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## ORIGINAL ARTICLE

### CHARACTERIZATION OF TRAFFIC ACCIDENTS THAT PRESENTED SPINAL CORD INJURY AS AN OUTCOME

#### CARACTERIZAÇÃO DOS ACIDENTES DE TRÂNSITO QUE APRESENTARAM COMO DESFECHO TRAUMA RAQUIMEDULAR

#### CARACTERIZACIÓN DE LOS ACCIDENTES DE TRÁFICO QUE PRESENTARON COMO RESULTADO TRAUMA ESPINAL

Rackynelly Alves Sarmiento Soares<sup>1</sup>, Iraktania Vitorino Diniz<sup>2</sup>, João Agnaldo do Nascimento<sup>3</sup>, Maria Julia Guimarães Oliveira Soares<sup>4</sup>

#### ABSTRACT

**Objective:** to characterize the traffic accident which had an outcome of victims with spinal cord injury, the locations of greater TA occurrence and whether there is a relationship between the nature of the traffic accident and the type of spinal cord injury. **Method:** the study was an observational descriptive sample of 32 individuals in João Pessoa, Brazil - PB who suffered some kind of spinal cord injury caused by a traffic accident. For analysis of the association *nature* of the accident and the level of spinal cord injury the correspondence analysis was used. The study was approved by the Ethics in Research, CAAE 0070.0.126.000-07. **Results:** the majority of victims were male (62.5%) and the level of the injury was complete paraplegia (50%) followed by complete paraplegia (37.5%). The vehicle most involved in these AT was mopeds (43%). **Conclusion:** the study showed a significant involvement of mopeds, signaling that this is a vulnerable group for this type of the injury. **Descriptors:** External Causes; Traffic Accidents; Spinal Injury.

#### RESUMO

**Objetivo:** caracterizar o acidente de trânsito que apresentou como desfecho vítimas com trauma raquimedular, os locais de maior ocorrência de AT e se existe relação entre a natureza do acidente de trânsito e o tipo de lesão medular. **Método:** o estudo observacional descritivo, com amostra de 32 indivíduos residentes em João Pessoa/PB que sofreram algum tipo de trauma raquimedular decorrente de acidente de trânsito. Para análise da associação *natureza do acidente e o nível da lesão medular* utilizou-se da análise de correspondência. O estudo foi aprovado pelo Comitê de Ética em Pesquisa, CAAE 0070.0.126.000-07. **Resultados:** a maioria das vítimas era do sexo masculino (62,5%), e o nível da lesão foi paraplegia incompleta (50%) seguido da paraplegia completa (37,5%). O veículo mais envolvido nesses AT foram os ciclomotores (43%). **Conclusão:** o estudo apresentou expressivo envolvimento dos ciclomotores, sinalizando ser este um grupo vulnerável para a ocorrência do agravo. **Descritores:** Causas Externas; Acidentes de Trânsito; Traumatismos da Coluna Vertebral.

#### RESUMEN

**Objetivo:** caracterizar los accidentes de tráfico (AT) como el resultado mostró que el trauma espinal. **Método:** el estudio fue observacional descriptivo de la muestra de 32 individuos que viven en João Pessoa - PB que han sufrido algún tipo de trauma espinal como consecuencia de accidentes de tráfico. Para analizar la asociación entre el tipo de accidente y el grado de lesión de la médula espinal se utilizó el análisis de correspondencias. **Resultados:** la mayoría de las víctimas eran de sexo masculino (62,5%), y el nivel de la lesión fue paraplejía completa (50%) seguido por paraplejía completa (37,5%). El vehículo involucrado en estos AT eran más ciclomotores (43%) que mostraron una fuerte asociación con lesiones en el pecho. Inexperiencia del conductor y el exceso de velocidad fueron factores contribuyentes mencionados por la mayoría de los encuestados (59%). **Conclusiones:** el estudio mostró una participación importante de los ciclomotores, lo que indica que se trata de un grupo vulnerable para la aparición de esta enfermedad. Dicha información permite que las políticas públicas se crean, prevención, vigilancia y educación de este grupo. **Descriptores:** Causas Externas; Accidentes de Tránsito; Traumatismos Vertebrales.

