Factors Explaining Quality of Life among People with Moderate to Severe Traumatic Brain Injury in Bangladesh: A Cross-Sectional Study.

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Abstract: Traumatic brain injury leads to mortality and disability with consequences for the poor quality of life of people. Little study regarding the quality of life of people with traumatic brain injury in Bangladesh exists. This cross-sectional study aims to examine the quality of life and its influencing factors among people with moderate to severe traumatic brain injury. The participants were 249 people with moderate to severe traumatic brain injury, and their caregivers recruited from three public hospitals in Bangladesh. Data were collected through questionnaires including socio-demographic, the Injury Related Illness and Injury Severity Score questionnaire, the Charlson Comorbidity Index, the Modified Barthel Index, the Patients Health Questionnaire-9, the MOS-Social Support Survey, the Quality of Life after Brain Injury (QOLIBRI), the caregiver socio-demographic, and the Caregiver Preparedness Scale. Data were analyzed using descriptive statistics, Pearson's correlation test, and stepwise multiple regression model.

Results showed that majority of the people reported a poor quality of life. Stepwise multiple regression analysis revealed that social support, caregiver preparedness, depression, and income, were significant factors and could explain 37% variance of quality of life. To improve the quality of life among people with traumatic brain injury, nurses should seek significant resources to support them, perform emotional support to prevent depression and prepare their caregivers with knowledge and proper skills for patients' care. Eventually, they can have healthy transition and obtain desirable health outcomes with good quality of life.

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Introduction

Traumatic brain injury (TBI) has been recognized as a leading cause of mortality, morbidity, and disability and has emerged as a global public health challenge and socio-economic problem.[1-3] It is estimated that 27.08 million new cases in each year and between

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55.50 million and 69 million people worldwide were reported to suffer from TBI.[2-3] Young and productive-aged people were considered as a high-risk group and often exposed to TBI, especially in low-and middle-income countries (LMICs), and older people were found in high-income countries (HICs).[1-3]

In Bangladesh, road traffic accidents (RTA) are the leading cause of TBI.[4] Other reasons includes mechanical injuries, physical assaults, falls, and workplace injury following building collapse. The frequency of TBI is increasing.[4-5] About 50% of PW-TBI requiring hospitalization were aged 16-36 years.[4-5] A study conducted in Bangladesh found that most PW-TBI were of lower socioeconomic status and experienced problems with various symptoms, sensory deficits, and declined functional status.[5]

TBI affects quality of life of both individual and family. It may change over time due to the long and complex recovery process with various factors involved.[6-7] QoL after moderate to severe TBI (msTBI) has been found to be worse than among the general population and patients with another injuries.[7-8] Previous studies reported that QoL is an essential indicator of patients' outcomes following TBI.[9]

Global studies have shown that QoL among PW-msTBI were poor in various low to middle incomes countries in Asia including Thailand, Indonesia, India and Pakistan.[9-11] There are many factors affecting QoL, such as age, education, income, severity of injury, co-morbid diseases, disability or level of dependence, depression, social support, and caregivers preparedness.[6-13] However, little is known about QoL and explaining factors among PW-msTBI in Bangladesh. Thus, this study aimed to describe QoL and its explaining factors, which would be the first step in formulate the intervention to improve QoL among PW-msTBI.

Conceptual Framework and Literature Review:

This study was guided by Meleis's transition theory,[14] and literature review of previous studies. The focus of transition theory is the human expereince, the responses, and the consequences of transition on the well-being of the people.[14] The goal of this theory is "to help people go through healthy transitions to enhance healthy outcomes." [14 (p.5)] Transition theories posits that individuals are always involved in ongoing change, and defined transition as "a passage or movement from one life phase, condition or status, or place to another."[14 (p.25)] The theory consists of multiple concepts embracing the elements of process, time span and perception.[15] The nature of transition consists of types, patterns, and properties of transition [14(p25.)] The types of transition consist of developmental, situational, health illness and organizational.[14(p25.)] The patterns of transition consist of single, multiple, sequential, simultaneous, related and unrelated. The properties of transition consist of awareness, engagement, change, and difference, transition time span, critical points and events. Transition conditions are influenced by personal, community, or social conditions, which referred to an antecedent and mediating factor. Personal condition consists of meaning, cultural belief and attitude, socioeconomic status, preparation and knowledge. The pattern of response was two types process and outcome indicator. Process indicator of response including feeling connected, interacting and developing confidence and coping. Outcome pattern of response may include mastery, fluid integrative identities and health outcomes or perceived well-being.[14(p.26)]

QoL of PW-msTBI can be explained by the transition theory, since they have to face multiple transition and complex situation overtimes. PW-msTBI faces with transition from the healthy person to the illness condition after the accident. Generally, PW-msTBI can realize the transition experience either separately or simultaneously based on their interpretation by the level of awareness. PW-msTBI have physical, cognitive, psychological, and social problems and may engage with these problems overtimes. Role transition or changes in the role of PW-msTBI in the family and society. Furthermore, family members are responsibile to act as a caregiver of the PW-msTBI, maintenance of the integrity of the family, and sometimes taking the role of family leader. The previous studies have supported the conceptual framework of the transition theory was widely applicable to nursing practice with diverse group of people including family caregivers, and people with chronic illness.[14 (p.386)]

The terms QoL and HRQoL have been used interchangeably in many studies. Several definitions of QoL have been proposed. However, the most widely accepted is the WHO definition of QoL as "an individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns."[15] QoL and TBI phenomena are similarly multidimensional, with biological, psychological, and social factors involved in outcomes. The two most influential domains are personal factors and environmental factors. Personal factors include the patient's educational level[10] and income[9-10], presence of comorbid diseases,[13,16] severity of injury,[9-10] disability or level of dependence,[7-8,9-13] and depression.[7,9,12,16-17] Environmental factors which influence people's QoL include social support, [9] caregivers' preparedness to provide care, and the functional status of the PW-msTBI.[18]

