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Repercussions of Traffic Accidents: An Integrative Review

Repercussões dos Acidentes de Trânsito: Uma Revisão Integrativa

Repercusiones de los Accidentes de Tránsito: Una Revisión Integrativa

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ABSTRACT

Objective: The aim of this review is to map the research on the main repercussions of traffic accidents in Brazil. **Methods:** This is an integrative review of the literature. LILACS and SciELO databases were searched using the descriptor "traffic accident" combined with "rehabilitation", "disabilities", "side-effects", and "quality of life". **Results:** 12 articles matched the inclusion criteria producing four categories: "Morbimortality due to traffic accidents in Brazil; "Traffic accidents and the return to work; "Impacts of traffic accidents on quality of life"; "Repercussions of traffic accidents in for the family and society"; "Suggested and/or adopted measures". **Conclusion:** Traffic accidents in Brazil negatively impact the physical and psychological well-being of victims and their families, worsening their quality of life and work performance, with repercussions for society and economy.

Descriptors: Traffic Accidents, Statistics on Side-Effects and Disability, Quality of Life.

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RESUMO

Objetivo: Analisar o que versam as produções científicas sobre os acidentes de trânsito no Brasil, no que tange as suas principais repercussões. **Métodos:** Revisão integrativa de literatura, cujos dados foram coletados nas bases de dados LILACS e SCIELO, por meio do descritor acidente de trânsito inter-relacionado com os descritores reabilitação, incapacidades, sequelas e qualidade de vida. **Resultados:** 12 artigos atenderam aos critérios de inclusão desta revisão, dos quais emergiram cinco categorias: Morbimortalidade por acidentes de trânsito no Brasil; Acidente de trânsito e retorno ao trabalho; Impactos dos acidentes de trânsito na qualidade de vida; Implicações dos acidentes de trânsito na estrutura familiar e social e; Medidas sugeridas e/ou adotadas. **Conclusões:** Os acidentes de trânsito no Brasil repercutem negativamente no bem-estar físico e psicológico das vítimas e de seus familiares, com redução na qualidade de vida e na capacidade desses indivíduos para o trabalho, com reflexos nos setores econômico e social.

Descritores: Acidentes de Trânsito, Estatísticas de Sequelas e Incapacidade, Qualidade de Vida.

RESUMEN

Objetivo: Analizar lo que versan las producciones científicas sobre los accidentes de tránsito en Brasil, en lo que se refiere a sus principales repercusiones. **Métodos:** Revisión integrativa de literatura, cuyos datos fueron recolectados en las bases de datos LILACS y SCIELO, por medio del descriptor accidente de tránsito interrelacionado con los descriptores rehabilitación, incapacidades, secuelas y calidad de vida. **Resultados:** 12 artículos atendieron a los criterios de inclusión de esta revisión, de los cuales surgieron cinco categorías: Morbimortalidad por accidentes de tránsito en Brasil; Accidente de tránsito y retorno al trabajo; Impactos de los accidentes de tránsito en la calidad de vida; Implicaciones de los accidentes de tránsito en la estructura familiar y social; Medidas sugeridas y/o adoptadas. **Conclusiones:** Los accidentes de tránsito en Brasil repercuten negativamente en el bienestar físico y psicológico de las víctimas y de sus familiares, con reducción en la calidad de vida y en la capacidad de esos individuos para el trabajo, con reflejos en los sectores económico y social.

Descriptores: Accidentes de Trânsito, Estadísticas de ecuelas e Incapacidade, Calidad de Vida.