<sup>1</sup>Geoprocessing Technologist, Master in Decision Models and Health, Federal University of Paraíba, Graduate Program in Decision Models and Health/UFPB/PPMDS. João Pessoa (PB), Brazil. Email: [rackynelly@gmail.com.br](mailto:rackynelly@gmail.com.br); <sup>2</sup>Nurse, Specialist in Stomal Therapy, Pedagogical Training in the Area of Health-Nursing/FIOCRUZ, João Pessoa (PB), Brazil, Email: [iraktania@hotmail.com](mailto:iraktania@hotmail.com); <sup>3</sup>Statistical analyst, Professor in Statistics, Federal University of Paraíba - Graduate Program in Decision Models and Health (UFPB/PPMDS), João Pessoa (PB), Brazil. Email: [jadnasci@hotmail.com](mailto:jadnasci@hotmail.com); <sup>4</sup>Nurse, Ph.D. Professor, Federal University of Paraíba / Graduate Program in Nursing, João Pessoa (PB), Brazil, Email: [mmjulie@ig.com.br](mailto:mmjulie@ig.com.br)

## INTRODUCTION

The traffic accident is considered an important public health problem in the world<sup>1</sup> representing one of the main external causes of mortality, especially in middle and low income countries.<sup>2-4</sup> Although poorer countries have the TA highest mortality rates (21.5 per 100,000 inhabitants) than wealthier countries (10.3 per 100,000 inhabitants), both suffer with this serious problem. In poorer countries the TA have victimized mostly pedestrians, cyclists and motorcyclists, while in wealthy countries, the main victims are the occupants of four-wheeled vehicles.<sup>2</sup>

It is estimated that in 2020 the traffic accidents will be the second leading cause of premature death<sup>4</sup>. Worldwide every year 1.2 million people die from traffic accidents; this number represents three thousand deaths per day, in addition to the injuries caused to the other 50 million<sup>2</sup>. For each death are 20 hospitalizations with severe lesions and 70 other visits with less severe injuries.<sup>5</sup> The high rate of mortality and injuries caused to children is also worrying. Inexperienced and, in most cases, belonging to the vulnerable group, children contribute with 6% of all deaths caused by TA in the world.<sup>5</sup>

Brazil has one of the world's most violent transits<sup>6</sup> whose violence translates into high social and economic cost. It is estimated that, each year in Brazil, 400,000 people suffer injury due to traffic accidents, of which approximately 140,000 are victims with permanent injuries<sup>7</sup> of which only 877 are victims with permanent injuries from the Brazilian federal highways<sup>8</sup>. Responsible for consuming 1.2% of the Brazilian GDP<sup>8</sup>, traffic accidents are an epidemic, with mortality rates higher than those of developed countries victimizing mostly the so-called vulnerable groups: cyclists, motorcyclists and pedestrians.<sup>9</sup>

Facing this relevant socioeconomic impact, the Brazilian government has prioritized traffic accidents, inserting the topic in various policies and actions, the example of the 'Healthy Brazil' ('*Saúde Brasil*')<sup>10</sup>, the 'National Policy for the Reduction of Morbidity and Mortality from Accidents and violence',<sup>11</sup> of the Surveillance System of Violence and Accidents<sup>12</sup>, the National Policy of Transit (PNT) that presents as one of their objectives as the "priority and the preservation of life, health and the environment".<sup>9</sup> This last document, in particular, recommends reducing the national rate of deaths to 14 deaths per 100,000 by December 2010.

The 2007 Map of Violence showed the city of João Pessoa in the 20th position regarding the average rate of deaths in the period 2002-2004. This rate exceeded capital such as Salvador, Cuiabá, Vitória, Natal, among others.<sup>13</sup> Among the severe injuries caused by traffic accidents, the spinal cord injuries present worrying figures. The spinal cord injury is defined by the American Spinal Injury Association (ASIA), as a decrease or loss of motor function and/or sensory impairment and/or anatomical, by trauma of neuronal elements within the vertebral canal, and may be total or partial.<sup>14</sup>

This health problem is a clinical dysfunction of high socioeconomic cost and that entails significant changes in quality of life of patients. For the purposes of this study, the expression spinal cord trauma injuries that occur in any part of the spine: spinal cord, bone, ligament, discal, vascular or radicular.<sup>15</sup> may be associated with a worsening more simple as a fracture without sensory deficits as the more serious injuries such as a complete neurological injury<sup>16</sup>. For lost spinal cord functions there is no effective treatment.<sup>17</sup>

Among the most important etiologies for spinal cord injury, in Brazil, cited are: traffic accidents, accidents per firearm, falls from height, dives in shallow waters and aggression, being that the first two oscillate between first and second place.<sup>15,17-9</sup> The majority of these etiologies refers to a traumatic origin and, therefore, are subject to prevention.<sup>17</sup>

