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Original Research

Quality of Life (QoL) using EORTC QoL–C30 and BN20 among Patients who Underwent Brain Tumor Resection in a Tertiary Care Center in Saudi Arabia

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Abstract

Introduction: Quality of life (QoL) encompasses the awareness of individuals' well–being in various aspects of their lives, including physical, personal, mental, and social domains. It is imperative to address QoL concerns in patients with brain tumors. The objective of this study is to assess the QoL among brain tumor patients treated a tertiary hospital in Saudi Arabia.

Methods: A retrospective study conducted at a single academic institution in 2017 analyzed data from adult patients diagnosed with brain tumors who underwent craniotomy and resection procedures over a 10–year period (2007–2017). The assessment of QoL was conducted employing a translated Arabic questionnaire derived from the European Organization for Research and Treatment of Cancer (EORTC) standardized model (QLQ–C30). This model evaluates various domains, including global health, physical function, role functioning, emotional functioning, cognitive functioning, social functioning, and symptoms domain. Furthermore, the brain cancer model (BN20) was utilized to assess symptoms and evaluate all aspects of well–being.

Results: In this study, a total of 76 patients were included, with a median age of 46 years. No gender bias was observed. Meningioma was the most prevalent brain tumor in our study, comprising 40% of the cases, followed by glioma and other types. It is noteworthy that more than half (65%) of the brain tumor patients had a World Health Organization (WHO) grade I brain tumor, while 15% had grade II, and 20% had grades III or IV. Supratentorial was the most common location for brain tumors. In all types of brain tumors, particularly in patients who underwent resection of meningioma and glioma, the QoL scales and measurements of daily functioning consistently exhibited low scores. Better QoL scores were correlated with male gender, the location of the brain tumor, and the WHO tumor grade. Conversely, perioperative headache, drowsiness, neurological deficits, and low socioeconomic status were associated with poor QoL.

Conclusion: Our study is the first study reported in Saudi Arabia to evaluate the quality of life of patients undergoing surgical procedures for brain tumors. We demonstrated that the QoL experienced by brain tumor patients consistently appeared to be poor, irrespective of the specific type of tumor. We underscore the paramount significance of evaluating the QoL of brain tumors within the Gulf and Middle East regions. To comprehensively evaluate the QoL of brain tumor patients globally, a substantial sample size and longitudinal or prospective studies are indispensable.

Keywords: Quality of life, Brain tumors, WHO grading, QLQ–30, EORTC

Introduction

Quality of life (QoL) refers to the subjective perception of an individual's well–being in life. It is influenced by their cultural background, personal values, aspirations, interests, and standards. [1] As healthcare providers, our primary responsibility is to select the most appropriate

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treatment and procedure that optimizes the patient's QoL in multiple dimensions. These dimensions encompass physical well–being, personal beliefs, mental health, social interactions, and environmental factors. [1,2]

In brain tumor patients, improving QoL is a crucial concern. Brain tumors exhibit abnormal cell cycle growth, which inevitably leads to the formation of large masses of tissue within organ cells. Brain tumors are classified into two categories: primary and secondary. Primary brain tumors originate from cells of the central nervous system, including glioma and meningioma. In contrast, secondary brain tumors develop from cells outside the central nervous system, often through metastasis. [3] In 2012, the World Health Organization (WHO) reported that the global incidence of brain and nervous system tumors was estimated to be 1.9 per 100,000 individuals, regardless of gender. [4] In Saudi Arabia, a study conducted by King Abdulaziz University Hospital (KAUH) in Jeddah reported an estimated incidence of brain tumors in the adult population to be 6.5 per 100,000. [5] Survival rates are contingent upon the histopathological grade of the tumor. [6]

Previous research evaluated the QoL of brain tumor patients using the Karnofsky scaling system, which has limited validation due to its limited scope of measurement, primarily focusing on functionality. [7] The QoL can be assessed using various questionnaires. For instance, in a study on children with posterior fossa tumors, the Pediatric Quality of Life Inventory (PedsQL) generic score scales and the Health Utilities Index Mark 3 (HUI3) were employed. These assessments revealed a poor prognosis in the presence of socioeconomic status and hydrocephalus. [8] Other questionnaires include the European Organization for Research and Treatment of Cancer's (EORTC) Quality of Life Questionnaire–Brain Cancer Module that measures full range of social, mental and physical health and the Functional Assessment of Cancer Therapy–Brain, that link QoL with adjuvant treatment of cancer. [7]

