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Predictive factors for community integration among Nepalese persons after traumatic brain injury

Sumana Lama[1], Jintana Damkliang[2] and Luppana Kitrungrote[2]

Abstract

Background: Various factors affect the community integration (CI) of persons experiencing traumatic brain injury (TBI). To ensure positive outcomes in terms of life at home, social activities, and productive work among persons suffering TBI, it is necessary to understand the factors that facilitate or impede CI.

Purpose: To compare CI by looking at demographic and clinical characteristics and determine significant predictors of CI among TBI Nepalese persons.

Methods: 120 participants were selected using a stratified random sampling technique. A questionnaire was used to identify the participants' demographic and clinical characteristics, and the Community Integration Questionnaire was used to measure CI. Univariate and multivariate analyses were performed for demographic and clinical factors associated with community integration.

Results: Using univariate analysis, male, employed, living with family, and independence in performing activities of daily living had significantly higher CI scores than female ($t = -4.18$, $p<.000$), unemployed ($t = -10.52$, $p<.000$), living with friends ($t = -3.30$, $p<.001$), and those with moderate to slight dependence ($t = -2.83$, $p<.005$). The multivariate analysis revealed that employment status, living with family, and length of hospital stay were significant predictors of CI among TBI Nepalese persons.

Conclusion: Employment status, living with family, and length of hospital stay were significant predictors of CI. These findings suggest that rehabilitation efforts should focus on minimizing hospital stay and promoting both productive and social activities among people surviving TBI.

Keywords

Traumatic brain injury, community integration, predictors

Introduction

Worldwide, more than 50 million people suffer from a traumatic brain injury (TBI) each year;[1] around 2% of the United States population and 1.3 million people in Europe are living with TBI-related disability.[2,3] In Nepal, a 2015 study showed that 22% of TBI survivors were living with disabilities.[4] Approximately 75% of all TBIs are mild or concussive events,[5] and 15–23% of mild TBI patients experience disabling symptoms like insomnia, fatigue, cognitive disturbance, dizziness, headache, depression, and pain that persistent beyond three months.[6,7] The consequences of moderate-to-severe TBI can manifest as various secondary pathological conditions such as seizures, sleep disorders, neuroendocrine dysregulation, and psychiatric problems.[8] They pose significant challenges for TBI survivors regarding their ability to return home and make the necessary adaptations for a post-TBI productive life or successful community integration.

Community integration (CI) is active participation in three major areas: home integration, social integration (participation in activities outside the home such as social activities/events) and productive activities such as employment, educational and volunteer activities in which the individual participates.[9] Many studies have shown community integration to be an essential component for the

[1]Shree Birendra Hospital, Kathmandu, Nepal
[2]Prince of Songkla University, Hat-Yai, Thailand

Corresponding author:
Sumana Lama, Nursing, Shree Birendra Hospital, Chhauni Hospital Road, Kathmandu 44600, Bagmati, Nepal.
Email: sumana.lama87@gmail.com

rehabilitation of TBI survivors.[10-12] Different factors have been evidenced to facilitate or impede community integration among TBI survivors. Individual demographic and clinical factors have been found to associate with community integration among persons experiencingTBI.[10,13,14] Younger age is associated with a high level of community integration.[12] Similarly, TBI survivors who are employed before their injury tend to exhibit higher levels of community integration compared to their unemployed counterparts.[11]

A higher level of community integration has also been reported among male TBI survivors than female ones;[14] moreover, TBI survivors with a higher level of education have better community integration compared to those with lower educational attainment, especially in relation to engaging in productive activities.[12] However, the findings related to the relationship between community integration and severity of injury has been inconsistent. One study suggested that the higher the severity of injury, the lower the level of community integration,[14] whereas another study reported non-significant association between severity of injury and community integration.[10] However, the length of stay in a rehabilitation center and CI had been shown to have a significant relationship with moderate disability but not with mild or severe disability.[15] Furthermore, the length of hospitalization among TBI survivors has not been found to associate significantly with community integration.[16]

The capacity of TBI persons to perform activities such as dressing, grooming, bathing, mobility, and toilet use has been found to influence community integration level. However, the impact of support from others remains controversial; some studies have reported that the support from friends and family contributes to a better community integration,[11, 17] meanwhile another study found the support from friends and others to associate with a low level of community integration.[18] Therefore, it can be said that the reported evidence concerning the association of community integration with demographic and clinical variables is inconsistent.

