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Road Traffic Accidents: Anatomical and Clinical lesions and favoring factors, about 705 cases at the Provincial General Hospital of Reference of Bukavu

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Abstract:-

Background: Road traffic accidents are defined as unfortunate or harmful events occurring on a road or path open to traffic and belonging to the public domain. Our work aims to analyze the epidemiological parameters of the victims, to identify the risk factors, to analyze the clinical parameters, to evaluate the vital prognosis and to propose a prevention strategy. This is a prospective descriptive study carried out at the HPGRB over a period of 12 months, involving 705 cases of road traffic accident victims. Methodology: An analytical study carried out at the level of the emergency and surgical departments of the Bukavu Provincial General Reference Hospital (HPGRB) over a 12-month period. It covered the period from 1 July 2011 to 30 June 2012. Results: Male predominance: 68.93%. The age group between 15 and 29 years is the most affected with 39.85% of cases. The majority of victims come from Kadutu in 34.6% of cases. Pupils and students followed by those without a profession are the most affected by ATRs with 30.5% and 23.4% respectively. The highest number of accidents is observed on weekends between 12:00 and 18:00 with 64.1%. Pedestrians are the most affected by TIAs, with 248 cases (35.2%) and motorcycle-pedestrian collisions with 24.4% of cases. Motorbikes are responsible for a significant proportion of mortality and morbidity. Careless crossing of the road is the cause of 30.2% of accidents and 50% of undetermined causes. Drivers were involved in 51.1% of accidents, with motorcyclists predominating in 53%. Bad weather was involved in 37.2%. Loss of control of the vehicle was incriminated in 54.8%. The injuries that led to death were head injuries (33 (37.5%) and open fractures (16 (18.1%)). Conclusion: The most common injuries were head injuries and fractures associated with visceral injuries, which were responsible for a large proportion of the deaths. The reduction in the number of accidents and victims on the roads of Bukavu in particular and of the DRC in general can only be achieved if the causal factors of the accident risk are eliminated, hence the need for a real approach to road safety, which requires first of all a political will.

Keywords: *Accident, road, injuries, facilitating factors, HPGRB, Bukavu, DRC.*

I. INTRODUCTION

Nowadays, with the modernization that has led to development reforms in all sectors, the reconstruction and development of more and more roads and means of transport has made it remarkably easier for people to carry out their activities on a daily basis. And in certain circumstances, they constitute a real danger to human life, we are witnessing an exponential increase in the number of traffic accidents. According to the statistics of the World Health Organization, every year, 1.2 million people die on the road, i.e. more than 3,000 people are killed every day, 140,000 are injured and 15,000 will be disabled for life. [1]. Road accidents are now a major public health issue worldwide. In Africa, in 2002, 19,091 people died in road traffic accidents. In the city of Kinshasa, for example, from January to March 2004, 814 accidents were recorded, resulting in 1391 victims. [2]. Starting from this obvious and effective problem, it is important to emphasize that this work aims to gain a better understanding of it, while specifying its multiple determinants, as well as to identify the actors, understand the contexts and the issues at stake, and thus repudiate received assertions such as "accidents happen when traffic is dense, a few kilometers per hour more is not very dangerous", in the world and in Africa in particular. In spite of a less abundant theory on TIAs in the DRC, we will try to cross the views, to generate ideas in order to improve the prevention policy of TIAs in our countries thanks to the contribution of authors from various horizons. We have found this to be an inherent reason for carrying out this study on ATR: anatomical and clinical lesions and favoring factors. With this in mind, we set ourselves the following objectives to study the epidemiological parameters of the victims, to study the

clinical parameters, to identify the favourable factors and to evaluate the vital prognosis.

II. METHODOLOGICAL APPROACHES

This is an analytical study carried out in the emergency and surgical departments of the Bukavu Provincial General Reference Hospital (HPGRB) over a 12-month period. It covered the period from 1 July 2011 to 30 June 2012. Our study included 705 subjects suffering from ATR regardless of age, sex, social level, religious beliefs and ethnicity.

Inclusion criteria: Patients (all ages and genders) who were victims of road traffic accidents who consulted the HPGRB emergency room and were managed in surgery or in the intensive care unit.

