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Original Article

Quality of life of victims of traumatic brain injury six months after the trauma

Rita de Cássia Almeida Vieira[1]
Edilene Curvelo Hora[2]
Daniel Vieira de Oliveira[3]
Maria do Carmo de Oliveira Ribeiro[4]
Regina Márcia Cardoso de Sousa[5]

Objective: to describe the quality of life of victims of traumatic brain injury six months after the event and to show the relationship between the results observed and the clinical, sociodemographic and return to productivity data. Method: data were analyzed from 47 victims assisted in a trauma reference hospital in the municipality of Aracaju and monitored in an outpatient neurosurgery clinic. The data were obtained through analysis of the patient records and structured interviews, with the application of the World Health Organization Quality of Life, brief version, questionnaire. Results: the victims presented positive perceptions of their quality of life, and the physical domain presented the highest mean value (68.4±22.9). Among the sociodemographic characteristics, a statistically significant correlation was found between marital status and the psychological domain. However, the return to productivity was related to all the domains. Conclusion: the return to productivity was an important factor for the quality of life of the victims of traumatic brain injury and should direct the public policies in promoting the health of these victims.

Descriptors: Quality of Life; Brain injuries; Trauma Severity Indices; Wounds and Injury.

[1] Doctoral student, Escola de Enfermagem, Universidade de São Paulo, São Paulo, SP, Brazil.
[2] PhD, Associate Professor, Departamento de Enfermagem, Universidade Federal de Sergipe, Aracaju, SE, Brazil.
[3] Specialist in General Surgery, Médico, Hospital São Matheus, São Paulo, SP, Brazil.
[4] PhD, Assistant Professor, Departamento de Enfermagem, Universidade Federal de Sergipe, Aracaju, SE, Brazil.
[5] PhD, Full Professor, Escola de Enfermagem, Universidade de São Paulo, São Paulo, SP, Brazil.

Corresponding Author:
Rita de Cássia Almeida Vieira
Universidade de São Paulo. Escola de Enfermagem
Av. Dr. Enéas de Carvalho Aguiar, 419
Bairro: Cerqueira César
CEP: 05403-000, São Paulo, SP, Brasil
E-mail: ritavieira@usp.br

Introduction

Traumatic Brain Injury (TBI) is in a serious public health problem in Brazil and worldwide, not only due to its magnitude but also because it affects young, productive aged people. Traumatic brain injuries cause cognitive, physical and behavioral alterations, being a burden for the healthcare system, and can compromise the quality of life (QoL) of the victims and their family members. Furthermore, a significant part of the population remains outside the productive and social process[1-3].

Regarding the evolution of the consequences of TBI, the disabilities and incapacities that result from the brain injury go beyond the acute phase of treatment, being extended and modified for a long period after the traumatic event. However, studies show a significant clinical improvement in the victims of TBI during the first six months after the traumatic event, with stability in the recovery process in the subsequent period[4-6]. Thus, the period of six months after the trauma has been recommended as a starting point for evaluating the long-term consequences of the TBI for the survivors, since earlier evaluations depict a period of great change in the condition of the patient and do not appropriately reflect the enduring personal and social burden of the TBI in the victim's life[4-6].

The measurement of QoL is of great importance in patients with TBI, particularly in the study of the prognosis, of the posttraumatic neurological alterations, of the effectiveness of the treatment, and of the social rehabilitation[7]. Measuring health-related QoL has an important role in the comprehensive evaluation of the patient's recovery after the TBI. This measurement also allows a holistic view of the health status, which correlates better with the individual perception of the victims in relation to the consequential damage from the TBI than the evaluations directed toward their physical and mental conditions[8].

In the study of TBI, the analysis of the relationship between the consequences of this type of injury and premorbid conditions, the severity of the trauma and brain injury has been a constant focus of interest for researchers seeking to establish reliable indicators that provide early knowledge about the prognosis, in the medium- and long-term, of a victim of this type of trauma. In addition, there is interest in the post-trauma productivity of the victims, as this is related to their social reintegration and their individual and family stabilization[3,6,9-10].