Most TBI survivors return to their home, social, and work activities when they get clinically better. In mild TBI cases, clinical symptoms take 3–6 months to subside, whereas for moderate-to-severe TBI cases, the recovery period is 6–12 months.[19,20] Thus, multidisciplinary rehabilitation and support during the six months following TBI is important for the patients to achieve successful independent living and social re-integration.[21] However, there is a paucity of studies examining the community integration of TBI survivors during the period of 6–12 months after injury.

In addition, the contexts of culture and health system can influence the process of recovery, that is, one's ability to integrate into home, social, and productive activities, of this patient population.[22] Unfortunately, previous studies on community integration have been conducted in developed/Western countries and have focused on individuals with acquired brain injury and rarely on TBI. In developing countries like Nepal, significant differences exist in terms of cultural aspects such as it being a collectivist society, as well as geography and availability of health care services, which is a challenge in some parts of the country. Furthermore, a study conducted among Nepalese TBI survivors found fatigue as one of the main barriers to rehabilitation outcomes resulting in delays in their return to home, and social and/or productive activities.[23] Moreover, that study recommended further investigation aimed at ascertaining predictive factors for CI among TBI survivors in Nepal.

It was, therefore, deemed necessary to conduct this study in order to (1) compare differences in community integration by exploring the demographic and clinical characteristics of TBI survivors in the Nepalese context and (2) determine whether community integration could be predicted using demographic and clinical characteristics.

Methods

Study Design and Sample

A predictive research design was employed, and the data were collected between December 2018 and April 2019. The target population of the study was the 327 TBI survivors discharged from five major neuro-trauma hospitals and living in the communities of Province Number Three, Nepal. A stratified random sampling technique was used for the selection of participants after receiving hospital permission a random sample of patients selected by simple lottery methods were contacted. One hundred and twenty people, who met the inclusion criteria and agreed to participate, were recruited from 13 communities (districts) of Province Number Three, Nepal.

The inclusion criteria were: a diagnosis of TBI and living in the community for 6–12 months after discharge from hospital, an adult aged 18 years or older, ability to understand and speak the Nepali language, and full conscious level and good outcome TBI indicated by a GCS score of 15.

Measurements

Demographic and Clinical Characteristic Questionnaire. The researcher developed this questionnaire after literature review. It included questions on age, gender, marital status, level of education, employment, cause of injury, severity of injury, length of hospital stay, and activities of daily living. Data related to the cause of injury, severity of injury, and lengths of hospital stay were obtained from the patients' medical records. Activities of daily living were assessed using the Modified Barthel Index (MBI),with scores ranging from 0 to 100 and categorized as total dependence (0–20), severe dependence (21–60), moderate dependence (61–90), slight dependence (91–99), and independence (100).[24]

Table 1. Demographic and clinical characteristics of participants (N=120).

Characteristics	N (%)	Characteristics	N (%)
Age (*Median* 34.5, *SD*±11.7, range 18–64)		Cause of TBI	
18–30	54(45.0)	RTA	58(48.3)
31–45	37(30.8)	Fall	40(33.3)
46–60	28(23.4)	Physical assault	22(18.3)
> 60	1(0.8)		
Gender		GCS at admission	
Male	95(79.2)	3–8	2(1.7)
Female	25(20.8)	9–12	44(36.6)
		13–15	74(61.7)
Marital Status		Length of hospital stay (days)	
Single/widowed/separated	34(28.3)	1–10	82(68.3)
Married	86(71.7)	11–20	25(20.8)
		>20	13(10.9)
Educational level		Activities of daily living (MBI)	
Illiterate or primary level	44(36.7)	Independence	116(96.7)
Secondary or higher level	76(63.3)	Moderate to slight dependence	4(3.3)
Employment status			
Unemployed or student	49(40.8)		
Employed	71(59.2)		
Living arrangement			
With family	115(95.8)		
With friends	5(4.2)		

GCS: Glasgow Coma Scale; MBI: Modified Barthel Index; RTA: road traffic accident; TBI: traumatic brain injury.