INTRODUCTION

Traffic Accidents (TAs) correspond to an important source of morbidity and mortality worldwide, with social and economic implications because they affect mostly the economically active young.[1]

It is estimated that approximately 1.2 million people die each year as a result of TAs on highways, being reported as the second cause of death among young people aged between 5 and 29 years and the third among people aged between 30 and 44 years.[2] More than one million hospitalizations and around 200,000 deaths occurred from 2010 to 2015 In Brazil. Motorcyclists, who accounted for more than 40% of the victims, has increasingly received attention.[3]

For those who survive the accident, the repercussions are wide and include physical, cognitive, psychological, behavioral and emotional disabilities, including serious damage to the quality of life and productivity. These repercussions often produce costly psychosocial and economic problems.[4] In addition, the increase in the number of such accidents overburden the health system, either with prolonged hospitalizations or with the high costs of rehabilitation.[5]

In this context, it is perceived that TAs cause serious problems for people and their relatives, as well as for the health system and society. Therefore, studies on TAs are of fundamental importance, since they may provide information for the elaboration and implementation of public policies in order to promote TA prevention and the victims' rehabilitation.

Thus, this study had the following guiding question: "What is the scientific knowledge about the repercussions of TAs in Brazil?" In order to answer this question, we mapped the research on the main repercussions of TAs in Brazil.

METHODS

This is an integrative review of the literature, which makes it possible to know and critically analyze the evidence of a given topic in order to identify gaps and provide in-depth knowledge about a research topic.[6]

This review was conducted following the following steps: (1) selection of the research topic and hypothesis or research question; (2) establishment of the inclusion and exclusion criteria; (3) selection of what information will be extracted from the studies/categorization of studies; (4) evaluation of the selected studies; interpretation of results; and presentation of the review/synthesis of knowledge.[6]

The bibliographic review was carried out in the Virtual Health Library using SciELO (Scientific Electronic Library Online) and LILACS (Latin-American and Caribbean System on Health Sciences Information) databases in June 2017. The descriptor "traffic accident" was used combined with the descriptors "rehabilitation", "disabilities", "side-effects", and "quality of life".

In order to select the studies, the following inclusion criteria were considered: full-text, free, and original scientific articles on TAs developed in Brazil, published from 2007 to 2017, and written in Portuguese, English or Spanish. Theses, dissertations, and articles on other subjects or in more than one database were excluded.

Initially, 9,727 publications were retrieved by searching for publications using the descriptors and combinations of them. From the 17 articles that matched the inclusion and exclusion criteria, 12 were used in this review.

Each article was read in full, observing if it really matched the purpose of this study. After this, a script formed by the characteristics of the articles and other variables of interest was developed. Finally, the texts were analyzed and read critically to extract the relevant results and characteristics.

For the data analysis and summaries of the articles, a synoptic table was used with following aspects: authorship/year, newspaper, title, goal, and conclusions. Afterwards, the

discussions about the results were carried out, which were based on other studies on the subject of this review.

RESULTS AND DISCUSSION

Twelve articles that matched the inclusion criteria were analyzed and their characteristics are described in **Table 1**. Seven articles were found in SCIELO and five in LILACS. The majority of the articles were published in 2016 (4), but none in 2007 and 2017.

Concerning the research method, ten articles were developed using quantitative methods: nine cross-sectional studies and one longitudinal cohort study. Qualitative approaches were used in two articles.

Based on the articles' results, four categories emerged: "Morbimortality due to traffic accidents in Brazil; "Traffic accidents and the return to work; "Impacts of traffic accidents on quality of life"; "Repercussions of traffic accidents for the family and society"; "Suggested and/or adopted measures".

