

A Comparison of Difficulties in Emotion Regulation and Quality of Life in Patients following TBI and Healthy Controls

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Abstract: *Traumatic brain injury is a debilitating neurological condition and is a leading cause of death and lifelong disabilities. It has adverse consequences in behaviour, cognitive, emotional and social domains. The current study aimed to investigate difficulties in emotion regulation and quality of life in patients with traumatic brain injury and healthy controls. Forty individuals following TBI ($M=35$, $SD=10.8$) and forty healthy participants ($M=31.5$, $SD=30$) were recruited. Patients sustaining TBI were selected from private and public sector hospitals in Peshawar, while the control sample was invited from the community. To measure emotion dysregulation and quality of life in both groups, the Difficulties in Emotion Regulation scale (DERS) and WHO Quality of Life-BREF (WHOQoL-BREF) scales were administered. The data were analysed using an independent sample t-test. The result demonstrated a significant difference between the TBI and control population in all six subscales and total scores of DERS. The findings further revealed that patients following traumatic brain injury experienced an overall lower quality of life and also showed low scores in all four domains as compared to their healthy counterparts. The findings have important implications in a clinical setting by suggesting the need for a comprehensive approach to cater for the needs of TBI survivors as well as to address emotional difficulties and consequently improve the quality of life of Pakistani individuals sustaining brain injury.*

Keywords: *Difficulties in Emotion Regulation, Traumatic Brain Injury, Quality of Life*

Introduction

Traumatic brain injury (TBI) is considered among the leading causes of morbidity and mortality worldwide, with a predicted rate of 69 million cases annually (Babiloni et al., 2020). It is presumed to be one of the three principal causes of injury-related fatality and disabilities by 2030 (Maas et al., 2022). As per the Centre for Disease Control and Prevention (CDC), traumatic brain injury is initiated by a concussion, shock, accident, or penetrating head trauma, upsetting the usual operations and structure of the brain momentarily or permanently (Kline et al., 2016). According to Crupi et al. (2020), TBI includes a diverse cluster of pathologies with numerous onset mechanisms causing various debilitating and adverse consequences.

Usually, the repercussions of TBI include an intricate combination of emotional, social, behavioural (Wauter & Marquardt, 2019), and cognitive impairments (Gorgoraptis et al., 2019). These outcomes are closely entangled and have an impact on each other (Wood & Worthington, 2017). In turn, the post-

injury symptoms often pose a significant financial burden for the families and the community (Van der Horn et al., 2020). Moreover, the impact of head injury is more devastating in low-income countries like Pakistan, where the average income is much lower and the dependency ratio is much higher.

Globally, a significant amount of literature has been conducted to investigate the behavioural and cognitive impairments following TBI; however, a negligible amount of research is available to identify problems with emotion regulation after TBI. Difficulties in emotion regulation are common following TBI (Neumann, 2017; Aboulafia-Brakha et al, 2016) and among the most incapacitating and crucial outcomes after TBI (Williams & Wood, 2013). Irrespective of pre-trauma mental well-being, the risks of emotional and psychological instabilities significantly increase after TBI. These psychological instabilities and related behavioural, cognitive, and emotional deficits are possibly caused by chronic and acute emotional dysregulations emanating from post-injury emotional and physical insults (Weis et al., 2022).

Emotion regulation is linked to acknowledgement, understanding, affirmation and management of emotions, each of which is vulnerable to disturbance following TBI (Neumann, 2017). Gross (1998) suggested that emotion regulation is a multiprocessing procedure, through which an individual can decide *which* emotions they have, *how* they recognise and express them and *when* they experience them. He also stated that the regulation of emotion begins with internal and external arousal, which is assessed and appraised as relevant to an individual's goals. Difficulties with emotion regulation may involve: (i) the inability to manage emotions in a way that is considered to be socially appropriate for an individual, (ii) maladaptive emotional responses that do not sufficiently reflect the situation, and (iii) the inability or failure to implement a suitable strategy to manage emotions efficiently (Gross, 2024).

Abreau et al. (2009) found that brain damage may cause the inability to regulate emotions, which affects the coping skills and worsens social interaction and consequently impacts the overall life satisfaction of individuals sustaining head injury. Similarly, Yule (2013) suggested that lesions to localised brain areas may cause poor management of emotion regulation skills, resulting in deleterious psychological and behavioural repercussions, further detrimentally affecting quality of life.