The Community Integration Questionnaire. The Community Integration Questionnaire (CIQ) was used to collect information about community integration; it is widely used, and its 15 items explore home environment (5 items), social network (6 items), and productive activities (4 items).[9] The appropriate level of validity and reliability of this tool has an established by previous studies.[9] The possible scores range from 0-29, where a higher score indicates greater integration, and a lower score indicate less integration. Community integration questionnaire was translated into the Nepali language by the researcher using the back-translation process proposed by Brislin.[25] In this study, the Cronbach's alpha of the Nepali version of CIQ was .75.

Data Analysis

Statistical analyses were performed using the statistical package for social sciences (SPSS; Version 20.0. Chicago, IL, USA). Descriptive statistics were used to assess the characteristics of the participants. The differences in community integration among variables related to demographics and clinical conditions were computed using the Independent sample t test and ANOVA. Predictors were determined via univariate and multivariate linear regression analyses. Significant predictors indicated by the univariate analysis were entered simultaneously into a multivariate regression analysis. Independent categorical variables were transformed into dummy variables. The data met the assumptions of normality, linearity, homoscedasticity, and multicollinearity. The level of significance was set at $p < .05$.

Results

Participant Characteristics

Table 1 presents the demographic and clinical characteristics of the 120 participants. Their mean age was 34.5 years, and the majority were male, married, employed, lived with family and had a secondary or higher level of education. The major cause of TBI was road traffic accidents and most of the participants were diagnosed with mild TBI based on their GCS score. In addition, the majority of participants stayed in hospital for 1–10 days and were totally independent at performing activities of daily living.

Mean Differences in Community Integration by Demographic and Clinical Characteristics

Table 2 displays the univariate analysis (Independent t test and ANOVA) data related to the community integration of

Table 2. Univariate analysis of community integration according to demographic and clinical characteristics.

Characteristics	Community integration			
	M (SD)	Mean difference	*p*-value	95% CI
Age		0.34	0.08	−1.32, 2.00
18–30	16.50 (3.39)	1.67		−0.12, 3.46
31–45	16.16 (3.01)			
46–60	14.82 (3.44)			
60+	15.00 (1.00)			
Gender		2.92	**0.00**	1.53, 4.31
Male	16.60(3.19)			
Female	13.68 (2.76)			
Marital Status		−1.14	0.09	−2.46, 0.18
Single/widowed/separated	15.18 (3.33)			
Married	16.31 (3.28)			
Educational level		−1.03	0.10a	−2.26, 0.21
Illiterate or primary level	15.34 (3.75)			
Secondary or higher level	16.37 (3.00)			
Employment status		−4.67	**0.00**	−5.56, −3.79
Unemployed or student	13.22 (2.59)			
Employed	17.90 (2.25)			
Living arrangement		−4.81	**0.00**	−7.69, −1.92
With family	15.79 (3.21)			
With friends	20.60 (2.70)			
Cause of TBI		0.61	0.57	−1.02, 2.23
RTA	16.16 (3.35)	−0.21		−2.19, 1.77
Fall	15.55 (3.25)			
Physical assault	16.36 (3.44)			
GCS at admission		1.38	0.61	−4.33, 7.11
3–8	17.00 (1.41)	0.81		−4.86, 6.48
9–12	15.61 (3.01)			
13–15	16.19 (3.53)			
Length of hospital stay (days)		0.74	0.15	−1.05, 2.53
1–10	16.34 (3.45)	1.80		−0.53, 4.14
11–20	15.60 (2.81)			
>20	14.54 (3.13)			
Activities of daily living		4.65	**0.00**	1.39, 7.89
Independence	16.15 (3.27)			
Moderate to slight dependence	11.50 (0.58)			

GCS: Glasgow Coma Scale, RTA: Road traffic accident, TBI: traumatic brain injury.

participants according to demographic and clinical characteristics. The results indicated that male, employed, and living with family had significantly higher community integration scores than female, unemployed, and living with friends. Similarly, participants with independence in performing activities of daily living reported a significantly higher community integration level than those with moderate to slight dependence.

