

Predictors of Quality of Life Among Omani Family Caregivers of Patients With Traumatic Brain Injury

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ABSTRACT: Objectives: This study aimed to explore the quality of life (QoL) of Omani family caregivers (FCs) of patients with traumatic brain injury (TBI). After acute care, the burden of caring for patients with TBI is mainly shouldered by FCs. **Methods:** This cross-sectional study was conducted at Khoula Hospital, Muscat, Oman. Patient data were collected at the time of discharge and 8 weeks post-discharge between April 2019 and December 2021. The SF-12 General Health Survey and Preparedness for Caregiving scale were used to measure the caregivers' QoL and preparedness, respectively. The Disability Rating and TBI Symptom scales were used to measure the patients' disability and symptoms, respectively. **Results:** A total of 36 FCs and patients with TBI were recruited. Most caregivers were the parent (41.7%) or child (27.8%) of the patient with TBI. Overall, the caregivers had good physical QoL (PQoL) and mental health QoL (MHQoL) but low caregiving preparedness at the time of discharge. At 8 weeks post-discharge, there were significant improvements in caregiving preparedness ($P < 0.01$) and patient disability ($P < 0.05$) but a depreciation in caregivers' MHQoL ($P < 0.05$), with no change in their PQoL. The caregiver's employment status and the severity of the patient's sleep and mood problems were modifiable predictors of the caregivers' PQoL. Caregiver's preparedness, the patient's inability to live independently, and the severity of the patient's mood and behavioural problems were predictors of caregivers' MHQoL. **Conclusion:** Caring for patients with TBI negatively impacts the QoL of Omani FCs; this correlates with the physical, emotional, and mental health symptoms of the patient.

Keywords: Family; Quality of Life; Caregiver Burden; Caregivers; Traumatic Brain Injury; Oman.

ADVANCES IN KNOWLEDGE

- Most Omani family caregivers of patients with traumatic brain injury have low caregiving preparedness and are not ready to adequately meet the patient's care needs after discharge from acute care in the hospital.
- Within a period of 8 weeks, family caregivers self-teach and improve their caregiving abilities and preparedness as they spend more time with the patients and in the caregiver role.
- The process of adapting to caregiving demands negatively affects family caregivers and is associated with a decline in caregivers' mental health at 8 weeks post-discharge.

APPLICATIONS TO PATIENT CARE

- The current study highlights the importance of a discharge plan that ensures family caregiver involvement, training, skill building, and support.
- There is a need for supportive care programmes that ensure caregiver readiness for caregiving responsibilities and personal health promotion while performing caregiver duties.
- Further research focusing on family-centred interventional programmes may help in the development of culturally sensitive and cost-effective programmes for supporting, educating and empowering caregivers of patients with traumatic brain injury.

TRAUMATIC BRAIN INJURY (TBI) IS AN ALTERATION in brain function or the evidence of a brain pathology caused by an external force.¹ TBI is a significant cause of death and disability, with a wide spectrum of symptoms and sequelae.² One of the leading causes of TBI is road traffic injuries (RTIs) arising from crashes and accidents. Annually, approximately 1.3 million people succumb to death due to RTIs, and RTIs are projected to become the leading contributor to global fatalities by 2030.³ Reports by the World Health Organization show that RTIs cause 3.55% of deaths in Oman, the age-adjusted death rate due to RTIs is 12.63 per 100,000 population,

and the country ranks 113th in the world in terms of the highest number of RTIs.⁴

In Oman, RTIs are attributed to the rise in urbanisation, nocturnal driving, speeding, alcohol use, mobile phone usage, and vehicle ownership.⁵ Other causes of TBI include unintentional falls, intentional self-harm, gunshots, violence, and assaults.⁶ The increasing population of older adult Omanis who experience falls and other forms of injuries also reportedly contributes to the rise in the incidence of TBI.⁷ Patients that survive the acute phase of TBI live with sequelae such as cognitive decline, functional impairment, physical disability, psychological and