Exclusion criteria: Patients who died before admission to the emergency room, ATR patients who did not consult the HGPRB. The parameters to be studied are Epidemiological parameters, Clinical parameters, Contributing factors and Vital prognosis.

III. RESULTS

EPIDEMIOLOGICAL PARAMETERS OF PATIENTS

TABLE I. DISTRIBUTION OF PATIENTS ACCORDING TO AGE GROUP AND GENDER.

Distribution of patients according to age group and gender.						
Age groups	***Male***		***Female***		***Whole group***	
	Workforce	***%***	***Workforce***	***%***	***Workforce***	***%***
<14 years	79	16,25	51	23,29	130	13,44
15-29 years	208	42,8	73	33,3	281	39,86
30-44 years	125	25,72	53	24,2	178	25,25
45-59 years	50	10,29	29	13,2	79	11,2
60 and over	24	4,9	13	5,9	37	5,25
Total	486	100	219	100	705	100

The extremes were 1 year and 82 years, the sex ratio was 2.21:1 for men, the calculated Chi-square(X^2) = 8.239 is less than the tabular X^2 9.488 at one degree of freedom: 4 and P> 0.05. Hence the difference is not significant. The age group between 15-29 years was the most concerned with 39.86% of the cases with a predominance of male.

TABLE II. DISTRIBUTION OF PATIENTS ACCORDING TO OCCUPATION

Distribution of patients according to profession						
Profession	***Male***		***Female***		***Whole group***	
	Workforce	***%***	***Workforce***	***%***	***Workforce***	***%***
Pupil and student	135	27,8	80	36,5	215	30,5
No profession	90	18,5	75	34,2	165	23,4
Motorbike and vehicle driver	109	22,4	0	0	109	15,5
Civil servant	74	15,2	16	7,3	90	2,76
Trader	6	1,2	28	12,8	34	4,82
Not specific	72	14,8	20	9,1	92	13,05
Total	486	100	219	100	705	100

Pupils and students were the most represented with 215 cases or 30.5%. The calculated X^2 = 122.916 is > the tabular X^2 = 11.070 at a Degree of freedom: 5 and P: 0.05. Hence the difference is significant.

TABLE III. DISTRIBUTION OF PATIENTS ACCORDING TO THEIR ORIGIN

Distribution of patients according to their origin						
Source	***Male***		***Female***		***Whole group***	
	Work force	***%***	***Work force***	***%***	***Workforce***	***%***
Commune of Kadutu	165	33,95	79	36,07	244	34,61
Commune of Ibanda	146	20,71	25	11,4	171	24,25
Commune of Bagira	74	15,2	35	15,98	109	15,46
Outside the zone	101	20,78	80	36,52	181	25,67
Total	486	100	219	100	705	100

244 cases of accidents were observed in the commune of Kadutu, i.e. 34.61% of cases. The calculated X^2 = 36.425 is > the tabular X^2 = 7.815 at a Degree of freedom= 3 and P< 0.05. Hence the difference is significant.

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2. FAVOURABLE FACTORS

TABLE IV: DISTRIBUTION OF PATIENTS ACCORDING TO MONTH OF ONSET

Distribution of patients according to profession						
Profession	***Male***		***Female***		***Whole group***	
	Work force	***%***	***Work force***	***%***	***Work force***	***%***
April	68	13,99	36	16,43	104	14,75
July	52	10,7	23	10,5	75	10,63
June	45	9,26	28	12,78	73	10,35
March	55	11,3	17	7,76	72	10,21
January	49	10,08	20	9,13	69	9,78
May	55	11,3	12	5,47	67	9,5
August	32	6,58	20	9,13	52	7,37
December	31	6,38	21	9,58	52	7,37
February	35	7,2	14	6,4	49	6,95
October	23	4,73	11	5,02	34	4,82
November	24	4,93	8	3,65	32	4,54
September	17	3,5	9	4,11	26	3,69
Total	486	100	219	100	705	100

104 cases of accidents or 14.75% were observed during the period of April, followed by the month of July with 75 cases or 10.63% of cases. The calculated X^2 is 14.184 which is < the tabular X^2: 19.675 at a Degree of freedom of 11 and at a P > 0.05. Hence there is no significant difference. Hence there is no significant difference.