Education level is the most important indicator of QoL domains. Education level has found related and identified significant predictor to QoL among PW moderate to severe TBI groups.[10] Abbasi and his colleagues studied RTI survivors with moderate to severe TBI and found that patients' education level significantly correlated and predicted their QoL.[10]

Income is the most important determinant of health and indicator of socioeconomic status. Most of PW-msTBI are more prone to physical disability, emotional and behavioral problems difficulties to cope and psychosocial adjustment. PW-msTBI were most unhappy with the satisfaction of their job and income needs. Moreover, unemployment rate has been noted in the TBI studies vary from thirty eight percent to forty two percent.[10] Becoming unemployed had a direct effect on patients' income and living status. Similarly, to the study of Songwathana and the others, income was also found to be strongly correlated and a significant predictor of HRQoL among 200 Thai individuals with TBI.[9]

Severity of injury has found associated with both physical and mental health problems and long-term psychosocial impact post-TBI.[9] Severity of injury was a significant predictor of patients' HRQoL, and long term effects up to 6 months to 12 months after suffering TBI.[9-10] The study in Pakistan found that PW-msTBI who had higher the Injury Severity Score (ISS) score experienced low QoL.[10]

Comorbidity has influence on physical health,[19] long and short-term outcomes in TBI.[20] Comorbidity have significant relations with QoL. Comorbid health condition has found significantly negative corelated with all domains of QoL among German PW-msTBI.[13]

Most of PW-msTBI experience disability or level of dependence following cognitive impairment, functional impairment or limitation and activities of daily living function (ADL). Andelic and colleagues,[7] found that 43% of PW-msTBI had moderate disability at 20 years after the injuries. Their study also revealed that patients' level of disability or dependence remained constant from 10 to 20 years after the injury. Disability has found negatively correlated with QoL and identified a significant predictor to QoL.[10] The other study from Pakistan, disability could explain 32.7% variance on QoL among PW-msTBI.[10]

Mental health problems are common neurobehavioral sequels and long-term effects among PW-msTBI. Prevalence of depression was found 19.3% at three months and 21% up to 20 years follow-up.[7] Depression score has been found significantly related with HRQoL over time and after 10 years follow-up.[12] Depression was identified as a significant predictor of HRQoL among patients with TBI, and described a strongly negative correlation.[9,12]

Perceived social support is important during and after the experience of traumatic events with a life transition. PW-msTBI often experience change of roles and family function. As a result, deceases or gradually changes social network occurs due to getting fewer resources. Songwathana and colleagues conducted the study among 200 PW-msTBI in Thailand[9] and found that patients with high social support demonstrated high QoL.[9]

Caregiver preparedness is considered as a critical determinant of effective caregiving. [21] Powell and colleagues[22] found that caregivers of PW-msTBI received less preparation for providing care than those who provided care for patients with different illnesses. They were unprepared, lack of knowledge and skills in caregiving throughout the patients' transition process from hospital to home. Eventually, they worry about managing patients' physical symptoms, emotional problems, behavioral changes, and physical disabilities.[22] The researchers noted the paucity of research about the relationship between caregiver's preparedness and QoL among PW-msTBI.

Study Aim

This study aimed to describe QoL and educational level, income, severity of injury, comorbidity, level of dependence, depression, social support, and caregivers' preparedness explaining QoL among PW-msTBI in Bangladesh.

Methods

Design

This report uses a cross-sectional study design. This report follows STROBE Statement—Checklist of items that should be included in reports of cross-sectional studies.

Sample

The samples consisted of PW-msTBI attending neurosurgical outpatient clinic for a follow-up care at three tertiary-level hospitals in Bangladesh and their family caregivers. Inclusion criteria for PW-msTBI (i) over 18 years old (ii) living with family (iii) attended outpatient neurosurgical unit for follow-up care between three months and one-year after the injury, and (iv) able to speak and communicate with researchers, having an AMT[23] score above six, which were considered to demonstrate normal cognition. Inclusion criteria for caregivers were: (i) primary caregivers (directly involved in providing care) from the patient's family members, such as spouses, parents, siblings, or children (ii) secondary caregivers, such as relatives or paid caregivers, (iii) at least 18 years old, and (iv) able to communicate with the researchers.

Sample Size and Setting

The sample size was determined using Cohen's formula,[24] and the effect size was calculated by Adjusted $R^2 = 0.06$ from the previous study.[25] Based on this criterion, 249 participants were needed, for desired effect size and size of power to detect this effect. PW-msTBI were selected from three tertiary-level public hospitals using a proportional random sampling process. One hundred forty participants were selected from the first hospital, seventy from the second hospital, and thirty-nine from the third hospital. In total, 249 patients and caregivers were selected. One hundred seventy-three candidates were excluded. Fifty-nine did not meet the AMT criteria. One hundred fourteen dropped out during interview sessions because they felt too tired to participate throughout the data collection process. Data were collected until met the sample target.

Ethical consideration

The study was approved by the Institutional Review Board of Faculty of Nursing, Mahidol University, Thailand (Approval COA No. IRB-NS2016.364/1706). In Bangldesh, IRB permission also taken from three studied hospitals with approval COA of ERC-NINS No: 2016/10/14, DMCH Memo No: 2146 and SOMCH Memo No: 1396 respectively. Informed consent was obtained from participants via forms either signed by participants or in the presence of a witness. Participants were free to withdraw from the study at any time and were informed of this right.