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behavioural disturbances and overall changes in personality.⁸ Irrespective of the severity of the injury, TBI is associated with neurocognitive deficits such as amnesia, insomnia, and mood disorders.⁹

In the acute phase, patients with TBI are managed in specialist trauma centres; they are later transferred to neuro-rehabilitation facilities. In countries where rehabilitation, long-term care, and/or home care services are almost non-existent, a family caregiver (FC) takes up responsibility for the patient's rehabilitation, home care, and reinstatement into society when the patient emerges from the acute phase. Trauma care is available in all tertiary hospitals in Oman, but the country has one specialised tertiary neuro-trauma care centre and a ratio of 1.25 physiotherapists per 10,000 population.¹⁰ Therefore, access to specialised neuro-rehabilitation facilities is only feasible in urban settings and limited in other locations, and this puts more burden on FCs.

Caregiving is a multi-faceted role that requires the FCs to provide physical, psychological, emotional, social, and financial support, often under strain and stress.¹¹ Due to the lack of well-established rehabilitation services, Omani FCs of patients with TBI are likely to assume caregiving roles without any support or training to help them meet the new demands and responsibilities.¹⁰ Considering the physical, cognitive, behavioural, and psychosocial sequelae of TBI, the FCs taking care of such patients at

home tend to be overwhelmed, especially when they are not supported.¹²

Similar studies conducted in other countries have shown that family members who assume the caregiver role without any formal training or support system experience a higher caregiving burden, poorer family functioning, poorer mental health, and higher emotional distress.¹³ These FCs also lack the time for self-care and experience an interrupted life, poor physical health, social isolation, sleep disturbances, depression, exhaustion, and anger.¹⁴ The most common physical symptoms among FCs of patients with TBI include low energy, trouble sleeping, digestive problems, back pain, and joint pain.¹⁵

A study conducted in Turkey showed that the caregiving burden is higher among older, unemployed FCs and FCs with financial difficulties, and both factors affected the quality of care given to patients with TBI.¹⁶ One of the few studies that focused on Omani FCs of patients with TBI found a limited availability of rehabilitative resources, lack of support services for FCs, and utilisation of personal religious faith and beliefs by the FCs to cope with the strain of caregiving.¹⁷ Despite the significant problem of TBI in Oman and its impact on the family, no study has focused on the QoL of Omani FCs of patients with TBI.^{4,7} Therefore, this study aimed to explore the QoL of Omani FCs of patients with TBI as well as the predictors of caregiver QoL.