TABLE V: DISTRIBUTION OF PATIENTS ACCORDING TO DAY OF ONSET

Distribution of patients according to the day of occurrence						
Day of occurrence	***Male***		***Female***		***Whole group***	
	Workforce	***%***	***Workforce***	***%***	***Workforce***	***%***
Friday	96	19,75	74	33,89	170	24,11
Saturday	104	21,39	62	28,31	166	23,54
Sunday	80	16,46	36	16,43	116	16,45
Thursday	57	11,73	14	6,39	71	10,07
Monday	57	11,73	12	5,48	69	9,78
Wednesday	50	10,28	11	5,02	61	8,65
Tuesday	42	8,64	10	4,56	52	7,37
Total	486	100	219	100	705	100

The highest number of accidents was observed during weekends with 451 cases. The calculated X^2 is 38.659 which is higher than the tabular X^2 12.592 at a Degree of freedom of 6 and a P< 0.05. Hence the difference is significant.

TABLE VI: DISTRIBUTION OF PATIENTS ACCORDING TO THE TIME OF ARRIVAL AT THE HPGRB.

Distribution of patients according to the time of arrival at the hospital.		
Time to arrive	***Number of accidents***	
	Workforce	***%***
6h1'- 12h00'.	166	23,54
12.1 - 6.00 p.m.	321	45,53
18:1'-6:00'.	218	30,92
Total	705	100

321 cases of accidents occurred between 12.1 p.m. and 6 p.m., i.e. 45.53% of the cases.

TABLE VII: DISTRIBUTION OF PATIENTS ACCORDING TO VICTIMS

Distribution of patients according to victims						
Victims	***Male***		***Female***		***Whole group***	
	Workforce	***%***	***Workforce***	***%***	***Workforce***	***%***
Pedestrians	155	31,89	93	42,46	248	35,17
2-wheel drivers (motorcyclists)	83	17,08	0	0	83	11,77
Vehicle drivers	46	9,46	2	0,91	48	6,8
Passenger on a motorbike	119	24,48	70	31,96	189	26,8
Passenger in a vehicle	83	17,08	54	24,66	137	19,43
Total	486	100	219	100	705	100

Pedestrians were more exposed to ATRs with 248 cases, i.e. 35.17%, with a significant difference between men and women, the latter being more exposed with 42.46% of cases. Motorbike drivers were also exposed, with a 100% predominance of men. Calculated X^2: 67.88 which is > the tabular X^2: 9.488 at a Degree of freedom: 4 and P: < 0.05. Hence the difference is significant.

TABLE VIII: DISTRIBUTION OF VICTIMS ACCORDING TO TYPE OF COLLISION

Distribution of victims according to type of collision						
Type of collision	***Male***		***Female***		***Whole group***	
	Workforce	***%***	***Workforce***	***Workforce***	***%***	***Workforce***
Motorbike without collision	95	19,54	55	25,11	150	21,27
Clean vehicle	90	18,51	45	20,54	135	19,15
Pedestrian motorbike	130	26,74	43	19,63	173	24,54
Collision between 2 motorbikes	25	5,14	28	12,78	53	7,52
Collision between 2 vehicles	36	7,4	10	4,56	46	6,52
Vehicle - pedestrian	50	10,28	25	11,42	75	10,64
Motorbike	56	11,52	13	5,93	69	9,78
Bicycle without collision	4	0,82	0	0	4	0,56
Total	486	100	219	100	705	100

The ATRs occurred much more often following collisions of pedestrians with motorbikes with 173 cases or 24.54% followed by those of motorbikes without collisions with 150 cases where women were more exposed in 25.11% of cases. The calculated X^2: 37.76 is > the tabular X^2: 15.507 at a Degree of freedom of 7 and a P: > 0.05. Hence the difference is significant.

TABLE IX: DISTRIBUTION OF PEDESTRIAN-RELATED CAUSES

Distribution of pedestrian-related causes						
Causes	***Male***		***Female***		***Whole group***	
	Workforce	***%***	***Workforce***	***Workforce***	***%***	***Workforce***
Careless crossing	51	32,9	24	25,8	75	30,24
Playing on the pavement	24	15,48	10	10,75	34	13,71
Breach of the highway code	11	7,09	3	3,2	14	5,65
Causes indeterminate	69	44,5	56	60,2	125	50,4
Total	155	100	93	100	248	100

125 cases of undetermined causes, i.e. 50.4%, followed by careless crossing of pedestrians with 30.24% of cases. The calculated X^2: 6.299 is < the tabular X^2 7.815 at a Degree of freedom 3 and a probability P: > 0.05. Hence the difference is not significant or there is no statistical link.