In this perspective of 11,080, victims of traffic accidents recorded by the surveillance system of violence and accidents 2006 and 2007 (VIVA), in 23 capitals and Federal District, 3.8% were affected by a spine/spinal cord injury.<sup>20</sup> In hospitals from the SARA network, the profile of traffic accidents revealed that 80% of patients treated in the study period suffered neuro-traumas (spinal cord and brain), being that the spinal cord injury reached 60.5%. Of these, 34% were quadriplegia and 66% paraplegia<sup>18</sup> international estimates are 40 to 50 new cases per million inhabitants/year, equivalent to 6,000 new cases per year in Brazil.<sup>21</sup> In Brazil, the incidence of this disease is difficult to define the view there is inadequate reporting of cases, as well as the lack of significant epidemiological studies.<sup>17</sup>

Given the above, the objective of this study is to characterize the traffic accident that presented as outcome victims with spinal cord trauma, the locations of higher occurrence of TA and whether there is a

relationship between the nature of the traffic accident and the type of spinal cord injury.

METHOD

The study design was observational retrospective and descriptive. The sample selection of the was made by convenience and the population was composed by traffic accidents victims whose outcome was spinal cord injury, over 18 years of age, residents in the city of Joao Pessoa - PB, Brazil and who agreed to participate in the research by signing the Free and Informed Consent.

For the sizing of the sample the following was done, initially, bibliographic research which showed that 10,000 new cases of spinal cord injuries occur per year in Brazil.<sup>22</sup> from this value, we obtained the incidence of 5.38%, a little higher than the one previously mentioned<sup>21</sup>. Through this rate the sample size was calculated using a 5% margin of error and confidence level of 95%. For this reason, it was considered that the exposed population is the entire resident population in the city of Joao Pessoa, which according to the 2010 census is 723,514, resulting in a sample of 79 individuals. However, this study considers only the spinal cord trauma caused by traffic accidents which, according to some studies represents less than 40% of all spinal cord injuries.<sup>15-6,18</sup> Thus the sample was composed of 32 individuals.

The data were collected using a semi structured and standardized questionnaire, based on studies with similar objectives. For its preparation, the authors performed bibliographic research for a better understanding of the topic and, consequently, to identify relevant variables to be investigated. The developed instrument was subjected to a critical evaluation by a neurologist and two physiotherapists, who suggested some modifications, which were included in the questionnaire.

The instrument is composed of two groups of variables the first whose function is to characterize the traffic accident and the second characterize the victims. For this study the variables of the first group were adopted, which are: The location of the occurrence, range of the year of occurrence (grouped by five years), period of accident (morning, afternoon, evening and early morning hours), use of safety equipment at the time of the accident (yes/no/NSA), who performed the pre-hospital care, condition (pedestrian, moped Rider, 4 wheeled vehicle Driver, Cyclist, Moped passenger and 4 wheeled vehicle Passenger), nature of accident

(Tramplng, Collision/Crash, Overturning/Shock with fixed object, Fall off of motorcycle), type of accident (Vehicle × Vehicle, Vehicle × Pedestrian, Vehicle × Vehicle, Vehicle × fixed Object Vehicle × Motorcycle Vehicle × Bike, Motorcycle × Pedestrian, Motorcycle × fixed Object, Motorcycle, Motorcycle × Bike), DPVAT (yes/no), elements contributing to the occurrence of the TA.

The data collection was performed by two graduate students in the months of May and June of 2011. The victims were approached in the following locations: rehabilitation centers Foundation Center for Integrated Support to People with Disabilities in the State of Paraíba - FUNAD; Program Integrated Care in Spinal Cord Injury - Clinical School of Physiotherapy, Federal University of Paraíba; Rehabilitation Clinic Helena Holland, School of Physiotherapy Clinic UNIPÊ. In these centers, individuals are services who fulfill the eligibility criteria of the study. Home visits were also conducted for victims registered at the Traffic Accidents Police Station in Joao Pessoa.

The relative nature of the traffic accident and the type of spinal cord injury was determined by correspondence analysis, a statistical technique that aims to describe categorical data by the multivariate association measure with representation in the Cartesian plane. The higher the proximity between the levels of the variable in the plan, the greater will be its association.<sup>23</sup>

The computational programs adopted for storage, manipulation and analysis of data were Microsoft Office Excel 2007 and SPSS *Statistics* version 19.00.

The study was approved by the Ethics in Research HULW / UFPB under SISNEP - CAAE 0070.0.126.000-07. For the design of this study, there was no conflict of interest and there was no funding.

RESULTS

♦Characterization of the traffic accidents

There were 32 victims interviewed from traffic accidents with spinal cord injury, being 20 males (62.5%) and 12 females (37.5%). The interviewees presented the following injuries: partial paraplegia (16/50%), total paraplegia (12/37.5%), quadriplegia complete (2/6.25%) and partial quadriplegia (2/6.25%).