There is an increasing trend of reports assessing the QoL in patients with brain tumors. A study in India measured QoL using EORTC questionnaire (QLQ–30) and specific Brain Cancer module (BN 20) that showed higher grading of tumor type and poor economic factors are linked with poor QoL. [9] A study conducted by Flechl et al. evaluated the neurocognitive function of glioblastoma patients undergoing chemotherapy. The study utilized the EORTC QLQ C30 and BN20 scales for assessment. The study revealed that patients with cancer in non–dominant brain regions demonstrated significantly higher scores in word fluency compared to those with cancer in the left hemisphere. [10] Additionally, other studies assessed the QoL using the EORTC QLQ–C30 and EORTC QLQ–BN20 scales among glioblastoma patients who received radiotherapy and/or chemotherapy. [11–17]

To our knowledge, there is a scarcity of research in the Gulf and Middle East region investigating the QoL in cancer patients. Notably, there is no reported assessment of QoL in brain tumors. Therefore, the primary objective of this inaugural study conducted in Saudi Arabia was to evaluate the QoL of patients who underwent brain tumor resection at a single–center (KAUH).

Methods

A retrospective study conducted in 2017 at KAUH in Jeddah, Saudi Arabia, examined adult patients diagnosed with brain tumors over a 10–year period (2007–2017). The study was approved by the Biomedical Ethics Research Committee at KAUH in accordance with the Helsinki Declaration.

Data collection

In our study, the total number of patients was 76. The inclusion criteria were patients diagnosed with brain tumors by histopathology and who underwent craniotomy or transsphenoidal tumor resection. The exclusion criteria were patients under the age of 15 (which corresponds to the pediatric age cutoff at our hospital), who were not diagnosed by histopathology, who had not undergone surgical procedures or had only biopsies, or who have not completed the assessment of QoL. The dataset encompassed patients' demographic information, diagnostic records, the dates of their diagnoses, histopathological findings, surgical dates, treatment modalities, postoperative complications or recurrences, and patients' telephone numbers. These data were sourced from the hospital's records to facilitate contact and assess the QoL of the patients.

Quality of Life Evaluation

The QoL assessment was conducted in the outpatient Neurosurgery clinic by trained and supervised medical students. We utilized a translated Arabic questionnaire based on a validated English version of the European Organization for Research and Treatment of Cancer (EORTC) standardized model (QLQ–C30). This model evaluates various domains, including global health, physical function, role functioning, emotional functioning, cognitive functioning, social functioning, and symptoms. [18] Additionally, a validated Brain cancer model (BN20) was utilized to assess specific symptoms. [19] This comprehensive approach enables the evaluation of all aspects of well–being. The scoring manual by the EORTC used to calculate each domain and item of the assessment tool to give the final raw score for each patient, then transformed it to standardized score by dividing it by the range of the items in the scale to give the mean standardized score for each domain. The higher

the functional scores, the better QoL, on the contrary, the higher the symptoms score, the lower QoL. The QoL was evaluated across various variables, including age, gender, tumor location, histological characteristics, and WHO classification grade.

Statistical Analysis

The statistical analysis of the data was conducted using SPSS version 26.0 (IBM Corporation, Armonk, NY). Descriptive statistics were presented, including means, standard deviations, ranges, and percentages. Statistical significance was established based on a p–value <0.05.

Results

Patients' characteristics

The present cohort study enrolled a total of 76 patients. Notably, by the end of our study, nearly 90% of these patients were still alive. In our study, the median age of the participants was 46 years (range: 31 to 55.5 years), with 55.3% of the participants being female. Approximately two–thirds of our patients (64.5%) were expatriates. The most common brain tumor in our study was meningioma by 40% followed by glioma of different WHO grades, and lastly pituitary adenoma. According to the WHO classification, more than half of brain tumor patients were diagnosed as grade I (65%), intermediate grade II (15%), and higher grades III and IV (20%). The supratentorial region accounts for the most prevalent location of brain tumors, comprising 60% of cases. This is followed by the sellar/suprasellar region, which accounts for 17% of cases. Finally, skull base and infratentorial regions collectively account for the remaining of cases (Figure 1 and Table 1).