Quality of life is an individual's subjective sense of well-being and contentment with different life domains, such as mental well-being, physical well-being, social interaction, and personal values (WHO, 2021). Quality of life is a holistic notion shaped by several aspects, comprising economic conditions, opportunities for education and healthcare facilities, and social and environmental factors (Koohsari et al., 2021). In numerous brain injury studies, brain injury has been shown to affect every day functioning in many ways, including affecting re-entry to the workforce and work efficiency, all known to impact one's quality of life (Sasse et al., 2013). Similarly, regardless of trauma severity, post-injury disabilities are associated with diminished productivity (Stolwyk et al., 2021) and are recognised as long-lasting unfulfilled needs of TBI survivors (Andrew et al., 2014).

Henry et al. (2006) suggested that TBI survivors, as compared to healthy participants, had greater difficulty in acknowledging and managing their emotions. The ability to regulate emotions is crucial in managing many aspects of daily activities (Kipps et al., 2009); consequently, emotion dysregulation has been closely associated with compromised quality of life (Maoz et al., 2016). Over the last decade, quality of life has become one of the imperative outcomes of trauma-related injuries in clinical trials. It becomes a beneficial frame of reference to explore the effects of TBI on individuals' lives. In an extensive review of TBI articles, Sukraeny et al. (2013) suggested that the majority of individuals following TBI have a compromised quality of life.

Pakistan is a heavily populated, lower-middle income country with a high prevalence of TBI cases (Umerani et al., 2014; Shamim et al., 2011). Owing to an underdeveloped health system and infrastructure shortfall, cases of brain injury are rapidly escalating with the expanding population. Furthermore, a proactive health care system for problem detection, treatment facilities and pre- and

post-operative care is not adequate. There are numerous plausible reasons for this discrepancy, but the prime reasons are the inaccessibility of brain injury specialized medical personnel and advanced cutting-edge medical equipment. Apart from the scarcity of resources, unawareness regarding brain injury post-trauma management puts a massive burden not only on the family but on society as well.

Despite the high occurrence of TBI in Pakistan, regrettably, a negligible amount of research has been conducted examining neuropsychological outcomes following brain injury in the Pakistani population. Studies have mainly focused on prevalence, causative factors and financial burden on the individual and family. There is a pressing need to understand TBI and examine its outcomes and their influence on the lives of individuals sustaining TBI in Pakistan. No prior research in Pakistan has investigated the variables of difficulties in emotion regulation and quality of life in individuals sustaining brain injury in a single study and contrasted them with those of their healthy counterparts. The current study was thus designed to examine emotion dysregulation and quality of life in patients sustaining TBI in contrast to their healthy counterparts. There is a significant knowledge gap regarding difficulties in emotion regulation and quality of life after TBI in Pakistan, which the current research aims to bridge.

Research Hypotheses

1. The patients sustaining traumatic brain injury will obtain greater scores on a measure of emotion regulation (Difficulties in Emotion Regulation Scale) suggesting greater difficulty with emotion regulation than the control group.
2. Patients sustaining traumatic brain injury will obtain significantly lower scores on the WHOQoL-BREF questionnaire than the control group.

Method

Sample

The present study anticipated a medium to large effect size for hypotheses based on data from across different studies (e.g. Kreutzer et al., 2018; Harrison et al., 2010), sample size calculation using G power based on t-test, examining the difference in means between two independent groups, with medium to large effect size, with a $p=0.05$ level, a sample size of 76 participants (36 control group and 36 patients sustain TBI) were needed to test the hypotheses. Embracing a more careful approach, the current research recruited a total of 80 participants (40 patients following TBI and 40 healthy controls) from the hospitals and local community, respectively. Using a purposive sampling technique, the data of traumatic brain injury patients were collected from private and government hospitals in Peshawar, and their diagnoses were made by respective neurosurgeons/ neurologists working in those hospitals.

The inclusion criteria for patients sustaining brain injury were a diagnosis of traumatic brain injury without any additional serious or chronic medical complications, and having the ability to provide consent. The participants were between ages 18 to 60 years. The participants must have the capability to comprehend the questionnaires/questions and be fluent in speaking and understanding Urdu. The control population was recruited from the local community and had no existing history of any health-related illnesses. The inclusion criteria for healthy participants were analogous to those of patients sustaining brain injury, apart from for the diagnosis of traumatic brain injury.