With respect to the site of the occurrence, the majority of accidents in this study occurred in the state of Paraiba (91%) in the city of Joao Pessoa (59.4%). The Brazilian Traffic Code classifies the existing roadways

as urban and rural and following this classification, 46.9% of the victims had suffered accidents on rural roads (highways and roadways), and the other on urban roadways.

All accidents on urban roads occurred isolated in the city of Joao Pessoa (an occurrence on each roadway), in only three roadways more than one occurrence were recorded (all roadways with two cases) which were: Av. Hilton Souto Maior, Av. Sen. Ruy Carneiro and Av. Alfredo Ferreira da Rocha. According to STTrans<sup>24</sup> these roadways are inserted in the ranking of 70 roadways with a higher Standard Unit of Severity (SUS) of the city and were classified into 3 (SUS 396), 6th (SUS 298) and 27 (SUS 85) places, respectively. The Standard Unit of Severity (SUS) was created by the National Department of Transit (DENATRAN) and its value is derived from the sum of the products of the number of occurrences per severity by the weight assigned to the respective severity.<sup>25</sup> The SUS is calculated by the formula:

$$SUS = (no. \text{ of accidents without victims} \times 1) + (no. \text{ of non fatal accidents with victims} \times 5) + (no \text{ fatal accidents} \times 13) (1)$$

As For the monthly distribution of accident victims with SCI, the month of November showed the highest rate, with 20% of the occurrences, followed by March and May, whose values were close to 10% as can be seen in Figure 1.

Even with respect to the time question, it is important to note that 63% of the victims had suffered the injury in the past five years as can be observed in Figure 2. Regarding the period of occurrence, the highest percentage was found in the Early Morning (24:00-05:59) and the lowest percentage in the morning (06:00-11:59) with 16% of the cases.

Regarding the use of safety equipment, 41% (13) reported being using safety belt or helmet, according to the case, and of these only one presented partial quadriplegia. Among those who reported not having used any safety equipment, 9% (3) of the victims had quadriplegia. Among the victims who did not use equipment at the time of the accident 19% (6) were pedestrians, i.e. the equipment does not apply to them. Thus, the remaining were cyclists with 9% (3) of cases, passengers of other vehicles with 28.12% (9) and passengers of mopeds 6.25% (2). It should be noted, however, that only from 1998, the CTB became mandatory the use of safety belt to the occupants of other vehicles and four-

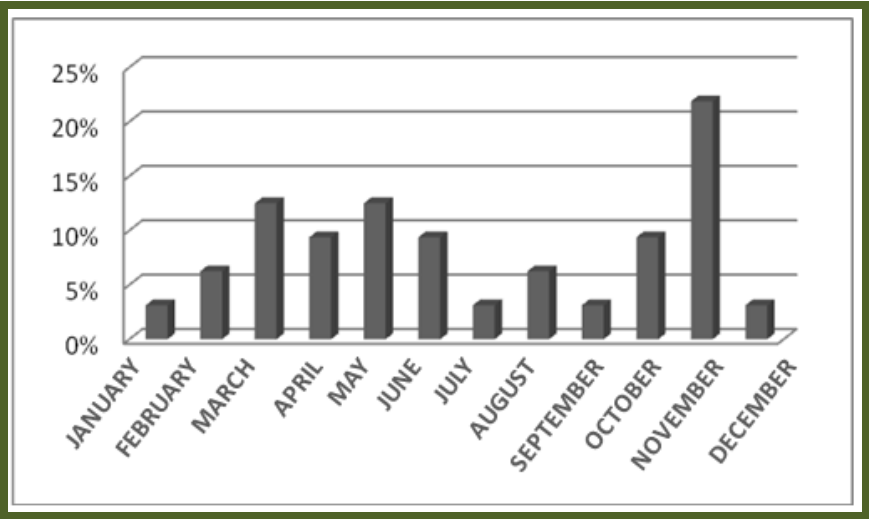
wheeled vehicles, including for those who are on the back seat. Therefore, what is observed is that the legislation was effective given that these 9 cases (5 passengers and 4 drivers) motor vehicle with four wheels only 2 disobeyed the CTB, because the other cases occurred years before the rule enters into force.

With respect to the provision of pre-hospital care, 65.7% of the victims have received appropriate care performed by specialized staff (15.6% by the Firemen, 6.3% by Federal Highway Police and 43.8% by the MECS). Of the visits made by third parties, two victims had tetraplegia complete, one rescued by a taxi driver and followed sitting the accident site until the hospital, without any kind of immobilization. This accident occurred in 2005, the 3:45 am dawn and it resulted in a fatality, a victim with complete quadriplegia (both without safety belt) and one with minor injuries. This victim used a safety belt. This fact is interesting, as alert to two important aspects: the use of seat belts and completion of pre-hospital care by a team trained in rescuing traffic accident victims.