Characteristics	n = 76
Age	
Median by year (IQR)	46 (31 – 55.5)
Gender	
Male, n (%)	34 (44.7)
Female, n (%)	42 (55.3)
Nationality	
Saudi, n (%)	27 (35.5)
Non–Saudi, n (%)	49 (64.5)
Tumor type	
Glioma, n (%)	16 (21)
Meningioma, n (%)	32 (42)
Pituitary adenoma, n (%)	11 (14.5)
Others, n (%)	17 (22.4)
WHO grade	
I, n (%)	50 (65.8)
II, n (%)	11 (14.5)
III, n (%)	6 (7.9)
IV, n (%)	9 (11.8)
Location	
Supratentorial, n (%)	47 (61.8)
Infratentorial, n (%)	5 (6.6)
Skull base, n (%)	11 (14.5)
Sellar / suprasellar lesion, n (%)	13 (17.1)

Table 1: Patient's Characteristics.

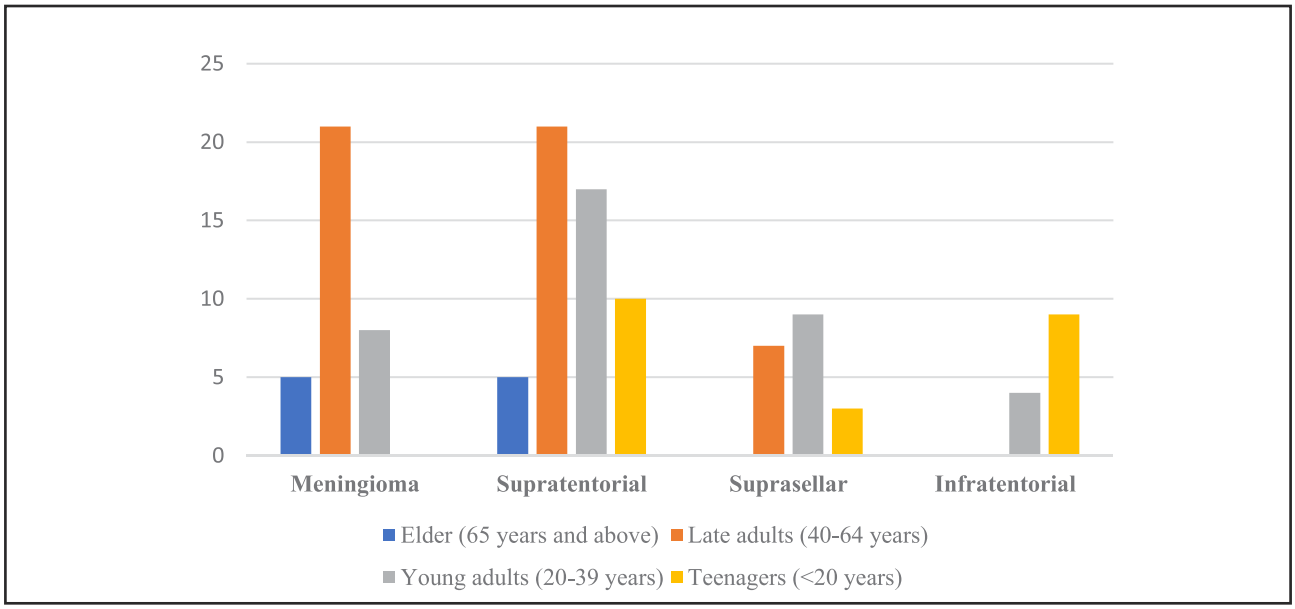


Figure 1: Distribution of brain tumors among patients.

Quality of Life Assessment

The QoL Score (QOL–C30 and QLQ–BN20) assessed various aspects of daily life, including physical, role, cognitive, emotional, social, financial, global health, and symptom functioning, exhibited low levels in all types of brain tumors. The functional scale mean within our cohort study spans a range of 72 to 84, with a global health QoL mean of 75. Fatigue and headaches were the most prevalent symptoms in brain tumor patients (Figure 2 and Table 2). In comparison to females, males demonstrated a superior functional scale and exhibited a reduction in symptoms. As evidenced in Table 3, pain and headaches exhibited statistically significant predictors of QoL across both genders.

The QoL was compared to the WHO classification grading system for brain tumors. This comparison revealed that grade 1 and 2 tumors exhibited higher scores and improved cognitive functions, while grade 3 and 4 tumors demonstrated higher physical and emotional scores. The QLQ–BN20 scale demonstrated that itchiness, hair loss, and leg weakness were statistically significant factors associated with poor QoL. (Table 4).