Instruments

Ten instruments used in the study comprised the Socio-demographic Questionnaire, the Injury Related Illness Questionnaire, the Injury of Severity Score, the Charlson Comorbidity Index, the Modified Barthel Index, the Patients Health Questionnaire-9, the MOS-Social Support Survey, the MOS-Social Support Survey, the Quality of Life after Brain Injury, and the Caregiver Preparedness Scale. Except for the Socio-demographic Questionnaire and the Injury Related Illness Questionnaire, the other eight instruments were used with permission form the developers. All English-language questionnaires were forward-translated into Bengali and then back-translated into English using back translation method according to guidelines suggested by WHO.[26] The content validity index (CVI) and reliability of the scales in previous studies, the pilot study (30 PW-msTBI and 30 family caregivers), and the actual study (249 participants in each group) along with the example of items of 5 instruments, the Modified Barthel Index, the Patients Health Questionnaire-9, the MOS-Social Support Survey, the Quality of Life after Brain Injury and the Caregiver Preparedness Scale were shown in **Table 1.**

Table 1: Item example, content validity index and reliability of the instruments

Instrument	**CVI**	**Cronbach' alpha reliability**			**Example item**
		Previous study	**Pilot study N=30**	**Actual study N=249**	
MBI	.92	.88-.93	.94	.91	Are you able to dress by yourself or you need any assistance from the other?
PHQ-9	.93	.71-.89	.69	.68	During the past 2 weeks, how often do you have trouble concentrating?
MOS-SSS	.94	.93-.95	.95	.86	Do you have someone available to help you if you confined to bed?
QOLIBRI	.97	.79-.95	.85	.95	How much do you satisfy with your daily life?
CPS	.87	.92-.95	.84	.86	How well prepared you believe you are for providing physical care for the patients?

Note: CVI = Content Validity Index, MBI = Modified Barthel Index, PHQ-9 =The Patients Health Questionnaire-9, MOS-SSS = The MOS-Social Support Survey, QOLIBRI = The Quality of Life after Brain Injury, CPS = The Caregiver Preparedness Scale

The Socio-demographic Questionnaire was developed by the primary investigator (PI) to obtain information of participants with msTBI on gender, age, education, income, and personal habits. For caregivers, the information obtained were age, gender, education level and relationship with the patient.

The Injury Related Illness Questionnaire was developed by the PI to describe injury nature, causes, types, treatment, and health problems of the PW-msTBI.

The Injury of Severity Score (ISS): ISS developed by Baker and colleagues[27] was used to measure overall severity of injury. The ISS separates the patients' body into the following six sites of injury: head and neck, bony and visceral pelvis, abdomen, face, thorax, external structures and extremities. The score in each site of body is given according to its injury: 1 refers to mild injury, 5 refers moderate injury, 10 refers to severe injury and 15 refers to very severe or life-threatening injury. The score "zero" is given to the body site without injury. The combination of the score from each region represents the total ISS score and reflects the severity of injury. The score ranges from 1 to 75, with a score above 15 indicating moderate to severe injury. In this present study, ISS from each participant was taken from the patients' medical record.

The Charlson Comorbidity Index (CCI): CCI developed by Charlson and colleagues[28] was used to measure comorbidity. It consists of 19 items of comorbid diseases usually found in adults and elders. Each comorbid disease is weighted from 1 to 6 bases on mortality risk and disease severity, and then summed to form of the total CCI score. One point was added to the total CCI score for each decade of age over 40. The PI asked each participant if he or she had comorbid diseases on CCI check list such as heart disease, diabetes, hypertension, chronic obstructive pulmonary disease and gave the score according to the participant's comorbid disease.

The Modified Barthel Index (MBI): MBI developed by Shah and colleagues[29] was used to assess participants' functional status in terms of performance of daily activities and reflected participants' level of dependence. It measures the individual performance of 10 activities of daily life (ADL) and function in the area of self-care, continence, activities in terms of function, disability, and health. Each daily activity is rated in 3 levels according to the level of dependence. A participant who is able to perform that daily activity independently by him or herself receives a score of 15, while one who need partial support on that activity receives a score of 5, and one who totally depend on the other receives a score of 1. The total scores range from 0 to 100. The score of 0-20 indicates total dependence, 21-60 indicates severe dependence; 61-90 indicates moderate dependence; 91-99 score indicates slight dependence; and the score of 100 indicates no dependence.

The Patients Health Questionnaire-9 (PHQ-9): PHQ-9 was developed by Spitzer and colleagues[30] used to measure depression. This is a self-reported questionnaire comprises 9 items. It measures the frequency of nine elements during the two weeks before to and including the day of data collection. Each item is rated on a 4-point scale from 0 to 3 (0 = never; 1 = on several days; 2 = more than half the time; and 3 = nearly every day). Total scores are between 0 to 27 and are interpreted as indicating severity of depression as follows: 0-4 = no depression, 5-9 = mild, 10-14 = moderate, 15-19 = moderately severe, and 20-27 = severe depression.

The MOS-Social Support Survey (MOS-SSS): MOS-SSS was developed by Sherbourne and Stewart.[31] This scale used to evaluate social support of the participants. It consists of four domains including emotional/informational support, tangible/instrumental support, positive social interaction, and affection. There are 19 items with 5-point Likert scales. After the summed score was obtained from each participant, it was transformed to the scores ranging from 0 to 100 as recommended by the scale developers.[31] The higher score refers to receiving good social support, while a lower score refers to a lack of social support.

The Quality of Life after Brain Injury (QOLIBRI): QOLIBRI was developed by von Steinbüchel and collegues.[32] It is a disease-specific instrument used to measure domains of QoL relevant to patients with brain injury consisting of 37 items. There are 6 dimensions including cognition, self , social relationships, daily life and autonomy, emotions, and physical problems. Responses were given on a 5-point Likert scale. The total QOLIBRI scores were then reported on a 0-100 scale; 0 represents the worst possible QoL, and 100 represents the best. The scale percentage scores were created by subtracting one from the mean score and then multiplying by 25. For example, a mean item score of 3,4 would be converted arithmetically as (3.4-1.0) × 25= 60,[33] QOLIBRI scale percentage scores fall into three categories: Impaired QoL (<60), Borderline QoL (60-67), and Normal QoL (68-82).[34]

The Caregiver Preparedness Scale (CPS): CPS was developed by Archbold and colleagues.[35] It used to measure caregiver preparedness. This scale consists of 8 items that investigate how well caregivers are prepared for the multiple domains of caregiving. It explores preparedness for the provision of physical care, emotional support, and in-home support services, and preparedness for the stress of caregiving for patients with TBI. Responses are graded on a 5 point Likert scale with answers ranging from 0 (not at all prepared) to 4 (very well prepared). Total scores are between 0 to 32. Higher scores indicate higher levels of preparedness for caregiving, and lower scores indicate lower levels of preparedness.[21,36]

Data Collection

The participants were selected by the primary investigator (PI) from a list of OPD patients from each hospital. Samples were then drawn randomly from these lists. PW-msTBI and their caregivers were invited to participate and were asked for permission to be interviewed. The information sheet, consent form, and questionnaire were distributed to the participants, who were advised to read them carefully on behalf of PW-msTBI or their witnesses. After consent was obtained from potential respondents, the interview was conducted. The interviews consisted of two or more sessions, according to the situation of the patients and caregivers. PW-msTBI were interviewed before interviewing their caregivers. A single interview took between 45 and 75 minutes depending on participants' desire. A 20-minute break was offered to minimize the PW-msTBI burden.