The most prevalent were the victims who were moped drivers (25%), followed by the four-wheeled vehicle driver, the passenger vehicle with four wheels and the pedestrian with 19% each. The condition with the lowest percentage was the cyclist and moped passenger at 9% each. Of The 11 female victims, only one was driving a four-wheeled vehicle, in other cases they were pedestrians or passengers (mopeds or not). If the type of vehicle is considered, all involvements with a motorcycle equal 43% (Figure 2).

Regarding Compulsory Insurance Personal Injury Caused by Land Motor Vehicles, the DPVAT, 69% (22) of the women interviewed said they had received the benefit. Of 31% (10) who claimed not to have received this benefit, a not asked the indemnification even having knowledge of insurance, while the others have requested the compensation and are awaiting the legal procedures of the process. This insurance was instituted by Law 6.194, December 19, 1974, which ensures, among other things, compensation for personal injury by permanent invalidity, total or partial. We found No other studies involving this correlation.





**Figure 1.** Distribution of 32 spinal cord injury victims according to the month of the traffic accident occurrence.

**Table 1.** Characterization of the 32 cases of traffic accidents victims who had spinal cord injury according to gender.

| Characteristics                                        | Male<br>(n=20) | Female<br>(n=12) | Total<br>(n=32) |    |
|--------------------------------------------------------|----------------|------------------|-----------------|----|
|                                                        | n              | n                | n               | %  |
| <b>The Accident Site</b>                               |                |                  |                 |    |
| João Pessoa-PB                                         | 12             | 7                | 19              | 59 |
| Other cities                                           | 8              | 5                | 13              | 41 |
| <b>Accident year range (five)</b>                      |                |                  |                 |    |
| 1980 a 1985                                            | 2              | 1                | 3               | 9  |
| 1986 a 1990                                            | 1              | 2                | 3               | 9  |
| 1991 a 1995                                            | 2              | 0                | 2               | 6  |
| 1996 a 2000                                            | 2              | 0                | 2               | 6  |
| 2001 a 2005                                            | 1              | 1                | 2               | 6  |
| 2006 a 2010                                            | 12             | 8                | 20              | 63 |
| <b>Accident period</b>                                 |                |                  |                 |    |
| Morning (06:00-11:59)                                  | 5              | 0                | 5               | 16 |
| Afternoon (12:00-17:59)                                | 5              | 4                | 9               | 28 |
| Night (18:00-23:59)                                    | 4              | 4                | 8               | 25 |
| Dawn (24:00 -05:59)                                    | 6              | 4                | 10              | 31 |
| <b>Use of safety equipment</b>                         |                |                  |                 |    |
| <b>At the time of the accident</b>                     |                |                  |                 |    |
| Yes                                                    | 9              | 4                | 13              | 41 |
| No                                                     | 9              | 4                | 13              | 41 |
| NSA                                                    | 3              | 3                | 6               | 18 |
| <b>Who performed the Pre-hospital care</b>             |                |                  |                 |    |
| MECS                                                   | 8              | 6                | 14              | 44 |
| Federal highway Police                                 | 0              | 2                | 2               | 6  |
| Third parties                                          | 7              | 1                | 8               | 25 |
| Firefighters                                           | 3              | 2                | 5               | 16 |
| Other                                                  | 3              | 1                | 3               | 9  |
| <b>At the time of the accident their position was:</b> |                |                  |                 |    |
| Pedestrian                                             | 3              | 3                | 6               | 19 |
| Driver of moped                                        | 8              | 0                | 8               | 25 |
| Driver of vehicle 4 wheel                              | 4              | 2                | 6               | 19 |
| Rider                                                  | 2              | 1                | 3               | 9  |
| Passenger of moped                                     | 1              | 2                | 3               | 9  |
| Passenger of 4 wheel vehicle                           | 2              | 4                | 6               | 19 |
| <b>Nature of accident</b>                              |                |                  |                 |    |
| Run over                                               | 3              | 3                | 6               | 19 |
| Collision/Crash                                        | 4              | 2                | 6               | 19 |
| Rollover/Tipping                                       | 4              | 3                | 7               | 22 |
| Shock with fixed object                                | 4              | 1                | 5               | 15 |
| Motorcycle Fall                                        | 5              | 3                | 8               | 25 |
| <b>Type of accident</b>                                |                |                  |                 |    |
| Vehicle X Pedestrian                                   | 3              | 2                | 5               | 16 |
| Vehicle X Vehicle                                      | 1              | 2                | 3               | 9  |
| Vehicle X fixed Object                                 | 1              | 1                | 2               | 6  |
| Vehicle X Motorcycle                                   | 2              | 1                | 3               | 9  |
| Vehicle X Bike                                         | 1              | 0                | 1               | 3  |
| Vehicle                                                | 4              | 3                | 7               | 22 |
| Motorcycle X Pedestrian                                | 0              | 1                | 1               | 3  |
| Motorcycle X fixed Object                              | 2              | 0                | 2               | 6  |
| Motorcycle                                             | 5              | 2                | 7               | 22 |
| Motorcycle X Bike                                      | 1              | 0                | 1               | 3  |
| <b>Received the DPVAT</b>                              |                |                  |                 |    |
| Yes                                                    | 16             | 6                | 22              | 69 |
| No                                                     | 4              | 6                | 10              | 31 |