TABLE X: DISTRIBUTION OF DRIVER-RELATED CAUSES

Distribution of driver-related causes						
Driver-related causes	***Motorbike drivers***		***Vehicle drivers***		***Group whole***	
	Work force	***%***	***Work force***	***%***	***Work force***	***%***
Speeding	44	53,01	23	47,9	67	51,15
Inattention on the track	3	3,61	2	4,16	5	3,8
Fatigue or drowsiness	1	1,2	1	2,08	2	1,5
Driving in intoxication	19	22,8	11	22,9	30	22,9
Exceeding dangerous	3	3,6	2	4,16	5	3,8
Dangerous turn	1	1,2	1	2,08	2	1,5
Bad driver manoeuvre	2	2,41	1	2,08	3	2,29
Mobile phone use	0	0	1	2,08	1	0,76
Undetermined causes	10	12,05	6	12,5	16	12,2
Total	83	100	48	100	131	100

67 cases of exceeding the speed limit, i.e. 51.15%, with a predominance of motorbike drivers in 44 cases, i.e. 53.01% of cases. The calculated X^2: 1.888 is < the tabular X^2 15.507 at a Degree of freedom: 8 and at a P: > 0.05. Hence there is no significant difference.

TABLE XI: DISTRIBUTION OF ROAD AND ENVIRONMENT-RELATED CAUSES

Distribution of road and environment-related causes		
Causes	***Workforce***	***%***
Bad weather	16	37,2
Visibility problem	5	11,6

Slippery ground - ice	9	20,9
Poor road conditions	13	30,2
Total	43	100

16 cases of bad weather followed by 13 cases of bad road conditions, i.e. 37.2% and 30.2% of cases respectively.

TABLE XII: DISTRIBUTION OF GEAR-RELATED CAUSES

Breakdown of gear-related causes		
Causes	***Workforce***	***%***
Tyre blowout (puncture)	23	20,35
Gear failure and loss of control	66	54,86
Unboxing	16	14,16
Barrel	8	7,08
Total	13	100

Among the causes related to the vehicle, vehicle malfunction and loss of control is in first position with 66 cases or 54.86%.

3. CLINICAL PARAMETERS

TABLE XIII: DISTRIBUTION OF PATIENTS BY TYPE OF LESION

Distribution of patients by type of lesion						
Types of injury	***Male***		***Female***		***Whole group***	
	Work force	***%***	***Work force***	***Work force***	***%***	***Work force***
Trauma	144	29,6	56	25,57	200	28,3
Polytrauma	32	6,58	22	10,05	54	7,66
Fractures	140	28,8	48	21,9	188	26,66
Trauma thoracic	15	3,08	5	2,28	20	2,8
Bruises	70	14,4	34	10,9	94	13,3
Sprain/dislocation	13	2,67	6	2,74	19	2,67
Various wounds	22	4,5	30	13,7	52	7,37
Others *	50	10,3	28	12,8	78	11,06
Total	486	100	219	100	705	100

[a](Abrasion, scratches, bruises, haematomas).

200 patients were head trauma patients, i.e. 28.3% of the cases. The calculated X^2: 26.337 is > the tabular X^2: 14.067 at a Degree of freedom: 7 and a P:< 0.05. Hence there is a significant difference.

TABLE XIV: DISTRIBUTION OF PATIENTS ACCORDING TO THE TREATMENT RECEIVED

Distribution of patients according to the treatment received						
Treatment received	***Male***		***Female***		***Whole group***	
	Workforce	***%***	***Workforce***	***%***	***Workforce***	***%***
Medical	187	38,47	85	38,8	272	38,58
Surgical	110	22,6	60	27,4	170	24,11
Orthopaedic	83	17,07	33	15,06	116	16,45
No treatment	106	21,81	41	18,72	147	20,85
Total	486	100	219	100	705	100

272 patients received medical treatment, i.e. 38.58% of cases. Calculated X^2: 2.484 is < tabular X^2: 7.815 at Degree of freedom: 3 and P: > 0.05. Hence there is no significant difference.