A comparative analysis of histopathological examination of the tumors (glioma, meningioma, pituitary adenoma, and other tumors) was conducted to assess their impact on QoL. It showed physical functioning better in glioma patients, while social and emotional function were better in patients diagnosed with meningioma. Pituitary adenoma patients exhibited the least symptoms compared to other tumors, which can be attributed to the effectiveness of endoscopic techniques. The symptoms scale of QOL–C30 revealed a statistically significance low QoL score for diarrhea and financial constraints, while drowsiness was a significant factor in QLQ–BN20 scale. (Figure 3 and Table 5).

QoL Assessment	Item No	Mean Score (+/– SD)
QOL–C30 Functional Scale		
Physical functioning	1–5	82.4 (23.1)
Role functioning	6, 7	75.7 (33.7)
Emotional functioning	21–24	77.2 (28.1)
Cognitive functioning	20, 25	72.6 (30.1)
Social functioning	26, 27	84.9 (28.4)
Global health quality of life	29, 30	75.5 (24.3)
Symptom Scale		
Fatigue	10, 12, 18	24.5 (27.1)
Nausea and vomiting	14, 15	43.6 (22.6)
Pain	9, 19	18.9 (25.6)
Dyspnea	8	9.6 (21.6)
Insomnia	11	28.9 (37.8)
Appetite loss	13	13.6 (27.3)
Constipation	16	21.5 (33.6)
Diarrhea	17	4.8 (14.1)
Financial difficulties	28	21.5 (36)
QLQ–BN20		
Future uncertainty	31–33, 35	18.7 (21.4)
Visual disorder	36–38	18.9 (25.9)
Motor dysfunction	40, 45, 49	18.6 (25.6)
Communication deficit	41–43	12.1 (25.6)
Headaches	34	34.2 (36.1)
Seizures	39	13.6 (27.3)
Drowsiness	44	20.6 (30.8)
Itchy skin	47	7 (21.3)
Hair loss	46	5.7 (19.2)
Weakness of legs	48	15.8 (31.5)
Bladder control	50	11.4 (29.6)

Table 2: Quality of Life Scores (QOL–C30 and QLQ–BN20) following surgical resection of brain tumors in the study cohort.

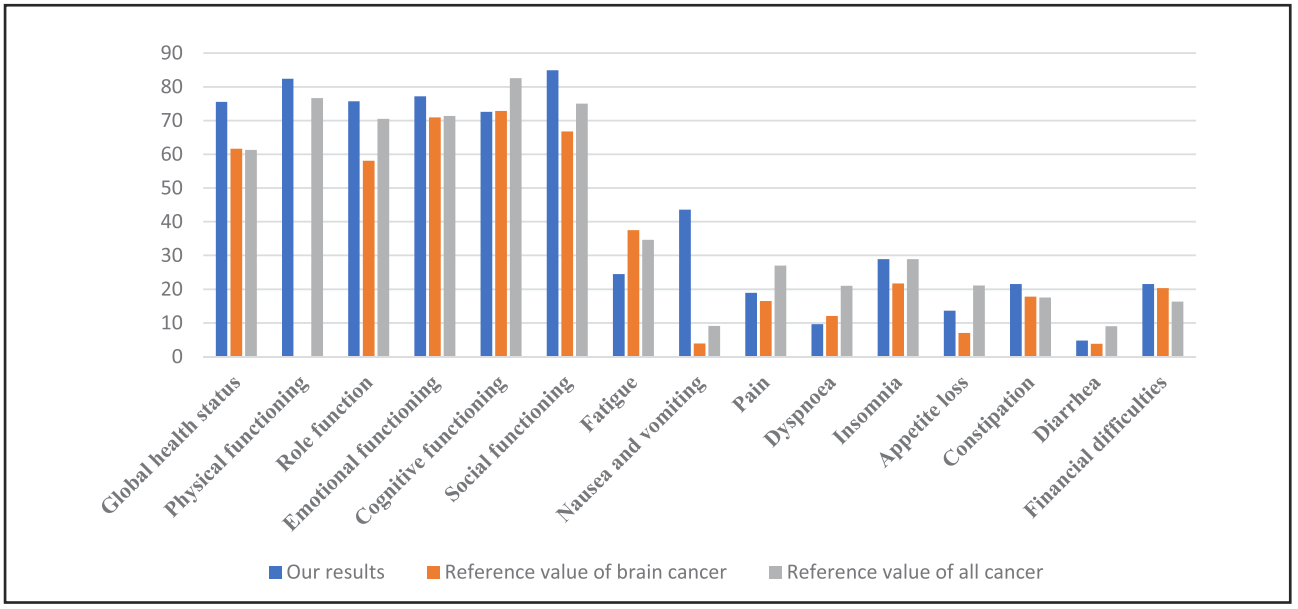


Figure 2: Comprehensive descriptive analyses of the QoL Score (QOL–C30) and the QoL Questionnaire (QLQ–BN20).

