus the predominance initially male becomes female from 50 years (Donaldson, 1990; Johansen, 1997; Singer , 1998; Van Staa, 2001) due to the feminine senile osteoporosis responsible for the fractures for benign traumatisms (Lyons, 2000; Barrett, 1999; Kannus, 2001).

The circumstances of the occurrence of fractures

In our series, they are largely dominated by traffic accidents (75.8%). Motorcycle subjects were the most exposed (63.9%). This is confirmed by Abalo (Abalo, 2009) in Togo, Kaboro (Kaboro, 2008) in Tchad, Ouatarra (Ouatarra, 2001) in Côte d'Ivoire, Abdou Raouf (Abdou Raouf, 2001) in Gabon who also highlighted this predominance of traffic accidents and in particular the involvement of two wheels in these fractures. The subjects, to reach their places of work, studies or homes are exposed to roads traffic accidents. These traffic accidents do not spare children (58 cases in our series), this is confirmed by Ouattara's study in Côte d'Ivoire (Ouatarra, 2001). These road traffic accidents generally result from the poor condition of our roads and vehicles, but also from the road users' failure to comply with the highway code.

Domestic accidents had a significant impact in the genesis of these fractures (10.2%), and we noted the predominance of fractures in children through gambling accidents (21.9%), as in the series of Abalo (Abalo, 2009) in Togo and of Lyons (Lyons, 1999) in England. Domestic accidents are also found preferentially in the elderly (50% of etiologies from the age of 75 in our series). At this age, the decrease in visual acuity and reflexes, the limitation of autonomy ... are factors favoring the falls. This is found constantly in Western studies: Donaldson, 1990; Johansen, 1997; Singer, 1998).

Work accidents are less frequent: 5.7% in our series against 2% and 1.9% respectively with Abalo (Abalo, 2009) and Da (Da, 2008); but their sequelae can be disabling because they are dominated by amputations (Caisse Nationale d'Assurance Maladie, 2014).

Sports accidents are infrequent: 3.1% in our series, they are the prerogative of the young subject of less than 24 years in our series. Abalo (Abalo, 2009) and Da (Da, 2008) found 9.7% and 2.1% respectively in their series.

Another particular circumstance is represented by the fractures in a conflictual context about 5% of our series, the reason of which is a conflict mostly related to a domain or family problem. Their proportions have not been specified by Abalo (Abalo, 2009) or Da (Da, 2008).

Frequency of fractures

The most frequent fractures in our series were those of the forearm (14.8%), the femur (19.8%) and the leg (32.2%).

Fractures of the forearm in general are more frequent in children (Da, 2008). (Barret, 1999) and occur most often during games. In our series they do not particularly affect children. They are paradoxically less frequent than fractures of the femur and the leg. In fact, 58 of our children were victims of roads traffic accidents (Table I) either by going to school or following their mothers to the market, as against 52 who were victims of domestic accidents. These 58 children presented both femoral and leg fractures. This may explain the disruption of the distribution of fractures in our children.

The fracture of the leg is the fracture of the adult (Donaldson, 1990; Singer, 1998; Court-Brown, 2006), which confirms our study or the subjects are mostly young (28.8% for the 25-34 years), active, with especially a great exposure of their leg segment to shocks especially in drivers of two-wheeled vehicles. This is corroborated by the series of Abalo (Abalo, 2009) and Da (Da, 2008).

Fracture of the femur is the fracture of the elderly (Donaldson, 1990; Singer, 1998; Kannus, 2001; Lyons, 1999) and is mainly concerned the proximal segment due to senile osteoporosis. But in our countries, life expectancy is low (55 years), infrequent osteoporosis and fracture of the femur is mostly the fracture of the young, diaphyseal and resulting from violent trauma, in general traffic accidents.

In our series, the subjects of 25-34 years are very preponderant, they therefore print the tendency of the distribution their lesions to the whole population studied. What is observed in the studies of Kaboro (Kaboro, 2008), Da (Da, 2008) and to a lesser extent in that of Abalo (Abalo, 2009) or the 0-14 years are numerous.

Conclusion

This work allowed us to fill somewhat the gap in the epidemiology of fractures in Benin. However, the fractures are scattered throughout the hospitals of the economic capital of Benin. It shows the predominance of road accidents in etiological circumstances. The frequency of accidents at work, despite the mechanization of industry is not too high. Fractured limbs are young, mostly male. Fractures of the lower limbs, in particular of the leg segment, are predominant. The preferred location of fractures in the upper limb is the forearm.

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