Statistical Analysis

The SPSS version 23.0 (SPSS, Chicago, IL, USA) was used for statistical analysis for descriptive statistics, correlation and stepwise multiple regressions. The assumption test was performed and satisfied for regression analysis in this study. A p-value <0.05 was considered to be statistically significant.

Results

Characteristics of PW-msTBI and Caregivers

A total of 249 PW-msTBI and Caregivers enrolled in this study. As shown in **Table 2**, the mean age of the PW-msTBI participants was 36.61 years with SD.±15.37and the majority was male. Most of the participants were married; 22.5% had completed primary education and 22.1% had completed junior education. A large portion of the participants were unemployed following their TBI. Nearly half proportion of them had a monthly income between 10,000 and 20,000 Bangladeshi Taka (U.S. Dollars 125-250). Nearly half had a history of pre-injury smoking habits. A few of them had a history of consuming alcohol.

Most participants' caregivers were female. They were aged between 18 and 67; the mean age was 36.63 years (SD ± 12.03 years). The majority of caregivers were in the primary education level. Most caregivers were spouses and parents in relations to their PW-msTBI. Caregiver preparedness scores ranged from 14 to 33; the mean score was 24.98 (SD ± 3.71). Most caregivers considered themselves relatively well prepared.

Table 2 Socio-demographical characteristics of PW-msTBI and caregivers (n = 249)

Characteristics of PW-msTBI	Frequency (%)	Characteristics of Caregivers	Frequency (%)
Age (years)		**Gender**	
< 20	30 (12.0)	Male	40 (16.1)
21-40	140 (56.2)	Female	209 (83.9)
41-60	60 (24.1)	**Age (Years)**	
>60	19 (7.7)	<20	14 (5.6)
(Mean= 36.61, SD ± 15.37)		21-40	133 (53.4)
Sex		41-50	71 (28.5)
Male	206 (82.7)	>50	31 (12.5)
Female	43 (17.3)	(Mean= 36.63, SD ± 12.03)	

Table 2 Socio-demographical characteristics of PW-msTBI and caregivers (n = 249) (Cont.)

Characteristics of PW-msTBI	Frequency (%)	Characteristics of Caregivers	Frequency (%)
Marital status		**Education level**	
Married	153 (61.5)	No Education	37 (14.9)
Single	78 (31.3)	**Educational Level**	
Divorce/Widow/Separate	18 (7.2)	Primary	99 (39.8)
Educational Level		Junior school	54 (21.7)
No education	44 (17.7)	Secondary	35 (14.1)
Primary	56 (22.5)	College and above	24 (9.6)
Junior school	55 (22.1)	**Relationship With PW-msTBI**	
Secondary	39 (15.7)	Husband/Wife	101 (40.6)
College & University	55 (22.0)	Father/Mother	68 (27.3)
Income (80 BDT = 1 USD)		Sister/Brother	24 (9.6)
No income	72 (28.9)	Daughter/Son	32 (12.9)
<10000 BDT	26 (10.4)	Relative and others	24 (9.6)
10000-20000 BDT	114 (45.8)	**Caregiver Preparedness (CPS)**	
> 20000 BDT	38 (14.8)	Well prepared	36 (14.4)
(Mean = 12,779.1 BDT, SD ± 15,661.85)		Quite well prepared	176 (70.7)
Employment status post-injury		Moderate well prepared	36 (14.5)
Employed (Service, Business)	46 (18.4)	(Mean = 24.98, SD± 3.71 Max = 33, Min = 14)	
Study	32 (12.9)		
Unemployed	171 (68.7)		
Place of the residence			
Urban	80 (32.1)		
Rural	169 (67.9)		
Pre-injury smoking habits			
Yes	106 (42.6)		
No	143 (57.4)		
Habits of consuming alcohol			
Yes	13 (5.2)		
No	236 (94.8)		

BDT = Bangladeshi Taka; USD = U.S. Dollars;

As shown in **Table 3**, more than half had sustained a TBI from an RTA. Nearly two-thirds were graded as having a moderate TBI. Almost half had stayed in the hospital between 7 and 14 days. A majority experienced a severe injury with an ISS score of more than 15. Half of them did not have a comorbid disease. Most reported a moderate level of dependency. Nearly half of the participants had mild depression, and one third had moderate depression. Approximately two-thirds of respondents had received good social support after TBI.

