

Full Length Research Paper

Research on Epidemiology and aetiology of fractures treated in four hospitals in the South West Region of Cameroon: A 5 year review

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Abstract

Background: Injury is the leading cause of death in low-and middle-income countries among people between the age of 5 and 45 years. Road traffic injuries in Cameroon have increased since the introduction of motorcycles for commercial transportation. Our aim is to establish the epidemiological profile of fractures treated in the South West Region of Cameroon. **Methods:** This was a hospital based retrospective analysis of files of patients managed with fractures from January 2013 to December 2017 in South West of Cameroon. **Results:** A total of 1267 patients had a fracture (57.3% of surgical emergencies). There were 905 males and 362 females (sex ratio of 2.5:1). The ages ranged from 02 to 94 years (mean: 36.99±17.73 years). The most affected were between 20-40 years. Farmers were the most affected. The most common cause of fracture was road traffic crash. The main causes of injury involved motorcycle collisions. Fractures of the lower limbs accounted for 65.32%. Operative treatment was done in 84.21% of fractures. **Conclusion:** Fractures make up a majority of surgical emergencies. Young male adults are the most affected. Road traffic crash involving motorcycles was the main mechanism of injury.

Key words: Fractures, Epidemiology, Aetiology, Treatment, Cameroon.

INTRODUCTION

About 5.8 million people die each year as a result of injuries. This accounts for 10% of the world's deaths, 32% more than the number of fatalities that result from malaria, tuberculosis and HIV/AIDS combined [1]. Injuries are a threat to health in every country of the world because they lead to dozens of hospitalizations, hundreds of emergency department visits and thousands of doctors' appointments. A large proportion of people surviving their injuries incur temporary or permanent dis-

abilities. The millions of deaths that result from injuries represent only a small fraction of those injured. [1, 2]

Injury is the leading cause of death in low-and middle-income countries among people between the age of 5 and 45 years and accounts for about 9% of disease burden in Africa [2].

Fractures are the most common cause of morbidity and mortality following road traffic crash in the 3rd and 4th decade of life [3]. Musculoskeletal injuries are a major public health problem globally affecting tens of millions of people and leading to hospitalization, emergency department or general practitioner treatment, or treatment that does not involve formal medical care. [1, 4]

The most common cause of injury in Cameroon is road traffic crash [5, 6]. Injuries from road traffic crash in our environment have increased since the introduction of motorized two-wheelers as a major means of commercial transportation with inadequate safety precautions. [7, 8] The main aim of this study is to establish the epidemiological profile of fractures treated in four major hospitals in the south west region of Cameroon. The aetiology, fracture characteristics and treatment modality were also determined. This will help guide towards the peculiar areas of emphasis in training of health personnel in fracture care in this region of the country.

MATERIALS AND METHODS

This was a hospital based retrospective analysis of clinical files of patients managed with fractures from January 2013 to December 2017. The study was carried out at the Mutengene Baptist hospital, St Luke Medical Center, the Buea and Limbe Regional hospitals. These are the main hospitals in the south west region of Cameroon where patients with fractures are referred for treatment.

Files of patients with fractures who were managed in these hospitals were sorted out from the various hospital records. We excluded incomplete files and those presenting with fractures that were already managed in other settings. Further search for information about their presentation was carried out in the operating theatre records and emergency units.

The data obtained from these records were the age, gender, the cause of the fracture, the injured side, location and type of fracture, management method, outcome (in terms of discharge against medical advice, discharged by physician after management, death or referred), and length of hospital stay. The data were stored and analysed using Epi-info version 7.2.2.6.

Categorical variables were presented as frequencies and proportions. Continuous variables were presented as means (and standard deviation). Results were represented on tables and figures to ease organization and comprehension.

RESULTS

A total of 2695 files of patients admitted as surgical emergencies within the study period were retrieved, 486 files were excluded for lack of required information. A total of 1267 patients had a fracture representing 57.3% of all surgical emergency admissions.