Concerning the focus site of this study, it is noteworthy that data from the Ministry of Health indicate that in 2010, Sergipe, the smallest state of the federation, occupied the 11th position in the Brazilian ranking of proportional mortality due to external causes. It was also observed in these data that the highest values of proportional mortality due to external causes were not in the most populous states, to the extent that Sergipe figures more prominently in this ranking that São Paulo and Minas Gerais[11].

Faced with the considerations presented, the aim of this study was to describe the QoL of TBI victims living in Aracaju, six months after the traumatic event, and the relationship between the observed results and the clinical and sociodemographic data, and the return to productivity of these individuals.

Method

This is an observational, correlational, cross-sectional study, carried out in a municipal public service, which is a reference for TBI victim outpatient care, located in the Municipality of Aracaju, State of Sergipe, Northeast Brazil. The sampling was not probabilistic due to accessibility and consisted of 47 TBI victims who met the following inclusion criteria: assisted in the public hospital for trauma cases in the State and attended in the neurosurgery outpatient clinic after the hospital discharge, aged ≥18 and <60 years, and trauma at least 6 months prior to the moment of the evaluation of the QoL. The victims who presented verbal communication disturbances during the data collection were excluded.

The data were collected from December 2009 to March 2010. The patient records of all the individuals registered in the outpatient clinic in 2008 and 2009 were analyzed considering the inclusion criteria of the study. From this analysis 117 victims remained, among these, nine were attended in the outpatient clinic during the data collection period and 38 were located, through a search for their addresses in the patient records, and interviewed in their homes. The other victims were excluded due to the lack of a complete or current address or death.

Data were collected from the patient records related to: age, gender, marital status, education, date and type of injury, length of hospitalization, and severity of the trauma and the TBI. During the interview the sociodemographic data and the data related to the traumatic event were confirmed, and information on the return to productivity and QoL of the victims was collected.

The severity of the trauma was estimated using the Injury Severity Score (ISS) and the New Injury Severity Score (NISS), and the Maximum Abbreviated Injury Scale for the head region (MAIS/Head) was applied to characterize the severity of the TBI[12-13].

To evaluate the QoL the World Health Organization Quality of Life brief version (WHOQOL-BREF) questionnaire was applied. This World Health Organization instrument has already been validated in Brazil[14]. This easy to understand and administer questionnaire is known worldwide for the evaluation of QoL, and is composed of 26 questions regarding the QoL, with two general questions and 24 distributed in four domains: physical health, psychological, social relationships, and environment.

The study was approved by the Human Research Ethics Committee of the Federal University of Sergipe (CAAE 3819. 0.000.107-09). All study participants agreed to participate and signed the Terms of Free Prior Informed Consent – TFPIC. Throughout the study, confidentiality of the data was assured, in accordance with Resolution 169/96 of the National Health Council

The information related to this investigation was stored in a computerized database using the program Statistical Package for the Social Sciences (SPSS®) version 17. 0. The scores obtained with the application of the WHOQOL-BREF were transformed into a scale from zero to 100, with values close to zero, considered unsatisfactory and those close to 100 satisfactory in relation to the QoL.

The numerical variables were analyzed first, according to the type of distribution by the Shapiro-Wilk test. In the correlation analysis of the results of the WHOQOL-BREF and the sociodemographic and clinical variables, the Pearson correlation test was used in cases of normal distribution, and Spearman's correlation test and Fisher's exact test were used in the cases of non-normal distribution for the categorical variables. The Student's t test was applied in the analysis of the mean scores of the QoL domains before the return to productivity. In all the statistical tests a significance level of 5% was adopted.