QoL Assessment	Gender		P–value
	Male Mean Score (+/– SD) N=34	Female Mean Score (+/– SD) N=42	
QOL–C30 Functional Scale			
Physical Functioning	83.7 (23.6)	81.4 (22.9)	0.60
Role function	79.9 (33)	72.2 (34.3)	0.17
Emotional function	78 (28.4)	7.8 (28.1)	0.36
Cognitive function	77.5 (29.8)	68.6 (30.2)	0.11
Social function	86.3 (25.1)	83.7 (31.1)	0.89
Global health quality of life	74.5 (29.1)	76.4 (19.9)	0.62
Symptom Scale			
Fatigue	21.2 (23.3)	27.2 (29.9)	0.5
Nausea and vomiting	41.7 (24.4)	45.2 (21.2)	0.10
Pain	10.3 (18.8)	25.8 (28.3)	0.006
Dyspnea	4.9 (14.5)	13.5 (25.6)	0.1
Insomnia	19.6 (35.9)	36.5 (41.5)	0.05
Appetite loss	10.8 (26.9)	15.9 (27.8)	0.22
Constipation	14.7 (28.7)	26.9 (39.8)	0.20
Diarrhea	1.96 (7.9)	7.14 (17.3)	0.14
Financial difficulties	23.5 (39.8)	19.8 (32.9)	0.88
QLQ–BN20			
Future uncertainty	16.4 (20.5)	20.6 (22.3)	0.29
Visual disorder	14.4 (20.7)	22.5 (29.2)	0.28
Motor dysfunction	16.3 (23.9)	20.4 (28.1)	0.62
Communication deficit	7.2 (19.3)	16.1 (29.4)	0.32
Headaches	21.6 (35.6)	44.4 (33.5)	0.001
Seizures	16.7 (29.9)	11.1 (25.1)	0.39
Drowsiness	18.6 (27.5)	22.2 (33.5)	0.84
Itchy skin	5.9 (15.3)	7.9 (25.3)	0.6
Hair loss	5.9 (17.4)	5.6 (20.7)	0.55
Weakness of legs	12.7 (28.4)	18.3 (33.9)	0.52
Bladder control	9.8 (29)	12.7 (30.3)	0.58

Table 3: Quality of Life Score (QOL–C30 and QLQ–BN20) categorized by gender.

The QoL has also been examined in relation to the tumor's location. Pituitary adenomas and posterior fossa tumors exhibited a higher functional and global health QoL, accompanied by reduced symptoms, like headache, in comparison to supratentorial tumors (meningioma and glioma) (Figure 3 and Table 6).

Discussion

Osaba and colleagues employed the term "disease burden" to illustrate the impact of disease on both mental and physical well–being. [11] Patients with brain tumors often experience mood disorders, personality alterations, and symptoms that hinder their ability to perform their daily life tasks effectively. Over 150 QoL questionnaires have been established since 1994. [20]

Although there is no universally accepted QoL questionnaire, the commonly utilized instruments include the EORTC QLQ–C30, which comprehensively assesses QoL, global health, and symptom management. Another QoL questionnaire utilized for brain tumor patients is the Functional Assessment of Cancer Therapy (FACT–G), which assesses family, social, functional, emotional, and physical well–being. The severity of symptoms is most accurately reported by the MD Anderson Symptom Inventory Brain Tumor Module (MDASI–BT). [21] Various studies indicated a decline in physical scores on the EORTCQLQ–C30 or EQ–5D scales, which is inconsistent with the findings of the Functional Assessment of Cancer Therapy–Brain (FACTBr), which reported stable scores. This discrepancy is attributed to the use of ununified physical scales in each group. Physical well–being is