Author and year	Journal	Title	goal	Conclusions
Sousa Filho; Xavier; Vieira, 2008	*Revista da Escola de Enfermagem da USP*	Hospitalization from the perspective of the traffic accident victim and his/her family member	Describing the hospitalization context experienced by TA victims and his/her family member.	The context of hospitalization experienced by the TA victim and his/her family member is represented by emotional, family, economic and social problems.
Dornelas, 2010	*Acta Ortopédica Brasileira*	Use of prosthesis and return to work in amputees due to traffic accidents	Verifying the use of lower limb prosthesis and return to work in TA amputees.	Prostheses are commonly used for walking and the return-to-work rate after rehabilitation is low.
Brito, 2011	*Coluna/Columna*	Inability due to secondary spinal cord injury caused by traffic accidents	Analyzing the TA victims with inability due to spinal cord injury.	The incidence of side-effects due to spinal cord injuries was 0.38%, mostly in car drivers (70.83%).
Jácomo; Garcia, 2011	*Revista Acta Fisiátrica*	Analysis of motorcycle accidents at the *Centro de Reabilitação e Readaptação Dr. Henrique Santillo (CRER)*	Identifying the profile of TA victims with motorcycles, neurological injury type, inabilities, work reintegration and the ability to drive vehicles after the trauma.	Most of the victims were economically active young men. The majority of them did not return to work (86%) and were receiving social security benefits (79.6%).
Diniz et al, 2012	*Revista Brasileira de Ciências da Saúde*	Characterization of the traffic accident victims with spinal cord injury	Mapping the epidemiological profile of TA victims with spinal cord injury.	All victims presented complications after the trauma with the quality of life impairment.
Lopez; Gamba; Matheus, 2013	*Revista Gaúcha de Enfermagem*	Meaning of living with external immobilization devices in lower limbs affected by grade III exposed fractures: patients' perspectives	Understanding the meaning of living with external immobilization devices in lower limbs affected by grade III exposed fractures according to the patients' perspectives	According to the patients, it is the personal desire and support of other people that provide life reorganization.
Macedo et al, 2014	*Revista Espaço para a Saúde*	Characteristics and physical disabilities of traffic accident victims attending the reference service for rehabilitation of *Mato Grosso* State, Brazil, 2010	Describing TA victims and their physical inabilities.	Young and male motorcyclists were highlighted among the victims. The injuries resulted in movement, muscle strength and joint disabilities.
Paiva et al, 2015	*Revista Latino-Americana de Enfermagem*	Readmissions for traffic accidents in a general hospital	Mapping the occurrence and causes of hospital readmissions due to TAs up to a year after the discharge	The reasons for hospital readmissions were: the need for maintaining surgical treatment, surgical site infection and falls due to side-effects from the trauma.
Silveira, 2016	*Revista Saúde e Pesquisa*	Side-effects of traffic accidents and its impacts on quality of life	Evaluating the general quality of life and quality of life for the health of individuals with side-effects from TAs.	Individuals with AT side-effects have an impaired quality of life, which can be improved by spiritual factors.
Paiva et al, 2016	*Revista Brasileira de Enfermagem*	Health condition and return to work after a traffic accident	Comparing the health condition of TA victims at the hospital discharge and after 6 months, as well as to analyze health condition predictors and return to work.	The victims' perception of health condition improved after 6 months from the discharge. No factors that influenced the return to work were identified.
Mello-Jorge; Andrade, 2016	*Revista Saúde Pública*	Mortality and potential years of life lost due to traffic accidents in Brazil, 2013	Estimating the potential years of life lost due to TAs after three years of the start of the Decade of Action for Road Safety.	The number of potential years of life lost due to TAs was one million in Brazil in 2013, especially for economically active young people.
Malta et al, 2016	*Ciência e Saúde Coletiva*	Traffic injuries and use of protective equipment in the Brazilian population, according to a population-based study	Describing traffic injuries according to demographic characteristics, use of protective equipment, use of health services, limitation of activities, and inabilities.	Although the use of safety equipment has increased, it is still low on the back seat, and educational and surveillance measures should be improved.

Through the analysis of the articles, it was possible to perceive that TAs is a serious public health problem in Brazil, with disastrous repercussions for the victim, their relatives, and society in general. It was also observed that the improvement of the TA victims' health condition often depends on large rehabilitation periods, and the effort into preventive actions continues to be the best way to deal with the problem.

Hence, four categories emerged from these results, which will be discussed separately.

Morbimortality due to traffic accidents in Brazil

According to data from the *Pesquisa Nacional de Saúde* (PNS) [National Health Survey], 3.1% of Brazilians aged 18 years and older (4.4 million people) reported having involvement in TAs.[7] This data corroborates the results of other studies analyzed, which show the predominance of economically active male motorcyclists among the injured.