Demographic characteristics

There were 905 (71.50%) males and 362 (28.50%) females giving a male to female ratio of 2.5:1. The ages

ranged from 02 to 94 years with a mean of 36.99 ± 17.73 years. The mean age for males was 35.14 ± 15.89 years, while the mean age for females was 41.73 ± 21.07 years. There was a statistically significant difference between the mean ages of males and females ($p=0.0000$). The main age group affected was between 20-40 years (47.67%) as shown in figure 1. Cash crops farmers were the majority of the cases (29.04%) followed by commercial motorcycles (15.55%) and commercial vehicles (15.79%) drivers as shown in table I.

Mechanisms of injury

The most common cause of fracture was road traffic crash (78.37 %). Amongst the road traffic crash cases, the main causes of injury were motorcycle/motor vehicular and Motorcycle/Motorcycle collisions. Most of fractures were due to high energy impact fractures (87.77%). A majority of the cases (57.93%) presented within the golden hour (within 1 hour) following injury as emergencies. Most of them were transported by commercial taxis. (Table II)

Patterns and types of fractures

There were 1514 fractures identified in 1267 patient files. Some of the patients had multiple fractures. The limbs were most affected (86.46%, $n=1309$) of which the left side was more involved (50.32%, $n=713$). Fractures of the lower limbs accounted for 65.32%, ($n=989$) of the cases followed by the upper limbs (24.46%, $n=320$), face/skull (3.04% $n=97$) and Pelvis (3.04%, $n=46$) as shown in Table III.

Concerning specific fractures types, femoral fractures were the most common (26.82%, $n=406$), followed by the combined Tibia-fibular fracture (18.36%, $n=278$). The most common upper limb fractures were forearm fractures.

Majority of the fractures were closed fracture (70.67%, $n=882$ files), while open fractures accounted for 29.33% of the cases ($n=366$). The most common type of open fractures were classified as Gustillo-Anderson type IIIA (39.23%, $n=86$).

Treatment modalities

Operative treatment was done in 84.21% of fractures. The most commonly used methods of surgical treatment were intramedullary nailing (40.68%, $n=384$), open reduction and internal fixation (ORIF) with plates and screws (28.49%, $n=269$) and external fixators in 21.50% of cases ($n=203$). The most commonly used non-operative management modality was closed reduction and casting (55.93%, $n=99$).

Closed fractures were treated by operative methods in 77.11% of cases (603) while 22.89% (179) of closed fractures were treated non-operatively. A vast majority