◆**Relationship between the level of the spinal cord injury and the nature of the traffic accident**

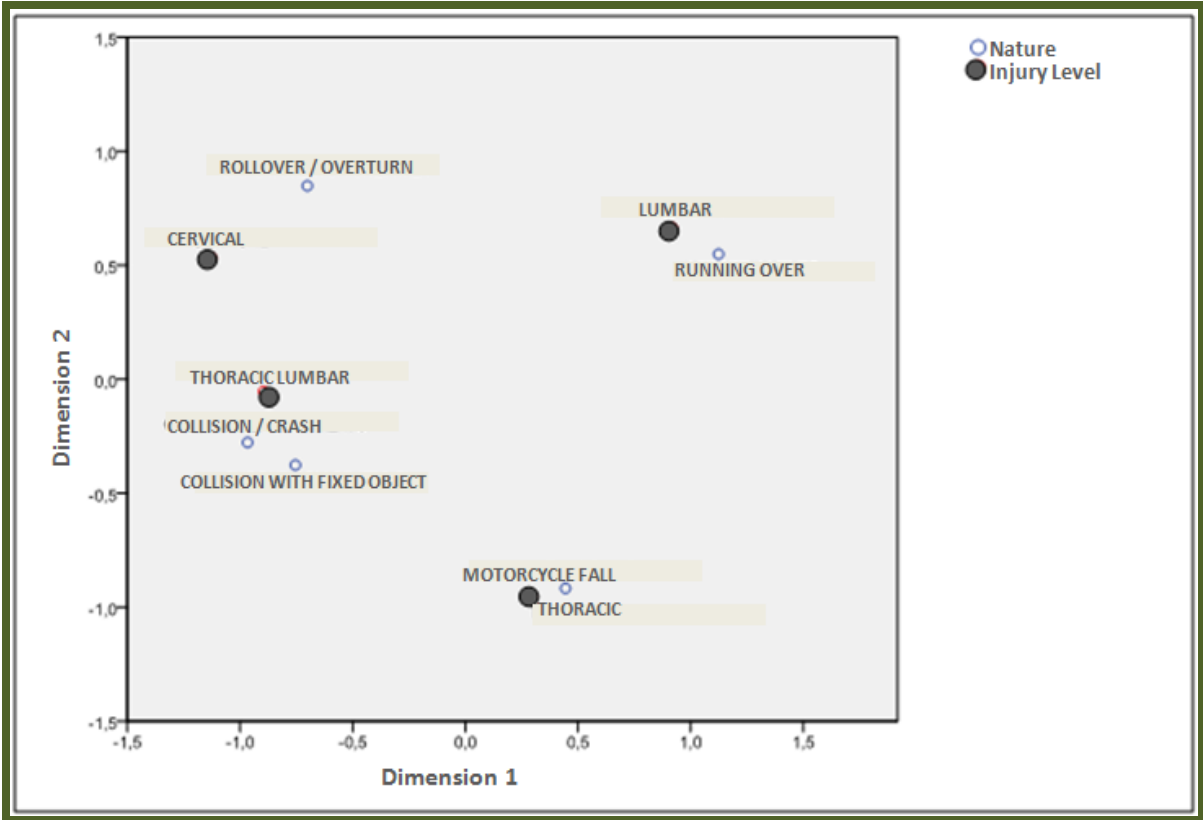
The verification of the existence of the relationship between the nature of the traffic accident and type of injury was demonstrated by correspondence analysis, which could explain 93.9% of this relationship with two dimensions. The proximity of the two points represented by the CERVICAL and THORACOLUMBAR compared with the distance between the LUMBAR and THORACIC points indicate that there is a contrast between the groups, thus revealing the existence of heterogeneity. In addition, correspondence analysis showed strong association between CERVICAL lesion and the ROLL-OVER/TIPPING nature; the THORACOLUMBAR injury and the IMPACT/COLLISION natures and SHOCK WITH FIXED OBJECT; the LUMBAR injury and the TRAMPLING nature; and finally, between the LUMBAR injury and the FALL FROM MOTORCYCLE nature as can be seen in Figure 3.