Table 3 Clinical characteristics of PW-msTBI (n = 249)

Clinical Data	Frequency(%)	Clinical Data	Frequency (%)
Cause of injury		**Comorbidity (CCI)**	
Road traffic accident	137 (55.0)	No comorbidity (score 0)	127 (51.1)
Fall	45 (18.1)	Low comorbidity (score 1-2)	75 (30.1)
Assault	54 (21.7)	Moderate comorbidity (3-4)	31 (12.4)
Work place injury	13 (5.2)	Severe comorbidity (> 5)	16 (6.4)
Severity of TBI (GCS on admission)		(Mean=1.18, S.D.± 1.61 Min=0, Max=7)	
Moderate TBI (GCS: 9-12)	158 (63.5)	Level of dependence (MBI)	
Severe TBI (GCS: 3-8)	91 (36.5)	Severe dependence (21-60)	60 (24.1)
Length of unconscious		**Level of dependence**	
30 minutes to 24 hours	158 (63.5)	Moderate dependence (61-90)	147 (59.0)
> 24 hours	91 (36.5)	Slight dependence (91-99)	22 (8.8)
Lengths of hospital stay (Days)		Independence	19 (7.6)
< 7	47 (18.9)	(Mean = 72.27, SD ± 18.64, Min = 15, Max = 105)	
7-14	114 (45.8)	**Depression (PHQ-9)**	
15-21	52 (20.9)	No depression (0-4)	31 (12.4)
22-28	26 (10.4)	Mild depression (5-9)	117 (47.0)
>28	10 (4.0)	Moderately depression (10-14)	84 (33.7)
(Mean= 13.56 days, SD ± 7.04)		Moderately severe depression (15-19)	15 (6.0)
Neurosurgical operation		Severe depression (20-27)	02 (0.8)
No	116 (46.6)	(Mean = 8.85, SD ± 3.718, Min = 1, Max = 21)	
Yes	133 (53.4)	**Social support (MOS-SSS)**	
Severity of Injury (ISS)		Good support (>80)	157 (63.1)
< 15 (Moderate ISS)	29 (28.1)	Poor support	92 (36.9)
>15 (Severe ISS)	120 (71.9)	(Mean = 77.39, SD ± 6.55, Min = 52, Max = 92)	
(Mean = 25.37, SD ± 11.80, Min = 9, Max = 52)			

Quality of Life and factors explaining QoL

As shown in **Table 4**, the total mean score of the QOLIBRI was 51.69; SD was ± 12.48. Patients reported comparatively higher scores for social relationships but lower scores for cognition and emotion and extremely low scores for physical problems. Most patients scored below 60, indicating impaired or poor QoL (**Table 4**).

Table 4 Characteristics of dimensions of QoL among PW-msTBI (n = 249)

Characteristics	Mean (%)	SD	Level of QoL		
			Impaired (%)	Borderline (%)	Normal (%)
Cognition	49.61	13.61	-	-	-
Self	53.58	16.03	-	-	-
Daily life and autonomy	53.45	18.97	-	-	-
Social relationships	60.42	12.57	-	-	-
Emotion	48.64	13.42	-	-	-
Physical problems	41.07	12.36	-	-	-
QOLIBRI Total	51.69	12.48	191(76.7)	17(6.8)	41(16.5)

QOLIBRI = Quality of Life after Brain Injury

As shown in **Table 5**, income, depression, social support, and caregiver preparedness were significantly correlated with QoL. However, education level, severity of injury, comorbidity, and level of dependence were not correlated with QoL.

Table 5 Correlation matrix of the study variables (n = 249)

Variables	Cognition	Self	Daily Life & Autonomy	Social Relationship	Emotion	Physical Problems	Total QOLIBRI
1. Education	.116	.041	.082	-.146*	.063	.098	.051
2. Income	-.143*	-.135*	-.003	.030	-.125*	-.003	-.122*
3. Severity of injury	-.028	-.153*	-.087	.030	-.142*	-.093	-.103
4. Comorbidity	-.067	.069	.012	.055	.077	-.007	.034
5. Level of dependence	.126*	.098	.089	-.032	-.011	.166**	.082
6. Depression	-.306**	-.438**	-.428**	-.166**	-.316**	-.318**	-.416**
7. Social support	.423**	.482**	.345**	.344**	.291**	.381**	.456**
8. Caregiver preparedness	.340**	.384**	.400**	.385**	.221**	.334**	.420**

*P <.05, **P < .01

Stepwise multiple regression analysis was performed. All significant correlation variables were run in a regression model. It was found that income, depression, social support, and caregiver preparedness were significantly explained QoL and all together explained 37% of variance (**Table 6**).

Table 6 Multiple regression model (Stepwise): predictors of QoL (n=249)

Variables	B	Std. Error	β	t	p-Value
Total scale (Constant)	-6.054	17.080		-.354	.723
Social support	.942	.200	.267	4.717	< .001
Caregiver preparedness	1.855	.346	.289	5.362	< .001
Depression	-1.456	.345	-.234	-4.225	< .001
Income	-3.041	.989	-.160	-3.074	.002

R = 0.605, R^2 = 0.366, Adjusted R^2 = 0.356, F Change = 9.449, F = 35.27, p < 0.01.

Discussion

The study's findings revealed that the majority of the patients experienced poor QoL, which supported by previous studies.[6] A recent survey of 105 Chinese PW-TBI found low scores for the physical and emotional dimensions of QOLIBRI.[6] This study also found lower scores for three QOLIBRI domains, physical, emotional, and cognition than for other domains. Moreover, patients reporting fatigue, pain, sleep disturbances, and emotional problems were more likely to have lower QoL scores, consistent with previous studies.[6] The other explanation is that 59.0% of the participants had a moderate level of dependence and 24.1 % had severe or total dependence on the other people (**table 3**), leading them to less confidence from being alone. These affected their emotional domain of QoL.

Income, social support, caregiver preparedness and depression were factors explaining QoL of PW-msTBI. The correlation of social support, caregiver preparedness and depression were in the moderate level, r = .456, .420 and -.416 respectively while income was in the low level (r = -.122). PW-msTBI in this study sustained the injuries from 3 to 12 months, during this period they still needed support and care from the others, in particular from ones who have close relationship. Previous studies supported that family caregivers play vital roles providing care for the patients both emotional and physical aspects. The patients tend to feel more comfortable without the feeling of isolated and alone under the continuous care of their loved ones. [37] Accordingly, they should be well prepared and perceive readiness during the transition period from hospital to home with a reach out care until they feel confidence in providing patient care.

Several factors influencing QoL were identified among PW-msTBI after discharged to their homes. An inverse relationship between education level and QoL was found, whereas this factor was a non-significant predictor in previous studies.[6] In a previous study, education level was found to have a non-significant negative relationship and did not explain each scale score of QOLIBRI.[6]

Income significantly explained QoL in this study, and identified a low-level negative correlation. In contrarily, the previous study of Songwathana and colleagues found that income had moderate-level positive correlation with QoL among PW-msTBI.[9] This finding confirmed that there is a need for further study.