Predictors of Community Integration

According to the regression analysis, gender, employment status, living arrangement, length of hospital stay, and activities of daily living accounted for 52% of variance in community integration (adjusted R^2=.52, $F_{5,\ 114}$=26.97, p =.00) (Table 3). Being employed, living with family, and a shorter length of hospital stay contributed significantly to

Table 3. Linear regression analyses of demography and injury related factors contributing to community integration (N = 120).

Variables	Univariate analysis			Multivariate analysis		
	β	p- value	95% CI	β	p- value	95% CI
Age	−0.05	0.07	(−0.09, 0.00)			
Gender[a]	−2.92	**0.00**	(−4.31, −1.54)	−0.40	0.50	(−1.59,0.78)
Marital status[a]	1.13	0.09	(−0.18, 2.46)			
Educational level[a]	1.03	0.10	(−0.21, 2.26)			
Employment status[a]	4.68	**0.00**	(3.79, 5.56)	4.17	**0.00**	(3.16, 5.18)
Living arrangement[a]	4.81	**0.00**	(1.92, 7.69)	2.76	**0.01**	(0.64, 4.87)
RTA[a]	−0.21	0.80	(−1.86, 1.44)			
Fall[a]	−0.81	0.36	(−2.57, 0.94)			
GCS	0.06	0.61	(−0.18, 0.30)			
Length of hospital stay	−0.07	**0.05**	(−0.14, −0.00)	−0.05	**0.04**	(−0.11, −0.00)
Activities of daily living	−4.65	**0.01**	(−7.89, −1.39)	−1.42	0.25	(−3.86, 1.01)
Model: constant = 14.05, R^2= 0.54, adjusted R^2 = 0.52, $F_{(5,114)}$ = 26.97, p = 0.00						

CI: confidence interval, RTA: Road traffic accident, GCS: Glasgow Coma Scale.
Significant p-values are written in bold.
[a]Dummy-coded variables.

community integration (β=4.17, 2.76, −0.05;t=8.15, 2.68, −2.01; &p=.000, .001, .04, respectively).

In other words, participants who were employed, lived with family, and had shorter hospital stays were associated with significantly higher levels of community integration than those who were unemployed, lived with friends, and stayed longer in hospital. The other demographic and clinical variables did not contribute significantly to community integration (p>.05).

Discussion

The purpose of this study was to extend the knowledge on demographic and clinical characteristics contributing to community integration among Nepalese persons after TBI. To our knowledge, this is the first Nepalese study examining the predictive factors for CI among this target population. Our findings indicate that living arrangement, length of hospital stay, and employment status were significant predictors for CI; in addition, gender and activities of daily living were significantly associated with CI in univariate analysis.

Previous studies have reported no gender-based differences in CI among persons who have suffered TBI.[10, 11, 13] This can be explained in terms of the cultural context regarding gender roles in developing countries. It has been reported that in most developing countries, the differentiation of male and female roles is common place. In such settings, it is typical for the female role to be reduced to primarily taking care of the children and housekeeping.[26] Similarly, in the context of Nepal, men exercise a higher level of authority; females are given the responsibility of performing household activities, and they typically relay on their husbands for financial support.[27] In addition, the Nepalese society is influenced by patriarchalism, which considers females as subordinate or inferior to males. Also, males play a dominant role in the family as well as in the society.[27] Furthermore, males, even when they are illiterate or disabled, are supposed to be strong and shoulder important responsibilities that come with their role in both the family and society.[28] Hence, because of perceived superior position and involvement in social and productive activities compared to their female counterparts, literature suggests that males who engage in a high level of social and productive activities have a high level of CI after TBI.[16] It is also well-established that Nepalese males have higher literacy (62.3%) and employment rates (62%) than females,[29] which may contribute to the high level of CI that characterizes male survivors of TBI.