Results

The majority of the 47 victims who had their QoL evaluated six months after the TBI were young men (91.5%), with an mean age of 29 years (SD=8.9 years), single (51.1%), and had not completed elementary education (57.4%). Regarding the type of injury, the vast majority were affected by blunt trauma (93.6%), due to traffic accidents (61.7%). These victims were hospitalized for a mean time of 30.5 days (SD=37.0 days) due to the trauma. The mean time between the trauma and the date of the interview was 11.6 months (SD=5.0 months) and the majority of the study participants had returned to productive activity (68.1%) when interviewed.

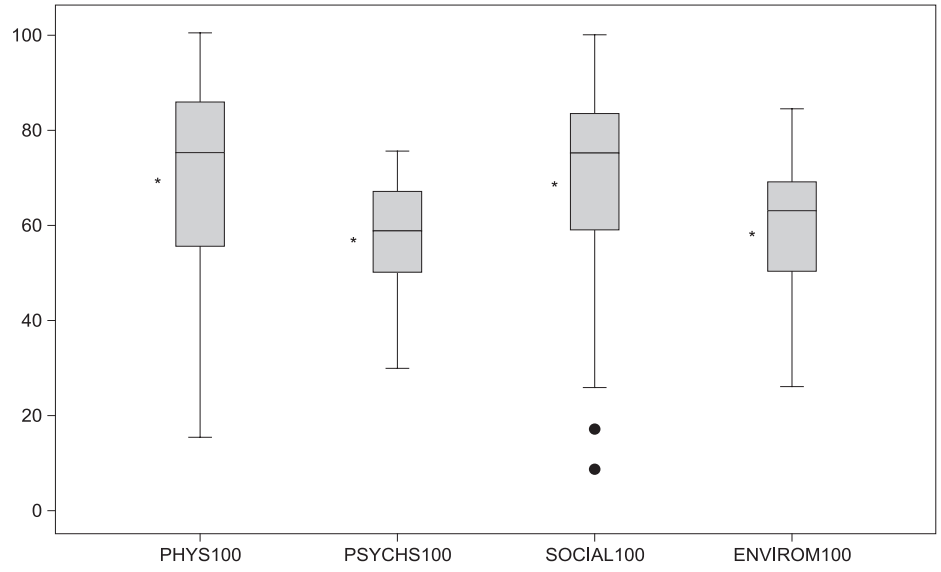
Regarding the severity of the trauma, 20 victims (42.5%) presented NISS scores ≥25.10, 21.3% had scores between 16 and 24, and 17 victims (36.2%) scored <16. The mean of the NISS scores was 21.7 (SD=11.3), with a minimum of 3 and maximum of 48. Applying the ISS in the same group of victims, it was observed that 44.7% presented scores <16, 44.7% had scores between 16 and 24 and 10.6% had scores ≥25. The scores of the victims ranged from 2 to 29 and the mean of the ISS scores was 15.42 (SD=6.21). The mean score of the MAIS/head, indicating the severity of the TBI, was 3.5 (SD=0.9), 26 (55.3%) of the victims presented MAIS/head scores of 4 or 5, 18 (38.3%) presented a score of 3, and three (6.4%) of the study participants had lower values.

The results for the four domains of QoL evaluated by the WHOQOL-BREF are shown in Figure 1, which shows the physical heath and social relationship domains with medians of 75, followed by the environment (62.5) and psychological (58.3) domains. In calculating the mean scores of the domains a higher value in the physical domain (68.4±22.9) was observed, followed by the social relationships (67.7±26.8), environment (58.2±14.7) and psychological (57.4±11.8) domains.

In relation to the general QoL questions, it can be observed in the data of Table 1 that the majority of the TBI victims rated their QoL as "good or very good" (65.9%) and felt "satisfied or very satisfied" with their health (66%).

Table 2 shows the results of the statistical tests used to analyze the relationship between the results of the WHOQOL-BREF and the sociodemographic characteristics of the victims. A significant association was observed only between the psychological domain and the marital status, with the married people having lower mean scores in the psychological domain than the unmarried individuals.