Severity of injury did not explain QoL in the present study. Similar to previous studies, Born and his colleagues,[33] found that ISS had no correlation with total QOLIBRI score. The explanation is that severity of injury was measured when patients arrived the emergency room after sustained the injury so that it reflected the initial injury status of the patients. After they received treatment including brain surgery to release intracranial pressure or remove blood clot, they usually recover.[4,6] Moreover, various factors such as nutritional support, care protocol or rehabilitation might affect the recovery process and improve PW-msTBI' QoL. [4,6]

In this study, comorbidity did not explain QoL. This finding supported a previous study[10] and contradicted with other studies.[13,16] Abbasi and his colleagues found a non-significant predictor to QoL with comorbid condition among PW-msTBI.[10] A possible explanation for our finding is that more than half of the participants had no existing disease or comorbid diseases.

Level of dependence did not explain QoL in this study, supported by a previous study[9] but contradicted other studies.[10,16] Our explanation would emphasize the level of support and care the patients received from their family caregivers. In our study, it reveled that 14.4 % of the caregivers were well prepared and 70.7% were quite well prepared for provide patients care at home. Hence, it ensured that family caregivers in our study were well equipped with essential knowledge and skills to perform patients care with confidence.

In the current study, depression significantly explained QoL, with a moderate negative correlation observed. These findings are consistent with previous studies.[7,9,13] In our study, 47% had mild depression and 33.7% moderate depression. Results from recent research,[38] reported that 65% of participants had mild to moderate and 20% had severe depression after 6 to 18 months post-TBI. Songwathana's study has found that depression was the significant predictor which a moderate negative correlation with QOLIBRI score.[9] Moreover, in the present study, QOLIBRI scores on the emotion scale were comparatively lower than those from other scales. This finding confirms that depression is a significant symptom in PW-msTBI and explaining QoL.

Social support was the strongest correlation and explained QoL, with a high and positive correlation observed, consistent with previous studies.[9] Songwathana and colleagues[9] found that social support was the most powerful predictor influencing HRQoL. Moreover, in our study, most of the participants received good social support, which may be attributable to the familial systems, socio-cultural systems, and belief systems of Bangladesh, similarly in Asian like Thai socio-cultural systems.[9]

Caregivers' preparedness significantly explained QoL in the present study. Little prior research exists regarding the effect of caregivers' preparedness on QoL for PW-msTBI. Our literature review found that only those caregivers' preparedness had been significantly associated with satisfied patients' physical and emotional needs.[36]

Limitations and Implications for Further Research

We do not claim generalizability from this study because participants were selected from only three public hospitals. Therefore, further study of this topic is warranted. To increase generalizability, we recommend using a larger sample and selecting patients from more regional hospitals. We recommend longitudinal research involving different periods of illness, and a qualitative study targets a deeper understanding of existing QoL factors and aims to identify new QoL explaining factors.

Conclusion and Implications for Nursing Practice

QoL for most PW-msTBI in Bangladesh was found to be poor. Income and depression were negatively and social support, caregivers' preparedness were positively significant to explain QoL. Findings from this study support the Transition theory in that patients' experiences change over time since they sustained TBI until the 3-12 months during the follow up care. Transition conditions facilitate or inhibit transition outcome (QoL). Among PW-msTBI, significant transition conditions include personal factors, depression, environmental factors, social support, and caregivers' preparedness. In order to promote healthy transition, nurses should routinely assess patients' depression and provide them with proper management to prevent and decrease depression. Seeking for resource and support from family and community is vital because adequate support can facilitate patients' health-transition. Caregivers should be well equipped with knowledge and skills about caregiving for the patients so that they will be able to perform patient care with confidence. Those aforementioned actions will facilitate smooth transition among PW-msTBI and make them obtain their QoL.

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References

1. Zimmerman A, Fox S, Griffin R, Nelp T, Thomaz EB, Mvungi M, et al. An analysis of emergency care delays experienced by traumatic brain injury patients presenting to a regional referral hospital in a low-income country. Plos One. 2020; 15(10). doi: 10.1371. e0240528. Epub 2020 Oct 12.
2. James SL, Theadom A, Ellenbogen RG, Bannick MS, Montjoy-Venning W, Lucchesi LR, et al. Global, regional, and national burden of traumatic brain injury and spinal cord injury, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Neurol. 2019; 18(1):56-87. doi: 10.1016/S1474-4422.
3. Dewan MC, Rattani A0, Gupta S, Baticulon RE, Hung YC, Punchak M, et al. Estimating the global incidence of traumatic brain injury. J Neurosurg. 2018; 130(4):1080-97. doi: 10.3171/2017.10.JNS17352.
4. Islam M, Saha S, Elahy M, Islam K, Ahamed S. Factors influencing the outcome of patients with acute extradural haematomas undergoing surgery. Bangladesh J Medical Sci. 2011; 10(2):112 (Bangladesh local journal).
5. Mondol MA, Rahman N, Akther S, Ahmed B, Rahman A, Momen MA,et al. Sociodemographical and clinical presentation of traumatic brain injury patients. J Dhaka Med Coll. 2013; 22 (1): 45-50 (Bangladesh local journal).
6. Gopaul R, Wei ZD, Yan J, Gong FY, Xiao SW. Clinical study of quality of life of traumatic brain injury patients after decompressive craniectomy and related influencing factors. Chin Neurosurg J.l 2016; 2(1): 33. doi: 10.1186/s41016-016-0044-5. Epub 2016 Sep 22.
7. Andelic N, Howe EI, Hellstrøm T, Sanchez MF, Lu J, Lovstad M, et al. Disability and quality of life 20 years after traumatic brain injury. Brain Behav. 2018;8(7): e01018. doi: 10.1002/brb3.1018. Epub 2018 Jun 11.