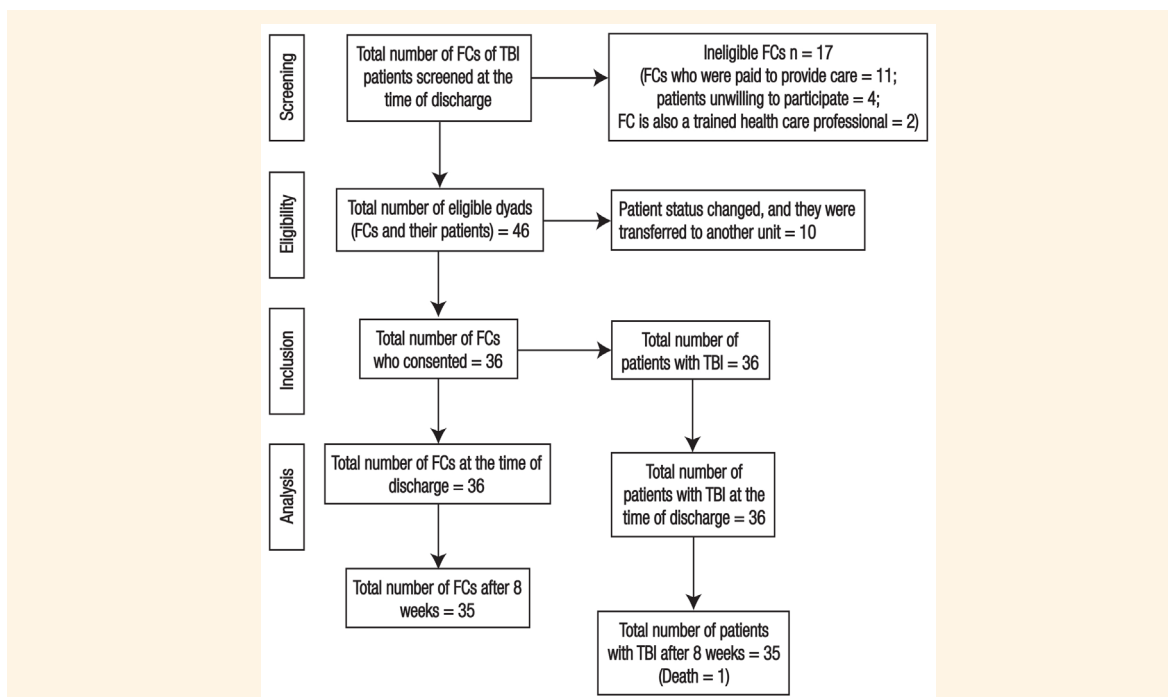


Figure 1: Flowchart showing the study inclusion process.

FCs = family caregivers; TBI = traumatic brain injury.

Methods

This cross-sectional study collected data from FCs and patients with TBI at the time of discharge from Khoula Hospital, Muscat, Oman, at 8 weeks post-discharge from April 2019 to December 2021. The patients were Omanis who were aged ≥ 18 years, had a confirmed diagnosis of TBI, were able to state their names and positively identify family members, and had a minimum Modified Rankin Scale for Neurologic Disability score of at least +1. The FCs were any family member who was scheduled to provide regular day-to-day care at home for the patient after discharge from the hospital. FCs were included if they were the main person responsible for the care of a patient with TBI at home, an Omani by nationality, aged ≥ 18 years, able to speak Arabic or English, living in the same household as the patients with TBI, and without formal training as a healthcare professional. A convenience sampling approach was used to identify patients with TBI and their FCs; this technique allowed access to a very difficult-to-access population—patients with TBI. Many studies on patients with TBI have used sample sizes ranging from 30 to 100.¹⁸ For the current study, a total of 36 FCs and their patients (with TBI) were recruited.

An interview questionnaire was used to collect data. This questionnaire comprised 6 sections: caregivers' QoL (the SF-12 General Health Survey); the Preparedness for Caregiving scale (PCS); the Disability Rating scale (DRS); the TBI Symptom Severity scale; and the FC and patient demographic characteristics.

The SF-12 Health Survey (SF-12) has internal consistency and test-retest reliabilities ranging from 0.67–0.82.¹⁹ The cut-off score for physical health QoL (PQoL) and mental health QoL (MHQoL) was set at 50 and 42, respectively.¹⁹ The FCs' preparedness to care for patients with TBI at home was measured using the PCS, which has 8 items assessing preparedness in multiple domains of caregiving.^{20,21} The participants' responses were rated on a 5-point Likert scale ranging from 0 (not at all prepared) to 4 (very well prepared). The items were summed to generate total scores (which range from 0–32). High scores on the PCS indicate a high level of preparedness. The PCS has a Cronbach's alpha of ≥ 0.88 .^{20,21} In the current study, the PCS Cronbach's alpha at the time of discharge and at 8 weeks post-discharge were 0.94 and 0.96, respectively.