In the data of Table 3 it can be seen that the mean domain scores of those who had returned to productive activity were higher than the scores of those who had not returned. This difference reached the level of statistical significance in all the domains (p=0.01).



* Mean values of the scores of the domains of the World Health Organization Quality of Life, brief version

Figure 1 - Box Plot of the scores of the domains of the World Health Organization Quality of Life, brief version, six months after the TBI (n=47). Sergipe, 2009/2010

Table 1 - Answers to the general questions of the World Health Organization Quality of Life, brief version, six months after the TBI. Sergipe, Brazil, 2009/2010

Question 1 - Perception of the Quality of Life			
Level	**Answer Scale**	**N**	**%**
1	Very poor	.	.
2	Poor	3	6.4
3	Neither poor nor good	13	27.7
4	Good	27	57.4
5	Very good	4	8.5
	Total	47	100
Question 2 - Satisfaction in relation to health			
Level	**Answer Scale**	**N**	**%**
1	Very dissatisfied		
2	Dissatisfied	6	12.8
3	Neither satisfied nor dissatisfied	10	21.3
4	Satisfied	28	59.6
5	Very satisfied	3	6.4
	Total	47	100

Table 4 shows that in the correlation tests the level of significance was reached in the analysis of the ISS and the physical and psychological domains of the WHOQOL-BREF, the NISS was associated with these two domains and with the QoL perception of the victims, and the MAIS/head, was associated with the physical domain, QoL perception, and satisfaction with health. In the psychological domain the p-value observed was on the threshold of the statistical significance level established in relation to the MAIS/head. Statistical significance was observed in the tests related to the length of hospitalization, to the social relationships and environment domains, to the perception of QoL and to the satisfaction with health. All the correlations that reached the level of significance were negative and moderate (r>.30).

Table 2 - Association between the results of the application of the World Health Organization Quality of Life, brief version, six months after the traumatic brain injury and the sociodemographic characteristics of the victims. Sergipe, Brazil, 2009/2010

World Health Organization Quality of Life, brief version	Perception of the Quality of Life	Perception of their health	Physical Domain	Psychological Domain	Social Domain	Environment Domain
Characteristics						
Age*	-0.029 (p=0.847)	0.064 (p=0.667)	0.162 (p=0.276)	0.096 (p=0.521)	0.174 (p=0.243)	0.103 (p=0.49)
Gender†	p=0.826	p=0.575	p=0.475	p=0.390	p= 0.430	p=0.446
Marital status†	p=0.207	p=0.457	p=0.685	p=0.010	p=0.500	p=0.832
Education†	p=0.185	p=0.063	p=0.318	p= 0.671	p=0.126	p= 0.403

*Pearson's Correlation
†Fisher's exact test

Table 3 - Association between the domains of the World Health Organization Quality of Life, brief version, and the return to productive activity of the victims six months after the TBI (n=47). Sergipe, Brazil, 2009/2010

Domains of the World Health Organization Quality of Life, brief version	Return to productive activity		p*
	Yes	No	
Physical Health	79.5 (SD=13.1)	44.8 (SD=21.3)	0.01
Psychological	62.4 (SD=8.2)	46.7 (SD=11.2)	0.01
Social Relationships	79.0 (SD=14.9)	41.7 (SD=28.3)	0.01
Environment	65.0 (SD=9.0)	43.8 (SD=14.2)	0.01

*Student's t test

Table 4 - Association between the results of the application of the World Health Organization Quality of Life, brief version, six months after traumatic brain injury and the clinical characteristics of the 47 victims. Sergipe, Brazil, 2009/2010