TABLE XV: PARACLINICAL EXAMINATIONS

Paraclinical examinations		
Reviews	***Workforce***	***%***
X-ray of the skull	234	34,2
X-ray of the upper limb	67	9,8
X-ray of the lower limb	218	31,87
X-ray of the chest	63	9,2
X-ray of the spine	17	2,5
Abdomen Without Preparation	10	1,46
Abdominal ultrasound	29	4,24
X-ray of the pelvis	26	3,8
CT scan	20	2,9
Total	684	100

X-rays of the skull: 234 and X-rays of the lower limbs 218, i.e. 34.2% and 31.87% respectively.

4. VITAL PROGNOSIS

TABLE XVI: DISTRIBUTION OF PATIENTS BY OUTCOME

Distribution of patients according to evolution						
Evolution	***Male***		***Female***		***Whole group***	
	Work force	***%***	***Work force***	***%***	***Work force***	***%***
Favourable	426	87,65	191	87,2	617	87,52
Deaths	60	12,34	28	12,78	88	12,48
Total	486	100	100	100	705	100

The outcome was favorable in 617 patients or 87.52%. Calculated X2: 1.061 and < tabulated X2: 3.841 at a Degree of freedom: 1 and P >: 0.05. Hence there is no statistically significant difference.

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TABLE XVII: DISTRIBUTION OF DECEASED PATIENTS BY AGE GROUP AND SEX

Distribution of deceased patients according to age and gender						
Age group	***Male***		***Female***		***Whole group***	
	Work force	***%***	***Work force***	***Workf orce***	***%***	***Workf orce***
< 14 years	6	10	8	28,57	14	15,9
15- 29 years old	18	30	6	21,49	24	27,27
30- 44 years old	22	36,66	8	28,57	30	34,09
45 -59 years	12	20	6	21,43	18	20,45
60 years and over	2	3,33	0	0	2	2,27
Total	60	100	28	100	88	100

The age group between 30 and 44 years occupies the first position with 30 cases, i.e. 34.09% of the cases with a predominance of the male sex. The calculated X2 is 5.97 which is < the tabular X2 9.488 at a Degree of freedom of 4 and a P: 0.05. Hence there is no significant difference. Hence there is no significant difference.

TABLE XVIII: FREQUENCY OF DEATHS BY OCCUPATION

Frequency of deaths by occupation		
Profession	***Workforce***	***%***
Pupil and student	20	22,3
Drivers	26	29,5
Civil servant	10	11,36
No profession	26	29,5
Trader	4	4,5
Not specific	2	2,3
Total	88	100

Drivers and unoccupied people are the most killed, with 26 deaths each, or 29.5%.

TABLE XIX: FREQUENCY OF DEATHS ACCORDING TO ORIGIN.

Frequency of deaths by origin		
Source	***Workforce***	***%***
Kadutu	22	25
Ibanda	21	23,86
Bagira	20	22,73
Outside the zone	25	28,41
Total	88	100

The periphery (outside the zone) of the city of Bukavu was the most affected with 25 deaths (28.41%) followed by the commune of Kadutu with 22 deaths (25%).

Table XX. Frequency of fatalities by road user

Frequency of fatalities by road user		
Users	***Workforce***	***%***
Pedestrians	30	34,1
Passengers on a Bikes	17	19,32
Passengers in a vehicle	15	17,04
Bikes drivers	16	18,18
Vehicle drivers	10	11,36
Total	88	100

Drivers were affected second only to pedestrians with a frequency of 26 motorbike and vehicle drivers or 29.544% of cases

TABLE XXI: FREQUENCY OF DEATHS BY TYPE OF INJURY

Frequency of deaths by type of injury		
Type of lesions	***Workforce***	***%***
Head trauma	33	37,5
Fractures openings	16	18,18
Poly fractures	11	12,5
Abdominal and thoracic trauma	5	5,68
Polytrauma	15	17,04
Deep wound	8	9,09
Total	88	100

33 deaths were caused by head trauma, i.e. 37.5% of cases.

TABLE XXII: FREQUENCY OF FATALITIES BY TYPE OF COLLISION

Frequency of fatalities by type of collision		
Collision	***Workforce***	***%***
Bikes - pedestrian	9	10,23
Pedestrian - vehicle	21	23,86
Bikes	6	6,82
Vehicle-vehicle	10	11,36
Bikes	23	26,14
Without collision	19	21,59
Total	88	100

30 pedestrians died as a result of collisions between motorcycle-pedestrians and vehicle-pedestrians, i.e. a frequency of 34.09% of cases.