The disabilities of patients with TBI were measured using the DRS, which comprises 8 items to measure and track TBI-related disability from the point when the patient is in a state of coma to when they are reintegrated into the community.²² The DRS focuses on impairments, disabilities, and handicaps related to eye-opening, communication ability, motor

Table 1: Characteristics of the family caregivers and patients with traumatic brain injury (N = 36)

Characteristic	n (%)	
	FCs	Patients
Gender		
Male	17 (47.2)	19 (52.8)
Female	19 (52.8)	17 (47.2)
Age in years		
18–40	25 (69.4)	9 (25)
≥ 41	11 (30.6)	27 (75)
Marital status		
Single	3 (8.3)	5 (13.9)
Married	32 (88.9)	23 (63.9)
Separated/divorced/widowed	1 (2.8)	8 (22.2)
Level of education		
\leq High school	29 (80.6)	34 (94.4)
\geq Post-secondary	7 (19.4)	2 (5.6)
Employment status		
Full-time	22 (61.1)	13 (36.1)
Unemployed	14 (38.9)	23 (63.9)
Relationship to patient		
Parent	15 (41.7)	
Spouse	6 (16.7)	
Child	10 (27.8)	
Sibling	4 (11.1)	
Legal guardian	1 (2.8)	
Cause of injury or patient diagnosis		
Fall		13 (36.1)
Motor vehicle accident		18 (50)
Assault		4 (11.1)
Other forms of trauma		1 (2.7)
Glasgow coma scale score on admission		
9–12 (i.e. moderate)		17 (47.2)
≤ 8 (i.e. severe)		19 (52.8)
Glasgow coma scale score at discharge		
14–15 (i.e. mild)		23 (64.2)
9–13 (i.e. moderate)		13 (35.8)

FCs = family caregivers.

response, feeding, toileting, grooming ability, level of functioning, and employability or level of handicap.²² The DRS has a total score ranging from 0 (no disabling impairments) to 29 (extreme vegetative state). The

Table 2: Symptom profile of patients with traumatic brain injury at the time of discharge (N = 36)

Symptom	Difficulty rating, n (%)				Mean ± SD
	No difficulty	Mild difficulty	Moderate difficulty	Severe difficulty	
Loss of muscle strength (paralysis, limited physical mobility, or poor coordination)	-	1 (2.8)	7 (19.4)	28 (77.5)	4.75 ± 0.50
Blurred or loss of vision	4 (11.1)	4 (11.1)	9 (25)	19 (52.8)	4.08 ± 1.30
Loss of hearing or ringing in the ears	7 (19.4)	4 (11.1)	6 (16.7)	19 (52.8)	3.83 ± 1.56
Loss of memory and concentration	3 (8.3)	6 (16.7)	4 (11.1)	23 (63.9)	4.22 ± 1.25
Change in speech or difficulty being understood	1 (2.8)	4 (11.1)	4 (11.1)	27 (75)	4.56 ± 0.91
Mood problems (including depression, anxiety, denial and frequent changes in emotion)	3 (8.3)	3 (8.3)	6 (16.7)	24 (66.7)	4.33 ± 1.20
Insomnia	8 (22.2)	3 (8.3)	5 (13.9)	20 (55.6)	3.81 ± 1.64
Changes in behaviour (aggression, anger, impulsiveness, etc.)	5 (13.9)	4 (11.1)	8 (22.2)	19 (52.8)	4.00 ± 1.39
Ability to live independently	-	-	1 (2.8)	35 (97.2)	4.97 ± 0.17

SD = standard deviation.

Table 3: Changes in patient disability, caregiver quality of life and caregiving preparedness at 8 weeks post-discharge (n = 35)

Variable	n	Mean ± SD	SEM	t	P value	MD	95% CI
TBI patient's disability rating scale score							
At the time of discharge	35	16.74 ± 4.15	0.70	2.33	0.026	1.40	0.18 to 2.62
At 8 weeks post-discharge	35	15.34 ± 5.00	0.85				
Family caregiver's caregiving preparedness							
At the time of discharge	35	19.74 ± 9.04	1.53	-4.33	0.000	-3.00	-4.41 to -1.59
At 8 weeks post-discharge	35	22.74 ± 6.71	1.14				
Family caregivers' SF-12 physical quality of life							
At the time of discharge	35	71.91 ± 25.69	4.34	1.02	0.316	2.98	-2.97 to 8.92
At 8 weeks post-discharge	35	68.93 ± 27.66	4.68				
Family caregivers' SF-12 mental health quality of life							
At the time of discharge	35	63.05 ± 16.96	2.87	2.11	0.042	4.64	0.18 to 9.11
At 8 weeks post-discharge	35	58.41 ± 17.98	3.04				