8. Rauen K, Reichelt L, Probst P, Schäpers B, Müller F, Jahn K, Plesnila N. Quality of life up to 10 years after traumatic brain injury: a cross-sectional analysis. Health Qual Life Outcomes. 2020;18:116. doi: 10.1186/s12955-020-01391-3. Epub 2020 Jun 4.
9. Songwatana P, Kitrungrote L, Anumas N, Nimitpan P. Predictive factors for health-related quality of life among Thai traumatic brain injury patients. J Beh Scie [Internet]. 2018 Jan 31 [cited 2021 Oct 24];13(1):82-92. Available from: https://so06.tci-thaijo.org/index.php/IJBS/article/view/81933
10. Abbasi SA, Ali T, Rozi S, Khan UR, Jooma R. Quality of life of road traffic injury survivors aged 15-44 years suffered from moderate and severe head injuries in Karachi, Pakistan. J Clin Res Bioeth. 2019;10:335. doi: 10.35248/2155-9627.19.10.335. Epub 2019 Jun 28.
11. Reddy RP, Rajeswaran J, Devi BI, Kandavel T. Cascade of traumatic brain injury: a correlational study of cognition, postconcussion symptoms, and quality of life. Indian J Psychol Med. 2017;39(1):32-9. doi: 10.4103/0253-7176.198940.
12. Grauwmeijer E, Heijenbrok-Kal MH, Peppel LD, Hartjes CJ, Haitsma IK, de Koning I, Ribbers GM. Cognition, health-related quality of life, and depression ten years after moderate to severe traumatic brain injury: a prospective cohort study. J Neurotrauma. 2018;35(13):1543-51. doi: 10.1089/neu.2017.5404. Epub 2018 Apr 6.
13. von Steinbüchel N, Real RG, Sasse N, Wilson L, Otto C, Mullins R, et al. German validation of Quality of Life after Brain Injury (QOLIBRI) assessment and associated factors. Plos One. 2017;12(5): e0176668 doi: 10.1371/journal.pone.0176668. Epub 2017 May 24.
14. Meleis AI. Transition theory: middle–range and situation–specific theories in nursing research and practice. New York: Springer Publishing Company; 2010.
15. World Health Organization. WHOQOL-BREF: introduction, administration, scoring and generic version of the assessment: field trial version, December 1996. World Health Organization; 1996. Available from: http://www.who.int/mental_health/ media/en/76.pdf
16. Von Steinbuechel N, Covic A, Polinder S, Kohlmann T, Cepulyte U, Poinstingl H,et al. Assessment of health-related quality of life after TBI: comparison of a disease-specific (QOLIBRI) with a generic (SF-36) instrument. Behav Neurol. 2016;2016:7928014. doi: 10.1155/2016/7928014. Epub 2016 Feb 1.
17. Gorgoraptis N, Zaw-Linn J, Feeney C, Tenorio-Jimenez C, Niemi M, Malik A, et al. Cognitive impairment and health-related quality of life following traumatic brain injury. Neuro Rehabilitation. 2019;44(3): 32-31. doi: 10.3233/NRE-182618.
18. Lieshout K, Oates J, Baker A, Unsworth CA. Cameron ID, Schmidt J, et al. Burden and preparedness amongst informal caregivers of adults with moderate to severe traumatic brain injury. Int J Environ Res Public Health. 2020;17(17), 6386. doi: 10.3390/ijerph17176386. Epub 2020 Sep 2.
19. Leijdesdorff HA, Krijnen P, van Rooyen L, de Mheen PMV, Rhemrev S, Schipper IB. Reduced quality of life, fatigue, and societal participation after polytrauma. Int Surg. 2018; 103(3-4): 158-66. doi.org/10.9738/INTSURG-D-17-00104.1.
20. Xiong C, Hanafy S, Chan V, Hu ZJ, Sutton M, Escobar M, et al. Comorbidity in adults with traumatic brain injury and all-cause mortality: a systematic review. BMJ Open. 2019; 9(11):e029072. doi: 10.1136/bmjopen-2019-029072. Epub 2019 Nov 7.
21. Stone K. Enhancing preparedness and satisfaction of caregivers of patients discharged from an inpatient rehabilitation facility using an interactive website. Rehabil Nurs. 2014; 39(2):76-85. doi: 10.1002/rnj.123. Epub 2013 Aug 28.
22. Powell JM, Wise EK, Brockway JA, Fraser R, Temkin N, Bell KR. Characteristics and concerns of caregivers of adults with traumatic brain injury. J Head Trauma Rehabil. 2017;32(1),E33-E41. doi: 10.1097/HTR.0000000000000219. PMID: 27022956.
23. Hodkinson HM. Evaluation of a mental test score for assessment of mental impairment in the elderly. Age Ageing. 1972;1(4):233-8. doi:10.1093/ageing/1.4.233. PMID: 4669880.
24. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillside: Lawrence Erlbaum Associates, Publishers; 1988.
25. Nolte, M. Disablement, context, and quality of life after brain injury: Measuring what matters [Dissertation Ph.D. Psychology]. [Kingston, Ontario]: Queen's Univesrity; 1999.
26. World Health Organization. Process of translation and adaptation of instruments. 2019 [cited 2019 December 26]. Available from: https://www.who.int/substance_abuse/research_tools/translation/en/