TABLE XXIII. FREQUENCY OF DEATHS BY DAY OF OCCURRENCE

Frequency of deaths by day of occurrence		
Days	***Workforce***	***%***
Monday	**10**	**11,36**
Tuesday	**4**	**4,54**
Wednesday	**6**	**6,82**
Thursday	**2**	**2,27**
Friday	**33**	**37,5**
Saturday	**23**	**26,14**
Sunday	**10**	**11,36**
Total	88	100

It is the weekend with the highest number of fatal accidents.

IV. 3. DISCUSSIONS

Our discussion will focus on the following elements:

Epidemiological characteristics of the patients; clinical parameters, facilitating factors and vital prognosis

3.1. EPIDEMIOLOGICAL PARAMETERS

- According to age groups:

In our study, it emerged that the age group most affected was the 15-29 year olds, i.e. 39.8% for both sexes. This high frequency among young adults can be explained both by the hyperactivity of this young population, which generally has two-wheeled machines, and by their carefree attitude, their taste for parties, their search for new experiences and their inexperience in driving, which means that young people do not always have the necessary lucidity to realize the risks they run on the road. Nevertheless, there are nuances with many other studies, notably the one by Diarra [3] and Sanogo [4].

The 15-24 year olds represent 12.6% of the population but 25.6% of those killed on the roads. Nearly 40% of the total number of years of human life lost to road accidents are in this age group. Road accidents are the leading cause of death among young people aged 15 to 24, accounting for 41% of deaths among 15 to 19-year-old boys. This phenomenon, which is not specific to France, has more to do with learning to live than learning to drive: older, harmful drivers have far fewer accidents than younger, harmful drivers [5].

- By gender:

The male predominance of 68.9% of cases in our series, with a sex ratio of 2.21:1 for men, can be explained by the fact that caution is much higher in women than in men. This male predominance is classically found in the literature: Diarra A [3]: 77.64%. Setodji K. [8] : 70,66%. Chékaro B. and Lassare S. [9] : 83%. Diakité S.K. [10]: 66.95%. Wilondja W.J. [11]: 60.98%. Faida M.B. [12]: 61.4%. In areas where traditions limit women's mobility, men spend more time driving a motor car than women, and in very small groups of the economic elite, more men than women own a car. 6] A study in Pakistan completed in 2004 found that 22.4 men per 1,000 populations were involved in traffic accidents, while the rate for women was 6.9 per 1,000. [7]

- According to the profession:

From our study, it appears that pupils and students were the most exposed to road accidents with a rate of 30.496% of cases; followed by the non-occupational population with 23.404%. This could be explained by the fact that most accidents take place during the day, which corresponds to the time when pupils and students are on their way to their respective schools. These results are consistent with those obtained by: Diallo A.M and Diakité S.K [30,10] Abdoul A.S [13]. Approximately 75% of accidents occur on the way to and from school. 15] If one kneels down to imagine the street seen by a child, one realises how different the angles of view are when one is barely one-metre-tall, and moreover in children there is a difficulty in evaluating speeds and movements, so the child may see a car coming but think (wrongly) that he has time to pick up his ball. [14]. The second most affected population in our study is the non-functioning population with a frequency of 23.404% of cases. This class of individuals without a profession is called upon to move around a lot in order to look for a job, even occasionally, and live at the rate of the day as they say in Bukavu. As a result, in their movements, this population is more exposed to road traffic accidents than a civil servant with a permanent and well established activity in an institution.

- Depending on the place of origin:

Almost one third of the population seen by the HPGRB in consultation originates from or lives in Kadutu, which explains their large number in the city of Bukavu, followed by the outskirts of the city with 25.673% of cases. These data are consistent with those of Wilondja W.J [11] and Faida M.B [12].

3.2. ENABLING FACTORS

Depending on the month:

April leads with 14.751%, July, June and March with more than 10% of cases each. Then come January, May and August respectively. This could be explained by the fact that these periods correspond to school activities for pupils and students and the beginning of holidays for pupils; but also, these last months are the period when rainfall is low in Bukavu, thus favoring multiple road accidents. This observation is similar to that of Diallo A.M [30] and Setodji K. [8] and concurs with that of Abdoul A.S. [13].