World Health Organization Quality of Life, brief version	Perception of Quality of Life	Perception of their health	Physical Domain	Psychological Domain	Social Domain	Environment Domain
Characteristics						
*Injury Severity Score**	-0.239 (p=0.105)	-0.254 (p=0.085)	-0.301 (p=0.037)	-0.313 (p=0.032)	-0.232 (p=0.117)	-0.213 (p=0.145)
*New Injury Severity Score**	-0.305 (p=0.037)	-0.281 (p=0.051)	-0.322 (p=0.027)	-0.338 (p=0.020)	-0.25 (p=0.090)	-0.232 (p=0.117)
Maximum Abbreviated Injury Scale, for the head region	-0.322‡ (p=0.027)	-0.327‡ (p=0.025)	-0.322* (p=0.023)	-0.288* (p=0.050)	-0.230‡ (p=0.119)	-0.160* (p=0.282)
Length of hospitalization*	-0.405 (p=0.005)	-0.401 (p=0.005)	-0.392 (p=0.070)	-0.269 (p=0.076)	-0.391 (p=0.007)	-0. 329 (p=0.025)
Time since Event*	-0.005 (p=0.975)	-0.017 (p=0.911)	0.041 (p=0.785)	0.013 (p=0.930)	0.136 (p=0.361)	-0.032 (p=0.832)
Type of trauma†	p=0.728	p=0.247	p=0.993	p=0.831	p=0.990	p=0.305

*Pearson's Correlation
†Fisher's exact test
‡Spearman's correlation

Discussion

Studies with TBI victims[8,15-17] show, as does the current study, that the majority of people are young, single, males with low levels of education. In the analysis of the severity, it was identified that the majority of the participants presented NISS and ISS scores ≥16, therefore, they were victims of major traumas and required assistance in specialist trauma care centers[18]. Regarding the severity of the TBI, it can be affirmed, from the scores of the MAIS/head, that almost all the victims presented at least one injury in this region with the potential to threaten life, i.e., with a score ≥3[18]. Despite suffering major injuries that threaten life and often having irreversible consequences, generally the victims in this study had positive perceptions of their QoL, as the answers to the general questions of the WHOQOL-BREF showed (Table 1).

In relation to the domain scores of the instrument (Figure 1), the mean values were close to those observed in a study conducted in Porto Alegre, a city in southern Brazil, with 751 participants, which aimed to provide normative data on the values of the WHOQOL-BREF from a sample of the general Brazilian population. These data are considered in the literature as a useful guide for interpreting the results of QoL in the absence of a "gold standard" that would subsidize this interpretation[19].

The data from this study show lower mean scores in the physical domain (58.9; SD=10.5) than the values of the present study (68.4; SD=22.9). The normative mean scores were higher in the psychological (65.9; SD=10.8) and social relationships (76.2; SD=18.8) domains compared with the present study (57.4; SD=11.8 and 67.7; SD=26.8, respectively). In the environment domain, the mean scores were 59.9; SD=14.9 for the normative data and 58.2; SD=14.7 in the sample of TBI victims analyzed. From these comparisons it can be concluded that the differences in the means were slight (between +9.5 and -8.5), especially considering that the scale of the instrument used ranged from zero to 100.

The findings of the present study also resemble the results of two other Brazilian studies that evaluated

trauma victims at least six months after hospital discharge through the WHOQOL-BREF[15,20]. One was conducted in Ribeirão Preto with general trauma victims, who suffered minor injuries (mean ISS of 8.1 and virtually no cases of neurological injuries), and showed mean values of 59.7 (SD=20.9) for the physical health domain, and 62.5 (SD=20.4); 69.7 (SD=26.9); and 52.4 (SD=18.4) for the psychological, social relationships and environment domains, respectively[15]. The other study was conducted in São Paulo, with TBI victims who completed a rehabilitation program, and in the results all domains had means higher than 60 points[20].