Assessment Measures

Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004)

The Difficulties in Emotion Regulation Scale (DERS) comprises 36 items, with 11 reverse-scored items. Based on a 5-point Likert scale ranging from 1 to 5, it assesses six aspects of emotion regulation and dysregulation, namely lack of emotional lucidity, incapability to accept emotions, difficulties in controlling emotions, inability to engage in purpose-driven behaviours, scarcity of emotional understanding and inability to access emotion management techniques. The scale produces a total score

along with scores on all six subscales of the measure. High scores are indicative of more difficulties in regulating emotions. Grats and Roemer (2004) determined the high internal consistency by Cronbach's coefficient alpha ($\alpha=0.93$). In the current study, an Urdu version of DERS was used. The DERS has been adapted in many languages, but no translation is available in the Urdu language. After granting permission from the author, DERS was adapted into the Urdu language. The Urdu version of DERS used in this study had a high internal consistency ($\alpha= 0.97$).

World Health Organization Quality Of Life – BREF

The WHOQoL-BREF comprises a 26-item questionnaire for assessing four key aspects of quality of life, namely physical health, mental health, socialisation and environment. The Urdu version of WHOQoL-BREF was used in this study. Lodhi et al. (2017) translated the WHOQoL-BREF into the Urdu language and established a high internal consistency by Cronbach's coefficient alpha ($\alpha= 0.86$). Higher scores on all four subscales and the total score are indicative of improved quality of life, and lower scores are suggested to reflect lower self-perceived quality of life.

Procedure

Patients with traumatic brain injury were approached and invited to take part in the study. Each participant's written consent was secured after explaining the study protocols in detail. A comprehensive information sheet regarding the study protocols was handed to the individuals with TBI and given the opportunity to ask questions regarding their participation in the study. After giving detailed information regarding study, consent was obtained. Before administering the questionnaires, the participants were assured of the confidentiality of their data. Similarly, the healthy controls were selected from the local community. Each individual was approached separately and invited to take part in the research. A detailed information sheet outlining the purpose and details of the study protocols was provided to the potential participants. After providing comprehensive information a consent was obtained. No inducement was provided for participation in the research. After conducting a brief interview, the questionnaires were separately administered to both groups. The interviews were carried out in a quiet, one-on-one session, and a uniform setting was provided to both groups.

Results

Upon data collection, SPSS-26 was used to execute the statistical analysis. The normality assumptions, such as skewness, kurtosis, and homogeneity of variance, were determined to ensure normality before performing parametric analysis. Table 1 demonstrates the demographic characteristics of the TBI group and healthy controls.

Table 1:

Socioeconomic characteristics of Traumatic Brain Injury and Control Group					
Variables		TBI Group(n=40)		Control Group (n=40)	
		N	%age	N	%age
Gender	female	18	45%	14	35%
	Male	22	55%	26	65%
Marital Status	single	12	30%	15	37.50%
	married	27	68%	25	2.50%
	Widow	1	2.50%	....	....
Socioeconomic status					
	middle	40	100%	37	92.50%

post-trauma duration	lower	.....	.....	3	7.50%
	11 months - 23 months	17	42.50%	.....	....
	24 months - 35 months	12	30%	.....	....
	36 months- 48 months	11	27.50%	.....	.....

Table 2:

Table 2 shows Cronbach's alpha of 0.97 and 0.93 for Difficulties in Emotion Regulation (DERS) and World Health Organization Quality of Life (WHOQoL-BREF), respectively. The table indicates that both scales had robust and acceptable reliabilities for both groups.

Psychometric properties of Difficulties in Emotion Regulation Scale and WHO Quality of Life-BREF Questionnaire

Scale	No of Items	M	SD	Range	Cronbach's α
DERS	36	87.8	30.2	36-180	0.97
WHOQoL-BREF	26	84	16	26-130	0.93

Note: DERS Difficulties in Emotion Regulation Scale, WHOQoL-BREF= WHO Quality of Life- Brief

An independent sample t-test was used to analyse the differences between the TBI and control groups. Table 3 indicates a comparison between both groups on the DERS total score as well as six subscales.