According to a study, the greater vulnerability of the young population can be attributed to the social and cultural behaviors of these individuals, such as less use of protective equipment, increased alcohol consumption, speeding, and lack of driving skills.[8] The greater frequency of motorcyclists among the victims can be explained by the increase in the fleet of motorcycles, motivated by urban and rural mobility difficulties, the precariousness of the collective transportation, and the advantages of motorcycles, such as agility, fuel economy, and low repair costs.[9-10]

Among the Brazilian regions, the fragility of the North, Northeast and Central-West regions was verified regarding TA rates, use of protective equipment, as well as access to fast hospital care.[7] These results may be influenced by the small number of municipalities in these regions registered with the *Sistema Nacional de Trânsito* [National Traffic System], with a municipal traffic management that can supervise the traffic and execute safety actions.[7] In addition, a large part of the municipalities do not present a prehospital service network and a hospital qualified to respond to the rapid increase in

the vehicle fleet, nor actions for urban and road planning enough to deal with these accidents.[11]

In 2013, 52.4% of the Brazilian TA victims received some health care and 7.7% (345,000 people) needed hospitalization.[7] Also, data from the *Sistema de Vigilância de Violências e Acidentes* (VIVA) [Violence and Accident Surveillance System], in 2011, indicate that approximately 30% of TA patients attending urgency and emergency services in 23 Brazilian capitals and Federal District were hospitalized or transferred to another health care service within the first 24 hours, which shows the severity of the injuries caused by TAs.[12]

Limbs were the most damaged part of the TA victims, especially the lower limbs. In addition, traumatic brain injury (TBI) was the main cause of death by TA.[13-14] Crushing injuries, amputations and spinal cord injuries, although less frequent, are of great importance because of the severity of their side-effects.[13-15]

Furthermore, TAs and their complications overburden the health system with high hospital readmission rates and long-term rehabilitation treatment. In a study that analyzed the causes of hospital readmission in TA victims after one year from hospital discharge, it was observed that 17.4% of the patients needed readmission, with a rate of 174/1,000 people per year, being surgical site infection the main cause[16]. In addition, temporary or permanent inability contribute to the increase in these rates, as well as to the decrease in functional capacity and muscular strength, postural instability and higher victims' fall rates.[16]

Regarding the mortality, a study showed that 42,266 deaths by TAs were recorded throughout the country in 2013, with a projected mortality rate of 21.0 deaths per 100,000 inhabitants, being young adults, males and motorcyclists the main victims.[17] In the same year, more than one million potential years of life were lost due to these accidents in Brazil, especially in the age group 20-29 years, which represents not only a personal or family impact but a collective one due to the population with high economic and intellectual potential being impaired.[17]

For TA survivors, statistics indicate that about 2 million Brazilians aged 18 years and more left their work as a result of TAs in 2013, and approximately 670,000 had some side--effects and/or inability due to the accident.[7] Corroborating these results, a study on the prevalence of physical side-effects among hospitalized TA people in the country from 2000 and 2013 showed that 23.5% (about 400,000) of the hospitalized patients presented a suggestive diagnosis of side-effects.[18]

The main impacts of TAs as a result of this review were: overburden of health services; potential years of life lost; absenteeism; early retirement; victims' physical and emotional limitations; and damages to the family and society.

Traffic accidents and the return to work

Three selected articles had as objective evaluating the return to work in TA victims. In one of these studies, it was shown that 48% of the victims did not return to work after six months from hospital discharge, and among those who returned to work, 4.9% changed their job due to post-traumatic conditions.[5] In the study carried out with victims of motorcycle accidents seen at a rehabilitation center, it was observed that 86% of the interviewees were unable to return to work after the accident, and 79.6% were looking for some type of social security benefit, of which 4% were self-employed, with the aim of increasing family income.[19]

Furthermore, a study on the use of lower limb prosthesis and the return to work in TA amputees found that all the individuals left their jobs after the accident, and 66.7% were on medical leave by the *Instituto Nacional do Seguro Social* (INSS) [National Social Security Institute], 25% were retired due to disability and 8.3% due to age. Five people on medical leave returned to work, and four retired people reported working beside receiving the pension.