QoL Assessment	Brain Tumor WHO Grade				P–value
	Grade I mean score (+/– SD) N=50	Grade II mean Score (+/– SD) N=11	Grade III mean Score (+/– SD) N=6	Grade IV mean Score (+/– SD) N=9	
QOL–C30 Functional Scale					
Physical Functioning	84.7 (22.55)	84.2 (20.5)	86.7 (16.33)	65.2 (28.44)	0.23
Role function	81.7 (30.35)	65.2 (40.45)	69.4 (26.7)	59.3 (42.58)	0.20
Emotional function	79 (28.33)	70.5 (29.9)	86.1 (8.61)	69.4 (33.07)	0.76
Cognitive function	74.3 (29.01)	68.2 (34.52)	72.2 (31.03)	68.5 (34.81)	0.94
Social function	82.7 (32.11)	91 (17.26)	88.9 (13.61)	87 (26.06)	0.9
Global health quality of life	76.7 (25)	74.2 (24.28)	76.4 (20.69)	70.4 (26.06)	0.83
Symptom Scale					
Fatigue	20.4 (25.53)	24.2 (24.75)	31.5 (36.8)	43.2 (27.5)	0.13
Nausea and vomiting	43.7 (22.81)	40.9 (15.57)	38.9 (13.61)	50 (33.33)	0.91
Pain	17 (26.19)	22.7 (23.89)	22.2 (22.77)	22.2 (28.87)	0.59
Dyspnea	9.3 (21.34)	15.2 (27.34)	0 (0)	11.1 (23.57)	0.57
Insomnia	29.3 (40.2)	27.3 (46.71)	22.2 (27.22)	33.3 (40.83)	0.97
Appetite loss	14 (28.64)	3 (10.05)	22.2 (40.37)	18.5 (24.22)	0.35
Constipation	21.3 (37.95)	18.2 (31.14)	22.2 (27.22)	25.9 (36.43)	0.82
Diarrhea	6 (16.06)	3 (10.05)	5.6 (13.61)	0 (0)	0.65
Financial difficulties	20 (36.27)	18.2 (34.52)	33.3 (36.52)	25.9 (40.06)	0.78
QLQ–BN20					
Future uncertainty	18.2 (23.9)	23.5 (18.94)	12.5 (11.49)	20.4 (14.5)	0.5
Visual disorder	20.2 (28.28)	17.2 (21.87)	13 (17.8)	17.3 (23.64)	0.99
Motor dysfunction	14.7 (23.7)	14.1 (27.26)	24.1 (19.14)	42 (32.77)	0.01
Communication deficit	9.6 (21.76)	26.3 (40.45)	24.1 (31.75)	1.2 (3.7)	0.13
Headaches	37.3 (36.04)	33.3 (39.44)	16.7 (27.89)	29.6 (38.89)	0.52
Seizures	11.3 (24.84)	21.2 (34.23)	16.7 (40.82)	14.8 (24.22)	0.70
Drowsiness	17.3 (28.76)	18.2 (34.52)	33.3 (36.52)	33.3 (33.33)	0.25
Itchy skin	3.3 (16.84)	3 (10.05)	16.7 (27.89)	25.9 (36.43)	0.003
Hair loss	0 (0)	12.1 (27)	33.3 (42.16)	11.1 (23.57)	0.0002
Weakness of legs	12.7 (28.48)	15.2 (27.34)	0 (0)	44.4 (47.14)	0.04
Bladder control	12 (31.41)	9.1 (21.56)	11.1 (27.22)	11.1 (33.33)	0.99

Table 4: Quality of Life Score (QOL–C30 and QLQ–BN20) categorized by WHO classification grade of brain tumor.

measured using the FACT–Br scale, while mobility and daily activities are assessed using the EQ–5D scale. [22]

Establishing a direct causal link between each factor influencing the QoL for tumor patients is challenging, as cancer, in general, is associated with unfavorable outcomes. [23] Survivors of patients with brain tumors, particularly children, are almost inevitably affected by cognitive function, as it may cause psychological manifestations, including behavioral and mood changes. They have almost thrice the risk of developing depression due to overthinking of recurrence, prognostication of the tumor, overall appearance, and reduced overall function. A prospective randomized controlled trial study conducted by Cheung et al. the examined the efficacy of a musical training program in reducing depressive symptoms and enhancing self–esteem and QoL in Hong Kong Chinese pediatric brain tumor survivors. [24] The study revealed that the experimental group exhibited statistically significant reductions in depressive symptoms, concomitantly with heightened self–esteem and improved QoL compared to the control group at the 12–month follow–up assessment. A cross–sectional study conducted by Kulkarni et al. to assess the long–term QoL in 62 children with posterior fossa brain tumors. In their study, approximately 50% of children diagnosed with posterior fossa tumors underwent chemoradiation treatment. Notably, 40% of these children developed hydrocephalus, while a 10% recurrence rate was observed. [8] The study uncovered significant correlations with quality of life, including the presence of hydrocephalus and socioeconomic determinants. Furthermore, another study conducted by Deisenroth A et