Furthermore, similar to previous studies, the majority of our participants (96.7%) were found to be independent in terms of their ability to perform activities of daily living.[30,31] In this study, most participants had mild TBI and were capable of performing the activities of daily living such as bathing, feeding, grooming, and using toilet on their own. It

can, therefore, be said that one's capacity to perform ADLs like dressing, grooming, bathing, mobility, and toilet use after suffering TBI is affected by the severity of his/her injury.[32] Consistent with findings from previous research, we observed a high level of CI among persons with independence in relation to performing activities of daily living.[31]

In the regression analysis, living arrangement, length of hospital stay, and employment status emerged as significant predictors for CI. Our findings showed that living with family was a significant determinant of CI; this was in disagreement with the findings of previous studies.[11,18] One of the reasons for this could be the cultural differences between Western and Eastern countries. In most Eastern countries, the preservation of family harmony is highly prioritized over individual preferences; thus, the family becomes a decision-making unit that affects individual autonomy.[33] This describes the situation in Nepal as well, which has a collectivist society where family relationships form the basis for the social structure.[34] In Nepal, the family structure is characterized by an extended and/or joint family system with strong bonds between family members.[34] Therefore, in the Nepalese culture, relatives usually support and care for family members who are sick or injured.[34] In addition, literature suggests that TBI survivors that enjoy a high level of social support have a high level of CI as well.[35]

Moreover, length of hospital stay was identified as another significant predictor of CI. This finding is incongruent with those of a previous study, which reported no significant relationship between length of hospital stay and CI among persons with TBI.[16] Most of our participants (68.3%) had shorter durations of hospital stay (1–10 days). One possible reason is that the majority had mild TBI. In addition, a shorter stay in hospital enhances the TBI patient's return to social and productive activities, which has been suggested to associate with better CI.[10,11] In contrast, some previous studies have reported that a longer length of stay in a rehabilitation center is associated with a high level of community integration among persons with TBI.[11,31] In a high-income country, rehabilitation for TBI survivors includes both inpatient and community rehabilitation, which help them in their process of recovery by facilitating their integration into their home, social, and productive activities.[36] However, in low- and middle-income countries, barriers to rehabilitation such as distance to a health service access point, availability of transportation, and affordability of services have been identified.[37] Similarly, in Nepal, the rehabilitation services available are limited. However, the government has recently adopted a10-year action plan to address rehabilitation needs nationwide. The goal is for every state to have at least one fully equipped rehabilitation center as well as make both training and education opportunities available for rehabilitation providers.[38]

Among the demographic and clinical characteristics of TBI survivors, employment status result the strongest predictor for CI after 6–12 months. This finding concurred with those of several earlier studies[10,39] but stood in contrast to those of a Dutch study that found no significant relationship between employment status and community integration.[40] Most studies on this topic have been conducted in developed countries that have facilities such as unemployed benefits; meanwhile, in developing countries like Nepal, such aid is not afforded to the people. Furthermore, in this study, more than half of the participants were employed and engaged in productive activities within the home environment after TBI, which could offer an explanation for the employment status being an important predictor for CI. Lastly, another reason is the fact that most of our participants were male; it is well-known that, in Nepal, employment rates are the highest among males.[29]

Limitations

There are a number of limitations that should be considered when interpreting the study findings. First, the participants included in this study were recruited from five hospitals in Province Number Three, Nepal, so the generalizability of the results to other hospitals and other provinces may be limited. Second, the participants included in this study were at good outcome after TBI with a GCS score of 15, so the results may be different when comparing to lower level of a GCS score. Finally, the follow-up length of living in communities was between 6 and 12 months after TBI. Therefore, the interpretation of the study findings may be different when comparing to other follow-up length.

Conclusion

This study found employment status, living with family, and length of hospitalization to be significant predictors of community integration. These results can serve as baseline data for both the monitoring and improvement of community integration of TBI survivors. In addition, they could be very helpful to community health nurse in formulating effective rehabilitation interventions that help promote productive and social activities among people suffering TBI. Lastly, these findings also indicate that clinical nurses need to plan effective interventions that shorten the duration of hospital stay after TBI, thereby promoting the community integration of these patients.

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Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

Guarantor

SL

Contributorship

SL, JD and LK researched literature and conceived the study. SL was involved in protocol development, gaining ethical approval, patient recruitment and data analysis. SL wrote the first draft of the manuscript. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

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ORCID iD

Sumana Lama https://orcid.org/0000-0001-9663-2835

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