- Day of occurrence:

In our study, the highest number of road accidents occurred on weekends with a frequency of 24.113% on Fridays, 23.546% on Saturdays and 16.453% on Sundays. These results are verifiable in the literature and are in line with those of Pascal Gayrard [16] and a French study on major accident data in 2007 [5], which found that weekday starts have a lower average than weekends and that weekends have more fatal accidents.

This can be explained by the weekly movements of the population:

Tourist weekends with the family in the city of Bukavu.
Students and workers returning home.
Movement of people visiting their families.
Time of arrival at the hospital (HPGRB)

Between 12:00 and 18:00, there is a frequency of 45.531% of cases with an average of one hour from the time of the accident in 50% of cases. During this period of time, which represents the peak hours: break, lunch (12 - 13h00') and leaving work or school, it is a period when activities are at their maximum.

Diarra A had noted that 61.8% of the cases of accidents occurred between 08:00 and 17:00. [17]

- According to the ATR victims:

Pedestrians represent a little more than a third of the users in road accidents at 35.177%, followed by two-wheeler drivers with 11.773% of cases and passengers on a motorbike with 26.8% of cases. These results are in line with a study carried out by the Bureau de Régulation de la Circulation et des Transports Urbains du Mali in 2002 which recorded 53.03% of cases among drivers of two-wheelers and Setodji K. 8] found 55.13 among motorbike users.

Several studies have reported a disproportionate number of pedestrian victims of TIAs in low-income countries [5], and a Kenyan study reported that pedestrians and passengers are the most vulnerable road users, accounting for more than 80% of TIA deaths [18]. This can be understood here in Bukavu by a dramatic increase in the number of motorized two-wheelers, which rose from 1039 motorbikes in 2010 to 3600 motorbikes in October 2012.

Depending on the type of collision:

The majority of the TIA victim population in our study were pedestrians. Of the 705 cases, 24.539% of the accidents resulted from a collision between a motorbike and a pedestrian, followed by motorbike accidents without collision with 21.276% of the cases. This is due to the fact that in the DRC, as in most low-income countries, facilities for pedestrians are rudimentary or non-existent.

Pedestrian-related causes:

In our study, we observe that undetermined causes were in first place among pedestrian-related causes with a rate of 50.4% of cases, followed by careless crossing in 30.241% of cases. This can be justified by the fact that most of the victims do not know the traffic rules. These results are not consistent with other studies such as those carried out in Benin where careless crossing of the road by pedestrians accounts for 91.1% of accidents. 19]; [5]: Pedestrian travel is primarily an urban phenomenon: 68% of pedestrians killed are in towns, whereas for other road victims, this rate is less than 25%.

Driver-related causes:

In our study, it appears that speeding is the first cause of ATRs linked to drivers with a rate of 51.145% of cases, with a predominance of two-wheeler drivers in 53.012% of cases, but with no significant difference with vehicle drivers. In second place comes drunk driving in 22.9% of cases. This is in line with the results of a French study [5]: 29% in 2007, if all drivers had respected the speed limits, at least 900 lives could have been saved and if all drivers had respected the legal blood alcohol limit of less than 0.5 grams per liter, at least 1,031 lives could have been saved.

Road and environmental causes:

Our study shows that bad weather is the main cause of accidents with a rate of 37.2%, followed by poor road conditions with 30.23%. This can be justified by the dilapidated state of our roads, especially during the rainy season. These results are higher than those of a French study where in 2007, 13% of accidents occurred during rainy weather. [5]

Gear-related causes:

Vehicle defects and loss of control in 54.866% of cases, tyre blowouts in 20.35% of cases. This is due to the lack of regular technical control, the lack of regulations on the age of manufacture of the vehicle in case of import and the lack of rigour of the PCR (Police de Sécurité Routière) on the technical control of the machines.

CLINIC

Depending on the type of lesions:

During our study, head trauma appears to be the most frequent injury with 28.367% of cases, followed by fractures with 26.66% of cases, where the lower limbs were the most affected. This could be explained by the high number of accidents among two-wheeler drivers who do not systematically wear protective equipment. LEWHE M. J. et al. report comparable results. 21] These results are not consistent with those of Diarra [3]: 60% of head injuries.