QoL Assessment	Brain Tumor Histopathology				P–value
	Glioma mean score (+/– SD) N=16	Meningioma mean Score (+/– SD) N=32	Pituitary Adenoma mean Score (+/– SD) N=17	Other tumors mean Score (+/– SD) N=11	
QOL–C30 Functional Scale					
Physical Functioning	86.7 (20.51)	84.4 (20.08)	77 (28.81)	78.4 (27.24)	0.47
Role function	74 (33.32)	76.6 (37.83)	68.2 (30.23)	80.4 (29.6)	0.45
Emotional function	65.1 (34.86)	82.3 (27.17)	74.2 (21.88)	80.9 (24.61)	0.29
Cognitive function	62.5 (34.16)	72.4 (29.51)	72.7 (28.16)	82.4 (27.93)	0.26
Social function	83.3 (28.54)	86.8 (31.32)	80.3 (20.84)	85.3 (28.8)	0.28
Global health quality of life	73.4 (27.25)	81.2 (21.06)	65.2 (23.52)	73.5 (26.88)	0.2
Symptom Scale					
Fatigue	23.6 (25.3)	19.8 (25.36)	29.3 (29.51)	31.4 (30.74)	0.52
Nausea and vomiting	45.8 (26.18)	44.3 (21.42)	53 (33.18)	34.3 (4.04)	0.10
Pain	21.9 (24.88)	16.7 (28.08)	27.3 (28.16)	14.7 (19.44)	0.38
Dyspnea	14.6 (27.13)	9.4 (22.77)	15.2 (22.92)	2 (8.08)	0.24
Insomnia	37.5 (43.67)	28.1 (41.57)	21.2 (34.23)	27.5 (37.7)	0.77
Appetite loss	16.7 (24.34)	6.2 (19.74)	24.2 (33.64)	17.6 (35.59)	0.11
Constipation	25 (37.52)	20.83 (37.63)	30.3 (40.7)	13.7 (26.51)	0.7
Diarrhea	2.1 (8.33)	2.1 (11.79)	12.1 (16.82)	7.8 (18.74)	0.03
Financial difficulties	31.3 (42.98)	7.3 (18.42)	51.5 (43.11)	19.6 (37.38)	0.002
QLQ–BN20					
Future uncertainty	21.9 (21.92)	15.6 (21.66)	28.8 (23.68)	15.2 (18.2)	0.23
Visual disorder	20.1 (24.42)	20.5 (29.75)	30.3 (29.85)	7.2 (8.73)	0.27
Motor dysfunction	19.4 (26.14)	16.3 (26.47)	21.2 (18.89)	20.3 (31.24)	0.5
Communication deficit	15.3 (29.78)	12.8 (28.66)	9.1 (15.57)	9.8 (21.83)	0.76
Headaches	27.1 (36.96)	31.2 (33.8)	60.6 (35.96)	29.4 (35.12)	0.07
Seizures	16.7 (32.2)	11.46 (27.58)	15.2 (22.92)	13.7 (26.51)	0.77
Drowsiness	37.5 (40.14)	11.5 (28.85)	30.3 (23.36)	15.7 (20.81)	0.007
Itchy skin	10.4 (26.44)	5.2 (19.14)	0 (0)	11.8 (26.2)	0.4
Hair loss	12.5 (29.5)	3.1 (13.01)	0 (0)	7.8 (22.14)	0.34
Weakness of legs	22.9 (35.94)	16.7 (33.87)	9.1 (21.56)	11.8 (28.73)	0.57
Bladder control	8.3 (25.82)	10.4 (28.63)	21.2 (40.2)	9.8 (28.3)	0.64

Table 5: Quality of Life Score (QOL–C30 and QLQ–BN20) categorized by brain tumor histopathology.

al. aimed to evaluate muscle strength performance and QoL in children and adolescents undergoing primary treatment for various types of cancer. [25] The authors indicated that muscle weakness and decreased QoL in children and adolescents may persist even at the commencement of anticancer treatment. This observation underscores the imperative of implementing countermeasures, such as exercise intervention programs, as early as possible during the treatment process.