27. Baker SP, O'Neill B, Haddon JW, Long WB. The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. J Trauma. 1974; 14(3),187-96. doi.org/10.1097/00005373-197403000-00001.
28. Charlson ME, Pompei P, Ales KL, MacKenzie CRA. New method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987; 40(5):373-83. doi: 10.1016/0021-9681(87)90171-8.
29. Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel Index for stroke rehabilitation. J Clin Epidemiol. 1989;42(8):703-9. doi: 10.1016/0895-4356(89)90065-6. PMID: 2760661.
30. Spitzer RL, Kroenke K, Williams JW, Validation and utility of a self-report version of PRIME-MD The PHQ primary care study. Primary care evaluation of mental disorders. patient health questionnaire. JAMA. 1999;282(18):1737-44. doi: 10.1001/jama.282.18.1737. PMID: 10568646.
31. Sherbourne CD, Stewart AL. The MOS social support survey. Soc Sci Med. 1991;32(6):705-14. doi: 10.1016/0277-9536(91)90150-b.
32. von Steinbüchel N, Wilson L, Gibbons H, Hawthorne G, Höfer S, Schmidt S, et al. QOLIBRI Task Force. Quality of Life after Brain Injury (QOLIBRI): scale development and metric properties. J Neurotrauma. 2010;27(7):1167-85. doi: 10.1089/neu.2009.1076. PMID: 20486801.
33. Wilson L, Marsden-Loftus I, Koskinen S, Bakx W, Bullinger M, Formisano R, et al. Interpreting Quality of Life after Brain Injury Scores: cross-walk with the Short Form-36. J Neurotrauma. 2017;34(1): 59-65. doi: 10.1089/neu.2015.4287. Epub 2016 Jul 8.
34. Born K, Amsler F, Gross T. Prospective evaluation of the Quality of Life after Brain Injury (QOLIBRI) score: minor differences in patients with major versus no or mild traumatic brain injury at one-year follow up. Health Qual Life Outcomes. 2018;16(1):136. doi: 10.1186/s12955-018-0966-z. Epub 2018 Jul 9.
35. Archbold PG, Stewart BJ, Greenlick MR, Harvath T. Mutuality and preparedness as predictors of caregiver role strain. Res Nurs Health. 1990;13(6):375-84. doi: 10.1002/nur.4770130605.
36. Pucciarelli G, Savini S, Byun E, Simeone S, Barbaranelli C, Vela RJ, et al. Psychometric properties of the Caregiver Preparedness Scale in caregivers of stroke survivors. Heart Lung. 2014;43(6):555-60. doi: 10.1016/j.hrtlng.2014.08.004. Epub 2014 Sep 18.
37. Azman A, Jali NA, Singh PSJ, Abdullah JM, Ibrahim H. Family roles, challenges and needs in caring for traumatic brain injury (TBI) family members: a systematic review. J Health Res. 2020;34(6):495-504. doi: 10.1108/JHR-07-2019-0138.
38. Rasmussen MS, Arango-Lasprilla JC, Andelic N, Nordenmark TH, Soberg HL. Mental health and family functioning in patients and their family members after traumatic brain injury: a cross-sectional study. Brain Sci. 2020;10(10):670. doi: 10.3390/brainsci10100670. PMID: 32992808; PMCID: PMC7600942.Epub 2020 Sep 25.

ปัจจัยอธิบายคุณภาพชีวิตของผู้บาดเจ็บศีรษะระดับปานกลางถึงรุนแรงในบังคลาเทศ : การศึกษาภาคตัดขวาง

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บทคัดย่อ: ผู้ที่ได้รับบาดเจ็บระดับปานกลางถึงรุนแรงหากรอดชีวิตมักต้องเผชิญกับความพิการซึ่งมีผลกระทบต่อคุณภาพชีวิตได้ ในประเทศบังคลาเทศงานวิจัยเกี่ยวกับผู้ป่วยบาดเจ็บที่ศีรษะยังมีจำนวนน้อยมาก การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาคุณภาพชีวิตและปัจจัยอธิบายคุณภาพชีวิตของผู้ป่วยหลังการบาดเจ็บที่ศีรษะระดับปานกลางถึงรุนแรง กลุ่มตัวอย่างประกอบด้วยผู้ป่วยและญาติสายตรงที่ทำหน้าที่เป็นผู้ดูแลผู้ป่วยจำนวนกลุ่มละ 249 คน คัดเลือกกลุ่มตัวอย่างจากโรงพยาบาลของรัฐ 3 แห่งในบังคลาเทศ เครื่องมือที่ใช้ในการเก็บข้อมูลจากผู้ป่วยประกอบด้วย แบบสอบถามข้อมูลส่วนตัว ข้อมูลเกี่ยวกับการบาดเจ็บ ระดับความรุนแรงของการบาดเจ็บ เครื่องมือประเมินโรคร่วม เครื่องมือประเมินระดับการพึ่งพาของผู้ป่วย เครื่องมือประเมินภาวะซึมเศร้า การสนับสนุนทางสังคม และเครื่องมือประเมินคุณภาพชีวิต เครื่องมือที่ใช้ในการประเมินผู้ดูแลผู้ป่วยประกอบด้วยแบบสอบถามข้อมูลส่วนตัว และเครื่องมือประเมินความพร้อมในการดูแลผู้ป่วย วิเคราะห์ข้อมูลโดยใช้สถิติแบบบรรยาย การทดสอบความสัมพันธ์ และการวิเคราะห์ถดถอยพหุคูณแบบการเลือกแบบลำดับขั้น

ผลการศึกษาพบว่า ผู้ป่วยส่วนใหญ่มีคุณภาพชีวิตในระดับต่ำ ตัวแปรที่สามารถร่วมอธิบายคุณภาพชีวิตคือ ภาวะซึมเศร้าของผู้ป่วย การสนับสนุนทางสังคมที่ผู้ป่วยได้รับ และความพร้อมของญาติผู้ดูแล ผู้วิจัยมีข้อเสนอแนะว่า ผู้ป่วยบาดเจ็บที่ศีรษะระดับปานกลางถึงรุนแรงควรได้รับการพัฒนาคุณภาพชีวิตโดยพยาบาลควรทำหน้าที่ในการแสวงหาแหล่งช่วยเหลือที่จำเป็นสำหรับผู้ป่วย ประเมินและแก้ไขภาวะซึมเศร้า และเตรียมความพร้อมให้แก่ญาติผู้ดูแลด้วยการให้ความรู้และฝึกทักษะที่จำเป็นในการดูแลผู้ป่วย ทั้งนี้เพื่อช่วยให้ผู้ป่วยสามารถเปลี่ยนผ่านสู่ภาวะสุขภาพที่ดีและมีคุณภาพชีวิตในระดับที่สูงขึ้น

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