In the analyzed studies, the reduction in family income after the accident was evidenced, which may be related to the victim or family member leaving their unpaid jobs, to unemployed people, or to the value of medical pensions being lower than wages.[5]

One selected publication verified the factors associated with return to work after TAs, in which no statistically significant results were found.[5] However, several factors related to trauma are linked to return to work, such as initial injury type, injury severity and presence of cranioencephalic injury. In addition, predictive factors related to return to work were reported after six months from the accident, such as the presence of physical or neuropsychological side-effects and persistent pain.[21]

In assessing the TA victims' quality of life regarding return to work, a study showed that the people who returned to work scored better evaluation in the Medical Outcome Survey 36-item short (SF-36) questionnaire, while in those who did not return to work, it was observed that the most affected domains were functional capacity, physical aspects, and emotional aspects.[5] In addition, when comparing the patient groups according to the average values found in each instrument domain, it was verified that the group that returned to work scored higher values in all domains and only vitality was not statistically significant.[5]

Thus, the return to work after a TA depends on conditions related to the individual, pathology or injury, the rehabilitation process and the socioeconomic environment in which the victim is inserted.[5] This is a complex problem, with repercussions on the quality of life and serious social costs.

Impacts of traffic accidents on quality of life

The selected studies indicate that traumas reduce the health-related quality of life in the medium and long term.[22] Many factors can influence the quality of life after a trauma, such as the quality of care offered by the health system, type and severity of injuries, number of surgical interventions,

side-effect degree, pain, rehabilitation access, socioeconomic conditions, among others.[22]

Among the articles included in the review, two evaluated the quality of life of individuals under TA side-effects. In one study, quality of life was measured using the World Health Organization Quality of Life-100 (WHOQOL-100) and the SF-36 questionnaires; while in the other, a questionnaire created by the researchers was used.

The WHOQOL-100 analysis showed that individuals suffering from TA side-effects reported having an average value of quality of life (not so good/not so bad) considering the level of independence in daily life activities, dependence on medications or treatments, and capability of doing work, in addition to aspects related to physical security and protection, home environment, financial resources, health care and social aspects.[23] It was also observed that the Spiritual Aspects/Religion/Personal Beliefs domain presented the highest score, which may mean that personal beliefs contribute to understand and face difficulties, that is, spirituality promotes hope, security and perseverance, collaborating for the TA patients' psychological well-being and better life quality.[23]

The results obtained from the SF-36 showed that individuals with AT side-effects present physical, emotional, and functional impairment.[23] According to the authors, these results may be related to long periods of physical limitation, hindering work because of the difficulties and interferences in performing daily activities, as well as the consequences of the psychological condition for the patient's well-being, which may be caused by abrupt lifestyle changes, mainly caused by injuries.[23]

Considering the study that evaluated the quality of life of TA victims with secondary spinal cord injury, a strong association was found between trauma complications and the medium and high levels of quality-of-life impairment. As a result, emotional aspects, autonomic dysreflexia, and intestinal disorders were closely related to the high level of impairment. On the other hand, pressure ulcers and urinary disorders were related to the medium impairment level.[24]

A study carried out with victims suffering from secondary spinal cord injury indicates that the domains of emotional aspects and mental health are impairing them, suggesting an imbalance between body and mind with a decreased quality of life, which is reflected in all domains, especially in social aspects.[25]

Thus, it can be inferred that TAs and its complications cause limitations to the victims, impairing their most basic and important actions, such as mobility, work, health and autonomy for daily activities, which impacts on their quality of life.