Regarding the comparisons presented, it is worth commenting on the recommendation of the authors who published the normative scores: caution is recommended in relation to the generalization of the results for the country as a whole, due to the heterogeneity of the Brazilian population[19]. Furthermore, regions and locations have different levels of development, considering employment, income, education and healthcare, and these differences may impact on the individual QoL. According to the FIRJAN Municipal Development Index that evaluates these parameters using public statistics, Porto Alegre, Ribeirão Preto and São Paulo have high municipal development, while Aracaju has moderate municipal development[21]. However, in a study[22] conducted in 2008 by the Getúlio Vargas Foundation at the request of the Ministry of Health, Aracaju was designated the healthiest city in the country. This information indicates the similarity in living conditions in the locations in which the studies were conducted, even considering cities in different regions of the country. Concluding the comments on the QoL of the TBI victims with significant injuries, six months after the trauma, it is worth summarizing that the results observed indicated similarity in the QoL between the victims analyzed and the general population, and other trauma groups studied in the Brazilian context using the WHOQOL-BREF.

As the consequences of trauma evolve with improvements for up to six months after the traumatic event, follow-up studies of TBI victims that evaluated the QoL from the time of hospital discharge until one year after the injury, showed that there is an improvement in the mean values of the QoL domains, particularly the social relationships and environment domains[3,15,18,23]. This improvement probably has an important role in the similarity between the QoL in the sample of this study and that of the general population, as well as the fact that all the victims had been assisted in the reference hospital for trauma cases for the state of Sergipe and were monitored in the neurosurgery outpatient clinic after discharge.

Also in this sense, another aspect to be considered is that although the literature emphasizes the losses resulting from the TBI, some studies report gains originating from this event, such as behaviors that denote inner personal strength and appreciation of the simple things in life, the acquisition of new skills, and the interruption of the self-destructive course of drug abuse[3]. Therefore, in the process of rehabilitation after TBI it is important to remember that the adaptability of both the patients and their families is individual and depends on personal as well as social and cultural factors.

Conversely, quality of life is a multidimensional concept that in addition to being influenced by these factors and by the quality of the care provided by the trauma system, can be altered by the type and severity of the injury to the victim. In the analysis of the present study, a moderate negative correlation was observed between the indicators of severity (ISS, NISS, MAIS/ head and length of hospitalization) and some results of the WHOQOL-BREF, therefore individuals with indications of greater severity (higher values) had scores that indicated worse QoL (lower scores) in some aspects. Although this association is an expected result, the moderate strength of correlation between the variables and the selectivity in the domains that achieved the level of significance weakened the expectation that the severity is the more important aspect of an impaired QoL after the trauma. The prospect of searching for other factors related to QoL in TBI victims in the medium- and long-term was strengthened.

In this study the sociodemographic characteristics and the return to productive activity were also analyzed. In relation to age, gender and education no significant associations were observed, however, married individuals presented a higher frequency of loss in the psychological domain compared to the others. Undoubtedly, the return to productive activity was the factor that most significantly correlated with the QoL of the TBI victims, six months after the trauma, with the individuals who had returned to productivity presenting much higher mean scores, in all the domains of the WHOQOL-BREF, than those who had not resumed this activity. This study, as well as other studies[3,9], indicates that the return to productive activity is the basis for better QoL of TBI victims. Therefore, one of the goals of the care measures for the recovery of the

victims should be the reintegration of the individual into their previous activity[2-3,9].

In the recovery process after TBI, the return to productive activity has been considered one of the major determinants of the QoL, since it affects important factors for the social adjustment, such as socioeconomic status, self-confidence and the sense of social inclusion. In the sample studied, 68.1% of the participants already had returned to their productive activity at the time of the evaluation and this was probably one of the factors that brought the perception of QoL of the victims close to the results of the general population.

Conclusion

Individuals with major TBI, attended in a reference center for trauma in the city of Aracaju/Sergipe presented QoL perceptions similar to a sample of the general Brazilian population, six months after the trauma. In this study the factor associated with perceived QoL was mainly the return of the victim to productive activity, with the severity of trauma and TBI, the length of hospitalization, and the marital status, presenting weaker associations.

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