Table 3:

Comparison of patients following TBI and the Control group on DERS (N=80)

Variables	Patients after TBI		Control Group		t(78)	P	Cohen'd
	M	SD	M	SD			
Non-acceptance	19.6	2.65	9.03	2.58	18.2	<0.001	4.06
Difficulties in Goals	18.5	2.73	8.4	1.97	18.9	<0.001	4.23
Lack of impulse control	21.3	3.17	9.2	2.21	20.0	<0.001	4.5
Lack of Awareness	17.1	2.3	12	2.56	9.26	<0.001	2.07
Limited Strategies	26.7	3.11	12	2.19	24.6	<0.001	5.5
Lack of clarity	13.6	2.05	8.5	1.65	12.4	<0.001	2.8
Total score of DERS	117	8.7	59	8.1	31.0	<0.001	6.9

Note: $p < 0.05$, DERS= Difficulties in Emotion Regulation Scale

The result shown in Table 3 identifies a considerable difference between patients sustaining TBI (M=117, SD=8.7) and the control group (M=59, SD=8.1) in terms of emotion dysregulation. Findings reveal that patients following TBI demonstrate higher scores on total DERS as well as on all six

subscales with very large effect sizes as compared to the control group, supporting the first hypothesis of the study.

Similarly, the second hypothesis presumes that the patients after TBI would have a poorer quality of life than the control group.

Table 4:

Comparison of patients following TBI and control group on the WHOQoL-BREF questionnaire (N=80)

Variables	Patients after TBI		Control Group		t(78)	p	Cohen'd
	M	SD	M	SD			
Physical	10.5	1.26	16.9	1.5	20	<0.001	4.5
Psychological	10.1	0.74	16.9	1.4	27.3	<0.001	6
Social	10.0	2.1	16.3	1.4	15.9	<0.001	3.5
Environment	10.1	1.3	16.0	1.7	16.8	<0.001	3.9
Total Score	40.8	3.9	65.9	4.6	26.2	<0.001	6.01

Note= $p < 0.05$,

Data shown in Table 4 reveal a notable difference between patients sustaining a TBI (M=40.8, SD=3.9) and the control group (M=65.9, SD=4.6) in terms of lower scores on the quality of life questionnaire. The results further indicate lower scores not only on total WHOQoL-BREF but also on all domains of WHOQoL-BREF with medium to large effect sizes.

DISCUSSION

The findings of the study robustly support the research hypotheses. Patients following traumatic brain injury obtained higher scores on the DERS than the control population. We found that patients sustaining TBI had not only considerably higher scores on total DERS but also higher scores on all six domains as compared to the control population. It may be suggested from these findings that individuals sustaining TBI may have greater difficulty in regulating their emotions.

Although there were significant differences in all six subclasses of DERS between both groups, the difference between GOALS, NON-ACCEPT, IMPULSE, and STRATEGIES subclasses were the largest. Similarly, on AWARE and CLARITY domains, the difference between them was notable too. This suggests that patients after brain injury may experience difficulty not only in the expression of emotions but also in proficiently regulating and monitoring their emotions. Furthermore, the findings suggested that the overall scores of DERS were substantially distinct between groups is consistent with the Grats and Roemer (2004) argument that the DERS is a comprehensive model which covers various important aspects of emotions.

The results are consistent with previous research reporting a notable difference between patients following TBI and their healthy counterparts in terms of negative and positive emotions and overall score of the DERS questionnaire (e.g. Mohammadi et al., 2018). Mohammadi et al. (2018) reported a substantial difference in Impulse, Goals, Strategies and Non-accept domains of the scale but found no significance in Clarity and Aware domains. Equally, the findings were also in accordance with the data suggested by Shields et al. (2016), who established an association between superior levels of emotion regulation strategies, lack of self-control and involvement in goal-driven activities in individuals following TBI. Additionally, their results highlighted the urgency for establishing productive interventions to address complications in recognizing and managing emotion post-trauma.

Likewise, the second hypothesis anticipated that patients following traumatic brain injury would have

a meaningfully lower quality of life than healthy controls. Our findings were in line with the individuals sustaining brain injury had a significantly poorer quality of life than healthy individuals. Furthermore, there was a considerable disparity between both groups concerning four domains of quality of life, i.e. physical well-being, psychological well-being, social life and environment. It can be presumed from our results that many patients following traumatic brain injury may encounter significant obstacles in practically all facets of everyday life and subsequently become discontent with their lives. Our results were also in compliance with prior research (Jacobsson et al, 2012; Nestvold et al., 2009), demonstrating deteriorated quality of life in patients following TBI as compared to non-TBI participants. Likewise, Cantor et al. (2008) found that TBI survivors demonstrate noticeably substandard results in all four domains of quality of life in contrast with their healthy counterparts.