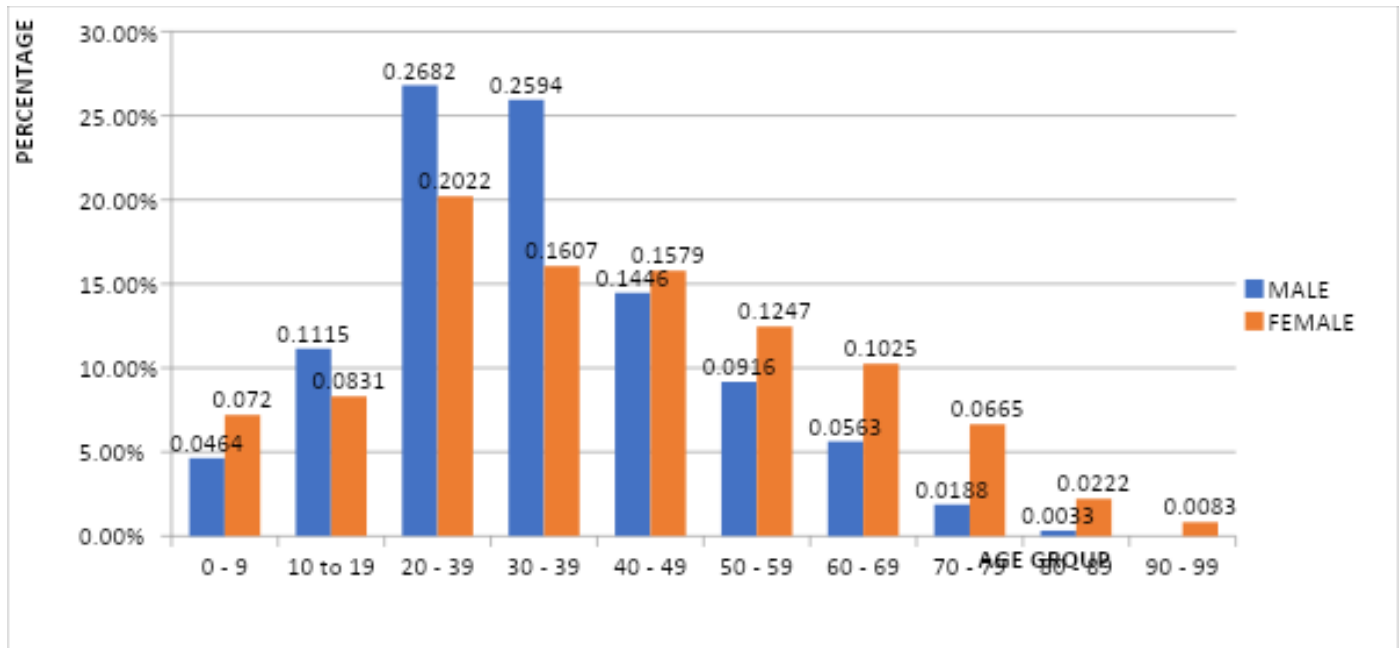


Figure 1. Age and sex distribution of fracture cases.

Table I. Employment status of the fracture cases.

<i>Employment status</i>	<i>Number</i>	<i>percentage</i>
Cash crop farmers	368	29.04
Commercial Car drivers	200	15.79
Commercial Motorcycle riders	197	15.55
Small scale business	132	10.42
Students	128	10.10
Employed	116	9.16
Unemployed	106	8.37
Retired	20	1.58
Total	1267	100

(91.32%) of open fractures were treated operatively as shown in table IV.

Complications and outcome

A total of 214 complications were found in the 1267 files giving a complication rate of 16.89% as shown in table V. The complications were immediate in 129 cases and late in 85 cases giving a rate of early complication of 10.18% and late complication of 6.71% respectively. The most common early complication was infections, while the most common late complication was fracture non-union. There were 2 cases of limb ischaemia complicating GA type IIIC open fractures which were all amputated.

A majority of the cases (79.72 %, n=1010) that were treated were discharged home with medical consent. However, 10.31 % (130) left the hospitals without medical

consent while 8.6 % (109) were referred to another hospital for further management. A total of 18 deaths were recorded giving a proportion of 1.42%.

The mean length of stay in the hospital after a fracture was 10.46±14.86 days, with a range from 1 to 209 days.

DISCUSSION

In this study, 1267 cases of fractures were recorded representing 57.30% of all surgical emergency admissions. This rate is higher than those obtained in other sub Saharan African countries [9-12]. This high rate testifies a surge of the number of injuries in the south west region of Cameroon which can be explained by an increase in road traffic fatalities in our environment [7]. Fractures resulting from road traffic accidents account for 78.37% of the cases in this study. Similar studies in the

Table II: Mechanism of injury, mechanism of impact, mode of transportation.

Variable	Frequency	Percentage
Mechanism of injury(causes)		
Motorcycle/Motorcycle	197	15.55
Motorcycle/motorvehicle	246	24.13
Motorcycle/pedestrian	183	14.44
Motorvehicular/pedestrian	184	14.52
Motorvehicle/motorvehicle	183	14.44
Falls	178	14.05
Gunshot injuries	15	1.18
Assault	38	3.00
Pathological Fractures	12	0.94
Industrial accident	18	1.42
Sports injury	13	1.03
Total	1267	100
Mechanism of Impact		
High energy	1112	87.77
Low energy	155	12.23
Time of presentation		
<1hour	734	57.93
1-6 hours	263	20.75
>6 hours	270	21.31
Mode of transportation		
Ambulance	317	25.02
taxi	507	40.02
Private car	392	30.94
motorcycle	35	2.76
Unspecified	16	1.26