Depending on the treatment received:

In 38.58% of cases medical treatment was initiated, 20.85M cases did not receive treatment, 24.1% of cases surgical treatment; these figures from our study are in agreement with those of LEWHE M.J, and ZEMMOUR O. [21]

According to the para-clinical examinations:

It can be noted that X-rays of the skull and lower limbs were the two most requested complementary examinations. This could be justified by the fact that these two parts of the body are the most affected areas in case of RTA.

VITAL PROGNOSIS

The outcome was favorable in 617 patients or 87.517% and poor in 88 patients or 12.482% of cases.

Mortality by age and sex:

Age: In our study, the age group most affected by mortality was 30-44 years, followed by 15-29 years with 34.09% and 27.27% of cases respectively. These age groups represent the most active part of the population. A study conducted by Winston FK- Rineer C. [22]. Found that the 18-24 age group was the most affected by road traffic deaths. Another study conducted by WHO [23] in 2002 showed that 50% of the world's road traffic deaths are among young adults aged 15-44 years. Our results are also consistent with those of Diarra A. [3], who found 44.6% of cases in the 15-29 age group.

Gender: Fatal accidents involved all genders with a male predominance of 68.81% compared to 31.81% of women. This would be linked to the greater frequency of road accidents among men than among women. Also, men represent the able-bodied arms of the population and are therefore more exposed to accidents by their occupants. Our results are consistent with those of the WHO in 2002[23] which concluded that more males than females are killed on the road, accounting for 73% of all deaths worldwide. Diarra A. [3] also found a high mortality among men, 92.86% of cases against 7.14% for women.

Lethality by cause of death:

During our study, head injuries were the most affected by mortality with 33 cases, followed by fractures with 27 cases. This high lethality would be linked to the seriousness of the lesions and to the insufficiency of the technical intervention platform. This result is consistent with those of most authors. Thus, Tangara [24], N'Diaye and Abondo [26], Diarra A. [3] LOVO A. [25], all find that the majority of deaths are due to head trauma during a road accident.

V. CONCLUSION

This analytical study of 705 cases of road traffic accidents at the HPGRB showed that this is a public health problem in underdeveloped countries such as the DRC. RTAs are responsible for a high morbidity and mortality. Men are the most affected and young people are the most affected population. The victims of ATR are often inhabitants of the commune of Kadutu followed by the outskirts of the city of Bukavu. Pupils, students and the unemployed are most affected. Pedestrians are more exposed to RTAs. Motorbikes are responsible for a significant proportion of mortality and morbidity. The areas of the body affected and the most requested radiographic examinations are the head and the lower limbs. The most common injuries are head injuries and fractures associated with visceral injuries, which account for a large proportion of deaths. The reduction in the number of accidents and victims on the roads of Bukavu in particular and of the DRC in general can only be achieved if the causal factors of the accident risk are eliminated, hence the need for a real approach to road safety, which requires first of all a political will. At the end of this study, the following recommendations are proposed or addressed:

To the political authorities:
The construction of roads to international standards;

Automate the management and control of road flows through a network of cameras and high-performance control centers linked to mobile brigades in the field;

Encourage studies by authors in this field to understand the mechanisms of accidentology and to fight against road insecurity;

Intensification of road safety awareness campaigns through audio-visual spots;

Periodically publish statistics on TIAs in order to inform the public about the seriousness of these accidents;

Application of repressive measures where necessary;

Road safety education in schools through basic road safety education in schools to prepare children to become road-friendly users

Machine operators:
Comply with road safety laws and regulations.
The ten commandments of the driver by Nelly PENON [29]:

1. Thou shalt analyze signage
2. Thou shalt control intersections
3. Thou shalt give way to priority
4. At the stop sign you will stop
5. At the sight of the pedestrian you will slow down
6. Thou shalt respect the safety distance
7. Thou shalt avoid excessive speed
8. You will share the road
9. You will arrive at your destination
10. In the end you will exist

To pedestrians

1. Strictly observe traffic regulations;
2. Move only on pedestrian crossings and pavements;
3. Catch the attention of the approaching motorist to make sure you are seen before you cross the road.
4. Avoid risky behavior such as walking in the middle of the road, changing direction while crossing the road;

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