Brain injury causes severe physical and psychiatric frailties, which impair the well-being and consequently degrade the overall quality of life of patients following TBI. We predicted that individuals sustaining TBI would have a depreciated quality of life in mental and physical aspects due to worsened physical state and post-injury symptoms. Similarly, the social and environmental aspects of quality of life were also noticeably poor in TBI survivors. The results were in agreement with the earlier research of Arango-Lasprilla et al (2012), which suggested that individuals sustaining TBI demonstrated a sizeable amount of role limitation in physical activity, as well as possessing mental and emotional infirmities and body fatigue.

Likewise, the psychological subscale contains questions regarding pleasure, zest for life, vigour, happiness and serenity and joyful as well as distasteful emotions. The study findings were consistent with prior literature that suggested that patients after TBI had considerably deteriorated quality of life in terms of psychological well-being. Furthermore, Vasterling et al. (2012) argued that anxiety and PTSD symptoms were significantly related to chronic health conditions in brain-injured patients and consequently affected their quality of life.

The social domains comprise questions regarding personal life, intimacy and social interaction. However, during data collection, a great hesitation was witnessed from patients with TBI over question 21, which probes into the intimate relationships of the person, which is one of the greatly affected and impaired areas of TBI survivors. Generally, in Pakistani society the people are reluctant to openly speak about their sexual lives and especially in Pashtoon culture, they considered it taboo to discuss their sexual lives in public. With the aim of improving the appropriateness of WHOQoL-BREF for TBI populations, it was proposed that a minor modification should be made in question 21 to make it more suitable for the brain injury population in Pakistan.

Regarding “environmental domains”, the WHOQoL-BREF questionnaire is regarded as one of the few that incorporates “environment” as an autonomous area of quality of life. Our findings were in compliance with earlier literature that suggested that home and work environment, job satisfaction, security and engagement in frivolous activities were seriously debilitated, and have an overall great impact on individuals with TBI (Whiteneck et al., 2004). A considerable amount of research studies point out several elements impacting the overall living standards of individuals with TBI. The discordant factors being identified as poor communication, disturbed family dynamics, fatigue, pain, (Kong & Tse, 2018) physical incompetence and disproportionate interpersonal relationships (Hilari et al., 2015) are one of the crucial components that have an adverse impact on the quality of life of individuals sustaining TBI.

Limitations

The present research is not without limitations, which should be considered by future researchers. Possibly the main limitation is the convenience sampling approach, which possibly increases the chances of sampling bias and therefore confines the generalizability of research findings. Similarly, data acquisition at a single point may restrict the investigator's capability to analyse changes in

emotional well-being and quality of life over time. Furthermore, the current study did not consider executive and memory impairment, which might have impacted our results.

Recommendations for Future Research

The current study has implications for future research. The injury attributes, for instance, nature of injury, illness severity, size and site of lesion, type of injury, duration of coma, and length of post-traumatic amnesia (PTA), were not included. It is possible that these injury characteristics might affect the findings, and therefore, it would be recommended to consider these variables for future research. Lack of insight was one of the major consequences of TBI, which was not assessed in our research. There is a possibility that anosognosia might impact the functioning of brain injury patients, and hence, it would be beneficial to include awareness/insight questionnaires for future studies.

Clinical Implication

The research findings may have extensive implications for investigators, neurorehabilitation experts, mental health professionals and government agencies to devise a holistic neurorehabilitation program for vulnerable TBI survivors, which adequately accommodates the needs of the TBI individuals and subsequently will improve post-injury symptoms and overall living conditions of TBI survivors. Our study serves as a stepping stone to increase awareness of the distressing sequel of TBI and its influence on people's lives, and subsequently offers a path for initiating neurorehabilitation institutions in Pakistan.

These study findings may also provide significant support to mental health experts, family members, and health professionals. Our results could also help the competent authorities and government officials to craft more compatible healthcare strategies, considering the unique needs of individuals sustaining TBI. Our findings may also help the community to acknowledge and better understand the impairments linked to TBI and help family members to handle the disabilities effectively.

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