Table III: Fracture location and types

VARIABLE	Number	percentage
LOCATION OF FRACTURE		
Femur	406	26.82
Patella	32	2.11
Tibiofibular	278	18.36
Tibia alone	184	12.15
Fibula alone	56	3.70
Foot	33	2.18
Clavicle	38	2.51
Scapula	5	0.33
Humerus	97	6.41
Radioulnar	116	9.58
Radius alone	22	1.45
Ulnar alone	8	0.53
Hand	34	2.25
Face and skull	97	6.41
Ribs	36	2.38
spine	26	1.72
pelvis	46	3.04
Total	1514	100
OPEN FRACTURES TYPES		
I	23	10.50
II	65	29.68
IIIA	86	39.23
IIIB	18	8.22
IIIC	27	12.33
Total	219	100

centre regions of Cameroon also highlighted road traffic accidents as the main aetiology of injuries observed at the emergency [5].

The ages in our study ranged from 02 to 94 years with a mean of 36.99 ± 17.72 years, and a male to female ratio of

2.5:1. These findings are similar to those obtained by other authors [13, 14]. Other authors reported a higher mean age [15, 16]. The male predominance in our study can be explained by the fact that by their nature, males are more active and likely to be involved in riskier activities

Table IV: Treatment methods of fractures.

Treatment method	number	percentage
<i>Operative methods</i>		
Intramedullary nailing of long bones	384	40.68
Open reduction and plating	269	28.49
External fixation	203	21.50
Pinning	71	7.52
Cerclage	9	0.98
Simple screws	8	0.85
Primary amputations		
Total	944	
<i>Non operative methods</i>		
Closed reduction and casting	99	55.93
Splinting	39	22.03
Braces	26	14.69
orthoses	13	7.34
Total	177	100

Table V. Complications and outcome of fractures.

Complications	Number	Percentage
<i>Early complications</i>		
Infections	55	42.64
Loss of reduction	37	28.68
Implant failure	22	17.05
Wound necrosis	5	3.88
Limb ischaemia	2	1.55
Compartment syndrome	5	3.88
Implant migration	3	2.33
Total	129	100
<i>Late complications</i>		
Malunion	23	27.06
Non-union	26	30.59
Axial deformities	15	17.65
Chronic bone infections	21	24.71
Total	85	100
<i>Outcome</i>		
Discharged home with medical consent	1010	79.72
Discharged without medical consent	130	10.26
Referred for a specialized treatment	109	8.60
Died	18	1.42
Total	1267	100

than females. These activities may include construction works, reckless vehicle driving, and motorcycle riding for commercial purpose. The most affected age group was between 20-40 years (47.67%). This range is the active and productive age group and the greatest human resources in the typical sub Saharan African population. This age group was significantly associated with the occurrence of fracture ($p=0.002417$). This finding is comparable to those obtained by other authors [6, 17]. A majority (57.90%) of the cases arrived hospital within one hour following injury. This can be explained by the

fact the inhabitants of the south west region are cognisant of the major hospitals caring for the injured. Other authors in some low-middle income countries reported arrival time beyond one hour following injury [9, 15, 18, 19].

The commonest cause of injury was motorcycle/ motor vehicular collisions accounting for 24.13% of fractures. Motorcycles were involved in 54.07% of road traffic crash. This is consistent with other authors who had similar findings in the littoral region of Cameroon [20, 21]. This is due to an increase in the use of motorcycles as

means of transportation and most unemployed male youths use this means of transportation for commercial purpose. Bad roads, disobedience of road signs, and lack of use of protective devices like helmets also account for this.

Fractures of the limbs were the commonest (86.46%, n=1309), and the lower limbs (65.32%, n=989) were more affected than upper limbs. The left side (50.32%, n=713) was more affected than the right side. This is similar to findings in Ethiopia [22] and India [23]. This is because the limbs are most exposed during motorcycle/motor vehicle crashes which were the main cause of injury in our study. The lower limbs are most exposed to impacts especially in drivers of two-wheeled vehicles which were used by the majority of the victims. The most common fracture type encountered was closed fracture. The most common fractured bone was the femur (26.82%), followed by tibia/fibula (18.36%). This is similar to results obtained in Nigeria [24] but differs from others who had tibia/fibula fractures as the commonest fractures [20]. It is worth noting that the lower limb long bones are the main organs of locomotion which are essential for daily activities.