SD = standard deviation; SEM = standard error of the mean; MD = mean difference; CI = confidence interval.

total scores are further classified as either no disability (0), mild disability (1), partial disability (2–3), moderate disability (4–6), moderately severe disability (7–11), severe disability (12–16), extremely severe disability (17–21), vegetative state (22–24) and extreme vegetative state (25–29).²² The DRS has an inter-rater reliability of ≥ 0.97 .²² In the current study, it was only used when the patients were not under the influence of any mind-altering drugs or recovering from a recent seizure. The Cronbach's alpha of the DRS at the time of discharge and at 8 weeks post-discharge were 0.71 and 0.75, respectively.

The TBI Patient Symptom scale was used to assess the severity of the symptoms of the sequelae

associated with TBI. The symptoms recorded include loss of muscle strength (paralysis, limited physical mobility, or poor coordination); blurred vision or loss of vision; loss of hearing or tinnitus; loss of memory and concentration; changes in speech or difficulty being understood; mood problems (such as depression, anxiety, denial and frequent changes in emotion); insomnia; changes in behaviour (aggression, anger, and impulsiveness); and inability to live independently. The severity of the symptoms was rated on a scale (developed by the authors) which ranged from 1 to 5 (1 = no difficulty, 2 = present but not bothered, 3 = mild difficulty, 4 = moderate difficulty, and 5 = severe difficulty). The Cronbach's alpha of the TBI Patient

Table 4: Predictors of caregivers' quality of life at 8 weeks post-discharge

Factor	Unstandardised coefficient		t	P value	95% CI
	β	SE			
Family caregivers' SF-12 physical quality of life (dependant variable)					
Constant	152.26	23.69	6.43	<0.001	103.81 to 200.71
Family caregiver age in years	-1.59	0.39	-4.14	<0.001	-2.38 to -0.81
Patient age in years	0.44	0.17	2.64	0.013	0.10 to 0.78
Family caregiver employment status	-13.27	3.66	-3.62	0.001	-20.75 to -5.78
Severity of mood problems such as depression, anxiety, denial and frequent changes in emotion	-10.34	3.16	-3.27	0.003	-16.80 to -3.88
Severity of insomnia	5.36	2.29	2.34	0.026	0.68 to 10.04
Family caregivers' SF-12 mental health quality of life (dependant variable)					
Constant	228.64	73.53	3.22	0.004	78.02 to 379.27
Family caregiver age in years	-0.94	0.29	-3.29	0.003	-1.53 to -0.36
Patient age in years	0.45	0.16	3.96	<0.001	0.22 to 0.69
Family caregiver's caregiving preparedness	0.59	0.29	2.02	0.050	0.00 to 1.20
Severity of mood problems such as depression, anxiety, denial and frequent changes in emotion	-11.61	3.18	-3.65	0.001	-18.13 to -5.09
Severity of behavioural changes such as aggression, anger, impulsiveness, etc.	8.33	2.86	2.91	0.007	2.47 to 14.20
Severity of the inability to live independently	-13.39	14.04	-2.24	0.034	-60.16 to -2.63

CI = confidence interval; SE = standard error.

Symptom scale at the time of discharge and at 8 weeks post-discharge were 0.90 and 0.91, respectively.

The authors approached the charge nurses of units that admit patients with TBI to identify those scheduled for discharge. During the in-patient period, all patients with TBI are followed up by the neurology team and other teams, depending on the medical care needs, comorbidities, and complications present in the patient. The medical team determines each patient's discharge date and time. The nurses assigned to the patients notified the study research assistant of the time of discharge and when the FC would be available to take the patient home. The research assistants in this project were all qualified nurses.