◆**Factors contributing to the occurrence of traffic accidents**

On this question there are multiple choices of factors, since it is known that the traffic

accident suffers multi factorial influence with the factor related to road-environmental, human factor and the vehicle factor.<sup>26</sup> A study<sup>28</sup> also adds the institutional factors and the socio-economic aspects. This same author conceptualizes the elements contributing to the occurrence of traffic accidents as being “the main actions, failures or conditions that led directly to the accident”.<sup>28</sup>

Among the elements that have contributed to the occurrence of the accident according to the opinion of the interviewed victims, the incompetence of the driver along with the excessive speed, were the elements most frequently mentioned, with 59% (19) each (Figure 4) both related to the human factor. The second contributing factor reported was roadway problems (44%). The third, also related to the human factor, was the influence of alcohol (31%). Not reported by any of the victims was the element of mechanical problems which is related to vehicular factor.



**Figure 2.** Representation of the level of the spinal cord injury and the nature of the traffic accident on a 2-dimensional plane.

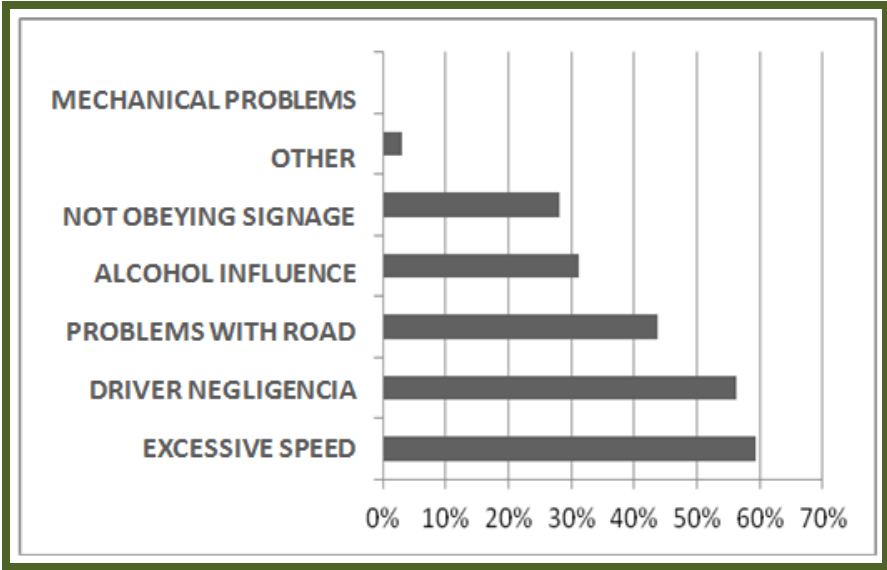


Figure 3. Factors contributing to the occurrence of the accident according to the victim's perspective.

DISCUSSION

Male preponderance is perceived in several studies<sup>15-8,21,31</sup> ranging between 65% and 75%. Such variation occurs due to the characteristics of each region and the type of activity of the population.<sup>21</sup> The literature shows that these men are in economically active age implying important socioeconomic impact.<sup>17</sup> in the study presented by <sup>26</sup> the males also showed to be majority (75.45%) between the victims of traffic accidents cared for by the Service of Emergency Medical Care (MECS) in 2010 in the city of João Pessoa

Regarding the place of occurrence, one study found that 60.9% occurred on rural roads and 38.1% in urban roads, differing from the results found in this study.<sup>18</sup>

Corroborating with our study, the study <sup>18</sup> showed higher frequency of victims of traffic accidents with paraplegia spinal cord injury (59.1%) when compared with tetraplegia (40.9%). A study conducted in the city of San Francisco Morato - SP with all persons with spinal cord trauma also presented paraplegia as most of the cases (64%).<sup>16</sup>

In the study presented by <sup>15</sup> were included various etiologies (diving and shallow waters, gunshot injuries, automobile accidents, among others) for traumatic spinal cord injury. In this study, the variable level of injury was grouped by gender and the results presented corroborate those found in our study the level cervical among the victims of the males was 39.5% and in women was 14.3%, compared to the thoracic lumbar spine level, was registered in 60.5% of cases of males and 85.7% of females.<sup>15</sup> In The same way, the study <sup>17</sup> presented a majority for the cases of paraplegia (135 - 64.9%) and quadriplegia (73 - 35.1%).