Operative treatment was done in 84.21% of fractures. This is so because the most common fractures encountered were lower limb fractures. Such fractures lead to serious long term complications if they are not managed surgically. The commonly used surgical methods were intramedullary nailing of long bones, plates and screws, and external fixations. This implies that such implants should be made readily available in the hospitals to ease the treatment of fractures. The most common non operative treatment method was casting (55.93%). Training of medical personnel should lay emphasis on the techniques of casting fractures as definitive or temporal treatment.

A total of 214 complications were found in the 1267 files giving a complication rate of 16.89%. The most common early complication was infections. A vast majority (79.72%) were successfully treated and were discharged home with medical consent. Conversely, 10.26% of the cases left hospital against medical consent despite counseling. It is worth noting that traditional bone setters are playing a major role in the management of fractures in sub-Saharan African countries in general [25, 26] and Cameroon in particular [27]. Despite the alarming rate of complications arising from such unorthodox methods of treatment of fractures [28, 29], some injured still prefer to visit them despite counseling about the risks and complication.

CONCLUSION

Fractures make up a majority of surgical admissions in this study. Young male adults were the most affected. Road traffic crash involving mostly motorcycles was the

main mechanism of injury. The most common bone fractured was the femur. Intramedullary nailing of long bones was the most commonly used treatment modality.

REFERENCES

1. *Injuries and violence: the facts*. Geneva, World Health Organization, 2010.
2. Beveridge M, Howard A. The burden of orthopaedic disease in developing countries. *J Bone Joint Surg Am* 2004; 86- A:1819- 22.
3. World Health Organization. Strengthening road safety legislation a practice and resource manual for countries [Internet]. Geneva, Switzerland: World Health Organization; 2013. Available from: <http://site.ebrary.com/id/10931287>
4. Mock C, Cherian MN. The global burden of musculoskeletal injuries: Challenges and solutions. *Clin Orthop Relat Res* 2008;466:2306- 16
5. Juillard CJ, Stevens KA, Monono ME, Mballa GAE, Ngamby MK, McGreevy J, Cryer G, Hyder AA. Analysis of Prospective Trauma Registry Data in Francophone Africa: A Pilot Study from Cameroon. *World J Surg*. 2014 Oct 1;38(10):2534–42.
6. Chichom-Mefire A, Atashili J, Tsiagadigui JG, Fon-Awah C, Ngowe-Ngowe M. A prospective pilot cohort analysis of crash characteristics and pattern of injuries in riders and pillion passengers involved in motorcycle crashes in an urban area in Cameroon: lessons for prevention. *BMC Public Health*. 2015;15:915. Published 2015 Sep 18. doi:10.1186/s12889-015-2290-4
7. Chichom-Mefire A, Nwanna-Nzewunwa OC, Siysi VV, Feldhaus I, Dicker R, Juillard C. Key findings from a prospective trauma registry at a regional hospital in Southwest Cameroon. *PLOS ONE*. 2017 Jul 19;12(7):e0180784.
8. Palle John Ngunde, Asang Christian Ngwa Akongnwi, Chichom Alain Mefire, Fokam Puis Prevalence and pattern of lower extremity injuries due to road traffic crashes in Fako Division, Cameroon. *Pan African Medical Journal*.2019;32:53. [doi: 10.11604/pamj.2019.32.53.17514]
9. Abalo A, Dossim A, Gnandi-Piou F, Walla A, Ayoub G, AgounkeW. (2009). Epidémiologie des fractures à Lomé (TOGO). *Mali médical*;24(1) : 19-22
10. Da SC, Ouedraogo S, Dieme C, Kafando H, Zan A, Nacoulma SI, Ouedraogo RK. (2008). Fractures des membres aux urgences traumatologiques à Ouagadougou (Burkina Faso). *JSci*; 8(3) : 1-9
11. Pascal C, Eric L, Fiacre T, Adebola P. Epidemiology of Fractures in a Tropical Country. *European Scientific Journal* August 2017 edition Vol.13, No.24 ISSN: 1857 – 7881 (Print) e - ISSN 1857- 7431
12. Babalola OM, Salawu ON, Ahmed BA, Ibraheem GH, Olawepo A, Agaja SB. Epidemiology of traumatic

Fractures in a tertiary health center in Nigeria. *J Orthop Traumatol Rehabil* 2018;10:87- 9.