On the day of discharge, the Research Assistant (RA) screened each FC and patient for eligibility and collected Time-1 data regarding the patient's symptoms, level of disability, and the caregiver's preparedness for caregiving and QoL. During the meeting (on the day of discharge), the FCs were informed that additional data about the caregiver's preparedness and QoL and the patient's symptoms and disabilities would be collected when the patient is brought for the follow-up visit in the neurology clinic at 8 weeks post-discharge. Patients with TBI return for follow-up care and review in the neurology clinic every

2 months. Data collection at 8 weeks post-discharge helped to ensure that FCs had a reasonable amount of time to experience the demands of caregiving. A total of 36 FCs and patients with TBI were recruited for the study; however, only 35 FCs and patients showed up for the first appointment at eight weeks. One FC did not show up because their patient had died before the first follow-up appointment [Figure 1].

Data were analysed using the Statistical Package for the Social Sciences (SPSS), Version 23 (IBM Corp., Armonk, New York, USA). Descriptive statistics were used to describe the symptoms and disabilities of patients with TBI and the FCs' preparedness for caregiving as well as their QoL. The paired t-test was used to examine the difference in patients' disability, FCs' caregiving preparedness, PQoL, and MHQoL between the two periods—at the time of discharge and at 8 weeks post-discharge. Multiple linear regression analyses (backward method) were used to examine the predictors of caregivers' QoL. Multicollinearity was tested using the variance inflation factor and tolerance. A *P* value of ≤ 0.05 was considered to be statistically significant.

The study was approved by the research and ethics committees of Khoula Hospital and the investigators' institutions (MH/DGKH/6/6/47/2020 and SQU/

CON/DO.34/2019). All the participants received a detailed explanation of the study procedures and signed the consent form prior to data collection.

Results

A total of 36 FCs and patients with TBI participated in the study. The mean age of the FCs was 38.44 ± 9.23 years. The majority of the FCs were female (52.8%) and were either the parent (41.7%) or child (27.8%) of the patient with TBI. The mean age of patients with TBI was 59.58 ± 20.57 years. The main causes of TBI were motor vehicle accidents, falls, and assaults. Most patients (52.8%) were male and had a Glasgow coma scale score of ≤ 8 , which is equivalent to severe injury, at the time of admission [Table 1]. The average Glasgow coma scale score on admission and at discharge was 7.92 ± 2.40 (severe injury status) and 14.20 ± 2.32 (mild injury status), respectively.

Most patients with TBI at the time of discharge had severe difficulty living independently (97.2%); furthermore, most had lost muscle strength (paralysis, limited physical mobility, or poor coordination; 77.5%); mood problems such as depression, anxiety, denial and frequent change in emotions (66.7%); and loss of memory and concentration (63.9%). None of the participants reported having symptoms that were not bothering them. The mean scores show that in this sample, the symptoms that were most common and severe to deal with were the inability to live independently, loss of muscle strength, mood problems, and changes in speech or difficulty being understood by others. At the time of discharge from the hospital, all patients were found to have multiple symptoms [Table 2].

Overall, the FCs had a good PQoL (mean = 71.91 ± 25.69) and MHQoL (mean = 63.05 ± 16.96) and a low level of caregiving preparedness (mean = 19.74 ± 9.04) at the time of discharge. At 8 weeks post-discharge, there was a significant improvement in caregiving preparedness ($P < 0.001$) and patient's disability ($P = 0.026$) as well as a significant depreciation in the caregivers' MHQoL ($P = 0.042$). There was also a decrease in caregivers' PQoL from 71.91 (at discharge) to 68.93 (at 8 weeks post-discharge), but this change was not significant [Table 3].