The majority of victims interviewed in our study received specialized care at the time of

TA, following this behavior, Brazil (2010) found that the means of locomotion used to arrive at the hospital in 23 State Capitals and the Federal District were the following: police 105 (1.1%), MECS 2556 (24.1%), ambulance 1534 (14.6%), rescue 963 (11.7%). A study carried out in Belo Horizonte - MG, involving 1,564 victims of traffic accidents, reported that 49.7% of these victims were taken to hospital by the service of pre-hospital care while the others were transported by private vehicles.<sup>30</sup> Moreover, in this study, it was noticed that the more serious the accident, the higher the search for pre-hospital service. In cases reported as more serious, with AIS ≥ 3, search for pre-hospital care reached 85%.<sup>30</sup>

On the motorcycle, asserting that some factors that certainly has contributed to the deterioration of this framework: the use of motorcycles as an instrument for work, in particular by companies for delivery of goods<sup>31</sup>; the ease that acquisition of this type of vehicle<sup>6</sup>; and the consequent accelerated increase of this fleet in the city of study in recent years whose index of motorization increased from 3.13 motorcycles for every 100 inhabitants, in the year 2008, to 8.17 in the year of 2010.<sup>26</sup> This group has presented increasing involvement in TA and for this reason it is considered as priority group in prevention programs, the risk of a motorcyclist to suffer injury by TA is four times higher when compared to the occupant of vehicle<sup>6</sup>.

With respect to the contributing factors, the study<sup>27</sup> it affirms that man is the greatest responsible for traffic accidents and to ratify this it presents the results of several studies showing that, for example, human failure is the most frequent cause that varies between 85% and 95%, the failure of the vehicle is between 5% and 10% and the deficiency of the roadway between 0% and 5%. It also highlights

that 90% of accidents are due to carelessness, negligence and incompetence of the driver<sup>27</sup>.

Studies on these factors in Brazil are scarce, although important for understanding of traffic accidents. This study presented<sup>8</sup>, although extensive, does not address these aspects leaving this gap. The preponderance of human factors at the expense of other factors in some states of the United States (Arizona, South Carolina, Georgia, Indiana, Iowa, Ohio, Texas, Wisconsin and Washington) and the United Kingdom.<sup>28</sup>

It is believed that the mechanical problems were not reported by the victims mainly because the average age of the fleet of Brazilian vehicles is relatively new (9 years), naturally presenting fewer problems than older vehicles.<sup>29</sup>

## CONCLUSION

Traffic accidents, beyond killing thousands of Brazilians, cause permanent injuries and mutilation, especially in the economically active male population. Among the severe injuries, spinal cord injuries, even with low prevalence, are able to promote significant change in the quality of life of the victim, as well as cause burden to health services due to the need for rehabilitation/readaptation, implicating with that, a serious public health problem.

Understanding that traffic accidents are, in their majority, preventable events, it is necessary to raise awareness of the users of the transit system (drivers, passengers and pedestrians) through educational campaigns, a time that our study showed that 63% of the victims suffered the injury in the past five years. Another worrying result is the significant involvement of mopeds, signaling that this is a vulnerable group for this type of the injury. The incompetence of the driver and the excess speed are pointed out as the main elements contributing to the occurrence of the accident. Namely, the serious accidents are still happening, even with governmental investment in traffic engineering, with the technological advances toward the vehicle safety and with the implementation/application of the Brazilian Traffic Code. This is because, the roadway fiscalizations are insufficient and the formation of conductors is outdated and incipient.

Investment in studies and research in this area are salutary, there are views that there is a lack of data and published studies focusing on the epidemiology of spinal cord injury, and in particular, associating traffic accidents to spinal cord injury.

Epidemiological studies allow for the development of preventive actions and policies in accordance with the real needs of the exposed population.

Moreover, the knowledge of the characterization of these accidents in the city of Joao Pessoa-PB provides that public policies are created, aiming at the prevention, surveillance and education group of risks here characterized - young male moped users.

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#### Corresponding Address

Rackynelly Alves Sarmiento  
Soares

Programa de Pós-graduação em  
Modelos de Decisão e  
Saúde/UFPB/PPMDS

Centro de ciências exatas da  
Natureza/CCEN

Universidade Federal da Paraíba

Cidade Universitária, s/n - Departamento de  
Estatística

CEP: 58051-900 – João Pessoa (PB), Brasil