Repercussions of traffic accidents for the family and society

In a study that quantified the costs of accidents on Brazilian highways, the *Instituto de Pesquisa Econômica Aplicada* (Ipea) [Institute of Applied Economic Research], pointed out the need to know the impact of TAs on the health and life of the victims directly or indirectly involved in those accidents, such as family members, rescue teams, and health teams, which are directly affected by stress, since they deal with disaster side-effects, life-threating risks and deaths by tragic circumstances on a daily basis.[26]

Victims and their families face problems caused by TAs that are apparently hidden, such as changes in lifestyle, sadness, and discouragement, which are intensified by severed physical injuries, impairment and death of a loved person.[27] According to a study that analyzed the context of hospitalizations due to TAs according to the injured person and his/her family member/companion, the most relevant contexts are the emotional, familial, economic and social ones.[27]

The participants reported having moments of anxiety, especially due to stoppage of surgeries, delayed surgery scheduling, prolonged hospital treatment and delayed health recovery. They also reported feeling sad/depressed, which is intensified by the death of a loved person; distance from family, friends and work; and uncertainty about the future.[27] Impotence and lack of skill for caring for children and member amputation were also reported as reasons that contribute to these individuals' emotional instability.[27]

Moreover, it was observed that the concern with the hospitalized person, homesickness, and lack of financial and/or emotional support increase the dissatisfactions of both the injured person and his/her family member-companion.[27]

Conversely, a study shows that when injured people receive family support, they see the family as a source of support and safety, which is the key to their recovery.[28] For these patients, the family represents the possibility of self-reorganization. It is of fundamental importance that the health professionals and other participants know the characteristics of the victim and his/her family caregiver, as well as their individual needs, in order to promote adequate support for caregivers and victims.[29]

Suggested and/or adopted measures

Due to the relevance and magnitude of the injuries and deaths caused by TAs in Brazil, some measures were adopted to deal with the problem. Among them, the creation of the Brazilian Traffic Code in 1998, and integrated inspection initiatives, such as the implementation of the "*Lei Seca*" in June 2008 and its revision in December 2012, and the creation of the *Rodovida* project from the Federal Highway Police, which contribute significantly to the reduction of traffic-related morbimortality in the country.[10]

Furthermore, the creation of *VIVA* in 2006 by the Brazilian Ministry of Health was also a relevant initiative12 for quantifying, characterizing and monitoring cases of TA victims attending urgency and emergency services in the country; and the *Projeto Vida no Trânsito* [Life in Traffic Project] in 2010, initially implemented in five Brazilian capitals, and later expanded to the other capitals and the Federal District,

with the objective of acting on the main risk factors for TAs by qualifying information and by planning, monitoring, and evaluating interventions.[30]

Regarding public policies, it is highlighted the creation of the *Política Nacional de Redução da Morbimortalidade por Acidentes e Violências* [National Policy for Reducing Morbidity and Mortality due to Accidents and Violence] in 2002. According to this policy, the Ministry of Health recognizes TAs as a public health problem in Brazil and defines actions for prevention, promotion, and rehabilitation of health.[31] Also, the *Política Nacional de Atenção às Urgências* [National Policy on Emergency Care] was implemented in 2003. One of its objectives was establishing the mobile prehospital component through the creation of the *Serviço de Assistência Móvel às Urgências* (SAMU-192) [Mobile Emergency Service] in municipalities and regions across the country.[32]

Furthermore, the selected studies emphasized that the obsolete human-vehicle-road triad must be overcome in order to approach TAs.[33] Thus, interventions must be linked and integrated to the governmental and non-governmental departments, which are responsible for promoting safe and sustainable transportation of the population and for promoting safe environments within the perspective of human mobility and quality of life.[34] In addition, when considering the multi-causality of these events, communication and education actions must also be implemented in a continuous and systematized way.[34]

CONCLUSIONS

In this review, it was observed that TAs in Brazil have a negative impact on the physical and psychological well-being of the victims and their families, worsening their quality of life and capacity for working, also producing repercussions for economy and society. The need for more in-depth investigations on the occurrence of side-effects due to these accidents, their risk factors and their impact on the victims' quality of life was also evidenced.

It is believed that this review may contribute to broadening the discussions on TA repercussions, as well as provide relevant information for creating public policies for health prevention and rehabilitation treatment.

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