The significant predictors of caregivers' PQoL were the age of the caregiver ($P < 0.001$), the age of the patient ($P = 0.013$), the caregiver's employment status ($P = 0.001$), and the severity of patient symptoms in relation to mood ($P = 0.003$) and insomnia ($P = 0.026$). The final regression model showed that these 5 factors were responsible for approximately 56.4%

of the variance in the caregivers' PQoL ($F [5, 29] = 9.80$, $R^2 = 0.628$, $R^2_{adjusted} = 0.564$; $P < 0.001$). The significant predictors of the caregivers' MHQoL were the caregiver's age ($P = 0.003$), the patient's age ($P < 0.001$), caregiving preparedness ($P = 0.050$), and the severity of the patient's mood problems ($P = 0.001$), behavioural problems ($P = 0.007$), and inability to live independently ($P = 0.034$). The final model showed that these 6 factors were responsible for approximately 44.9% of the variance in caregivers' MHQoL ($F [6, 28] = 5.62$, $R^2 = 0.546$, $R^2_{adjusted} = 0.449$; $P = 0.001$) [Table 4].

Discussion

Traumatic brain injury (TBI) is a common health problem in Oman, and the risk factors are abundant due to the high percentage of youths in the population and the increasing geriatric population, urbanisation, and motor vehicle ownership.^{7,23,24} Despite the problem of TBI and its associated sequelae, there has been no study on the QoL of FCs caring for patients with TBI in Oman or the Middle East region. The majority of the studies that have focused on FCs in Oman included caregivers of patients with cancer and children with autism and found high caregiver burden and low QoL.^{25,26}

The findings of the current study show that the FCs of patients with TBI were mostly female, the parent or child of the patient with TBI, and assumed caregiving responsibilities for a patient with severe TBI (52.8%) and multiple severe symptoms. The symptoms that were most common include inability to live independently (97.2%); loss of muscle strength; paralysis; limited physical mobility or poor coordination (77.5%); mood problems such as depression, anxiety, denial, and frequent change in emotions (66.7%); and loss of memory and concentration (63.9%). When the FCs started caring for patients with TBI, they were in good physical and mental health but had low levels of caregiving preparedness, which could be due to inadequacies in discharge planning and a lack of programmes to prepare FCs for caregiving responsibilities before the patient with TBI is discharged home. A study conducted in New South Wales, Australia, found that the majority of the caregivers (72%) of patients with TBI felt well prepared or very well prepared overall for caregiving, especially with regard to the patient's physical needs and responding to patient needs in an emergency.²⁷ Caregivers in New South Wales had been caring for patients with TBI for at least one year and felt least prepared to get help and information from the

health system and deal with the stress of caregiving.²⁷ Australia's healthcare system has established discharge planning processes, neurorehabilitation facilities, and long-term care facilities.²⁷ It is important to note that even in countries with well-established healthcare systems, FCs of patients with TBI have challenges related to caregiving stress and seeking help and information from the healthcare system.

The findings of the current study show that within just 8 weeks post-discharge, there was significant depreciation in the caregivers' MHQoL ($P = 0.042$). These findings are similar to those of a study in Iran, in which the QoL of the FCs of patients with spinal cord injury was found to be mainly poor in the mental health dimension.²⁸ Consistent with the current study's findings, a study conducted in the Netherlands showed that the mean mental health score of FCs of patients with TBI significantly depreciated from 63.07 at the time of discharge to 58.41 at 8 weeks post-discharge.²⁹ The above findings demonstrate that caring for patients with TBI is difficult and promptly impacts the caregivers' QoL if support and interventions to increase caregiving preparedness are not provided. Hence, there is a need for interventions that will involve teaching, supporting, and increasing FCs' preparedness before patients are discharged and across the caregiving trajectory. The literature shows that interventions focusing on skill building, peer support, support groups, advocacy training, and other community-based services targeted at the FC or dyad (FC and patients with TBI) improve health outcomes.³⁰

This study's findings also show that at 8 weeks post-discharge, there was a significant improvement in caregiving preparedness ($P < 0.01$) and the patients' disability score ($P = 0.026$) but no significant change in the FCs' PQoL. This shows that without support or efforts by the healthcare system to prepare FCs, caregivers use inherent intuition, life experiences, and other resources to provide care to their relative with TBI while also learning how to address the patient's needs and symptoms. This is likely a very stressful and emotionally draining task that compromises their MHQoL. The authors recommend that future longitudinal studies focus more on assessing the resources FCs use to meet the needs of the patient at home as well as the health and health promotion practices of FCs as they adjust to the demands of caring for patients with TBI beyond the 8-week period.