13. Owoola AM, Thanni LOA. Epidemiology and Outcome of Limb Fractures in Nigeria: A Hospital Based Study. *Niger J Orthop Trauma*. 2012 Jan 1;11(2):97–101.

14. Akinpelu OV, Oladele AO, Amusa YB, Ogundipe OK, Adeolu AA, Komolafe EO. Review of road traffic accident admissions in a Nigerian tertiary hospital. *East Cent Afr J Surg*. 2007 Jan 1;12(1):63–7.

15. Dongo AE, Kesieme EB, Eighemherio A, Nwokike O, Esezobor E, Alufohai E. Motorcycle Related Injuries among Rural Dwellers in Irrua, Nigeria: Characteristics and Correlates. *Emerg Med Int*. 2013;2013:1–4.

16. Court-Brown CM, Caesar B. (2006). Epidemiology of adult fractures: A review. *Injury*; 37(8): 691-7

17. Sawe HR, Mfinanga JA, Mbaya KR, Koka PM, Kilindimo SS, Runyon MS, Mwafongo VG, Wallis LA, Reynolds TA. Trauma burden in Tanzania: a one-day survey of all district and regional public hospitals. *BMC Emerg Med*. 2017 Dec;17(1):30

18. Sawe HR, Mfinanga JA, Mbaya KR, Koka PM, Kilindimo SS, Runyon MS, Mwafongo VG, Wallis LA, Reynolds TA. Trauma burden in Tanzania: a one-day survey of all district and regional public hospitals. *BMC Emerg Med*. 2017 Dec;17(1):30

19. Nantulya VM, Reich MR. The neglected epidemic: road traffic injuries in developing countries. *BMJ*. 2002 May 11; 324(7346):1139–41.

20. Chichom-Mefire A, Palle-Ngunde J, Fokam P et al. Injury patterns in road traffic victims comparing road user categories: Analysis of 811 consecutive cases in the emergency department of a level I institution in a low-income country. *International Journal of Surgery Open* 10 (2018) 30-36

21. Fokam et al. Patterns and presentations of femoral fractures treated with external fixator in general hospital Douala: a ten 10 year review: *Afr. J. of Integ. Health* 2020, 10 (01): 14-19

22. Admasie D, Tekle Y, Wamisho BL. Radiological and clinical details of major adult limb fractures in a teaching hospital, AAU, Ethiopia. *East Cent Afr J Surg*. 2009 Jan 1;14(1):88–97.

23. Huda N, Gupta P, Pant A, Iqbal A, qar MJ, Khan MZ, Agrawal NK. Pattern of Orthopaedic injuries among patients attending the emergency department in a tertiary care hospital - An analytical study. *Acta Medica Int*. 2014 Dec 9;1(1):10–4.

24. Madubueze CC, Chukwu COO, Omoke NI, Oyakhilome OP, Ozo C. Road traffic injuries as seen in a Nigerian teaching hospital. *Int Orthop*. 2011 May;35(5):743–6.

25. Arie's MJH, Joosten H, Wegdam HHJ, van der Geest S. Fracture treatment by bonesetters in central Ghana: patients explain their choices and experiences. *Tropical Medicine and International Health* 2007; 12(4); 564–574

26. Hag M. I. A. E. L., Hag O. B. M. E. L. Complications in fractures treated by traditional bonesetters in Khartoum, Sudan. *Khartoum Medical Journal*, 2010; 3(1): 401- 405.

27. Alegbeleye BJ. Traditional bone setting practices in the Northwestern Region of Cameroon. *E Cent Afr J Surg*. 2019;24(1):47-60 World Health Organization (WHO). World Health Report. Traditional Medicines Strategy 2002–2005. WHO, Geneva. 2002

28. Eze CB. Limb gangrene in traditional Orthopaedic (Bone Setters) practice and amputation at the NOHE – facts and fallacies. *Nig Med J*. 1991; 21:125