The significant modifiable predictors of the FCs' MHQoL were caregiving preparedness and the severity of the patient's symptoms in relation to mood problems, changes in behaviour, and inability to live independently. These findings are consistent with those of other recent studies, which reported that

the caregivers of patients with TBI have low MHQoL due to the patient's mental health issues and ongoing care needs.^{31,32} The significant modifiable predictors of PQoL were the FC's employment status and the severity of the patient's symptoms in relation to mood problems and insomnia. These findings demonstrate that interventions focusing on training FCs to increase their caregiving preparedness and the skills needed to care for patients with TBI who have behavioural problems, as well as the availability of home-based care by health professionals, such as nurses, to assist with symptom management and other community-based services, may enhance the caregivers' QoL and the outcomes of patients with TBI.

Studies conducted among FCs of patients with TBI in the USA (mainly veterans) found that caregivers reported a lower QoL in the mental health dimension than in the physical.^{28,31,32} The low MHQoL was mainly attributed to factors such as perceived social stigma regarding the sequelae of TBI, inappropriate behaviours of patients with TBI, anticipated future financial problems, social isolation, unhealthy family functioning, dissatisfaction with intimate relationships, responsibility overload, sleep deprivation and suppression of personal needs and emotions.^{28,31,32}

Regarding caregiving preparedness, the current study revealed that overall, the FCs had low caregiving preparedness at the time of patient discharge from the hospital. At 8 weeks post-discharge, there was a significant improvement in the FCs' caregiving preparedness. Similar findings were reported by a longitudinal study conducted among Danish FCs of patients with TBI.³³ However, the FCs in this Danish study had received initial support from healthcare providers regarding helping patients with activities of daily living.³³ Therefore, healthcare facilities in Oman must prioritise the implementation of tailored pre-discharge teaching and education and other interventions to increase caregiving preparedness to mitigate poor health outcomes among FCs of patients with TBI.

The current study's findings need to be interpreted in view of its limitations, which include the small sample size (this increases the risk of a type II error), convenience sampling method used, and lack of data on caregiver outcomes such as depression, anxiety, and coping. The sample mostly comprised FCs who are caring for patients with severe TBI-related disabilities, and this limits the generalisability of the results. Despite its limitations, this study highlights that caring for patients with TBI promptly impacts caregivers' QoL in the absence of interventions that enhance support and preparedness. It is recommended

that more longitudinal and interventional studies focus on caregiver education, skill building, and support throughout the caregiving trajectory. There is also a need for acute care hospitals to augment discharge planning with interventions that enhance caregiver preparedness before the patient is sent home. Nurses could implement such interventions through community-based services such as home care, which can be tailored to the Omani culture and social context.

Conclusion

This is the first study to explore the QoL of FCs of patients with TBI in Oman. The Omani FCs of patients with TBI experienced a decline in their MHQoL after assuming caregiving responsibilities. The modifiable predictors of QoL were the caregiver's employment status and caregiving preparedness and the patient's symptoms in relation to mood, insomnia, behavioural problems, and disability. These modifiable factors can be targeted to enhance FC preparedness and mitigate poor health outcomes for the dyad (caregiver and patient with TBI).

AUTHORS' CONTRIBUTION

DJ and JKM conceptualised and designed the study. ERL, DJ, and HR collected the data. JKM analysed and interpreted the data. All authors were involved in the study investigation. ERL, DJ, HR, and JKM handled the project administration. JKM and DJ drafted the manuscript. ERL and HR reviewed and edited the manuscript. JKM, DJ, and HR supervised the study and acquired the funding. All authors approved the final version of the manuscript.

CONFLICT OF INTEREST

The authors declare no conflicts of interests.

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