The QoL and psychosocial well–being of brain tumor patients and their carers was assessed by Janda et al. using the Hospital Anxiety and Depression Scale and the Functional Assessment of Cancer Therapy–General (FACT–G). [26] The study demonstrated substantial correlations between the FACT–G and HADS subscales, particularly between emotional well–being and anxiety, physical and functional well–being and depression, and between patients' and their caregivers' quality of life.

A study conducted by Krolikoska et al. aimed to assess the QoL following surgical treatment for brain tumors. The study utilized the EORTC QLQ–30 and EORTC QLQ–BN20 scales to evaluate the QoL outcomes. [27] A study revealed that significant reduction in QoL was observed within the immediate postoperative period in patients diagnosed with low–grade glial tumors (WHO I and II) and extracerebral tumors (meningiomas and neuromas). Subsequently, a significant improvement in the QoL was observed after 30 days in all patients, particularly in those with meningioma and neuroblastoma. Conversely, the QoL was the lowest in patients undergoing treatment for metastatic tumors.

QoL Assessment	Brain Tumor Location				P–value
	Supratentorial mean score (+/– SD) N=47	Infratentorial mean Score (+/– SD) N=5	Sellar suprasellar region mean Score (+/– SD) N=47	Skull base lesions mean Score (+/– SD) N=11	
QOL–C30 Functional Scale					
Physical Functioning	82 (23.3)	77.3 (29.29)	79 (26.78)	90.9 (13.75)	0.39
Role function	75.5 (33.85)	76.7 (36.51)	73.1 (30.08)	78.8 (40.20)	0.76
Emotional function	76.4 (30.53)	63.3 (37.55)	74.4 (19.97)	91.7 (15.37)	0.14
Cognitive function	69.9 (32.16)	80 (36.13)	74.4 (26.01)	78.8 (24.82)	0.71
Social function	86.2 (29.55)	60 (43.46)	82.1 (19.79)	93.9 (20.1)	0.61
Global health quality of life	77.1 (23.92)	61.7 (34.16)	68.6 (23.11)	83.3 (21.41)	0.23
Symptom Scale					
Fatigue	26.5 (28.05)	37.8 (26.76)	24.8 (29.1)	10.1 (16.07)	0.17
Nausea and vomiting	44 (23.16)	36.7 (7.46)	50 (31.18)	37.9 (7.79)	0.78
Pain	19.5 (26.31)	10 (22.36)	25.6 (26.01)	12.1 (23.68)	0.23
Dyspnea	9.2 (22.74)	0 (0)	15.4 (22)	9.1 (21.56)	0.3
Insomnia	30.5 (41.02)	20 (44.72)	25.6 (33.76)	30.3 (43.35)	0.92
Appetite loss	14.2 (28.44)	13.3 (29.82)	20.5 (32.03)	3 (10.05)	0.42
Constipation	22 (35.63)	26.7 (43.46)	28.2 (38.12)	9.1 (30.15)	0.36
Diarrhea	4.3 (14.94)	0 (0)	12.8 (16.88)	0 (0)	0.01
Financial difficulties	19.1 (33.87)	20 (44.72)	43.6 (43.85)	6.1 (20.1)	0.03
QLQ–BN20					
Future uncertainty	18.4 (21.97)	20 (27.39)	26.3 (22.53)	10.6 (12.96)	0.36
Visual disorder	16.1 (23.03)	15.6 (28.98)	26.5 (28.88)	23.2 (33.5)	0.67
Motor dysfunction	18.9 (27.5)	42.2 (41.13)	18 (19)	7.1 (11.41)	0.17
Communication deficit	16.5 (30.55)	0 (0)	7.7 (14.62)	4 (10.27)	0.37
Headaches	32.6 (37.1)	6.7 (14.91)	56.4 (34.39)	27.3 (29.13)	0.03
Seizures	18.4 (31.71)	0 (0)	12.8 (21.68)	0 (0)	0.09
Drowsiness	19.9 (33.1)	26.7 (43.46)	30.7 (21.35)	9.1 (21.56)	0.08
Itchy skin	10 (24.98)	13.3 (29.82)	0 (0)	0 (0)	0.2
Hair loss	7.8 (22.21)	13.3 (29.82)	0 (0)	0 (0)	0.28
Weakness of legs	20.6 (36.48)	26.7 (27.9)	7.7 (19.97)	0 (0)	0.07
Bladder control	13.5 (31.59)	0 (0)	17.9 (37.55)	0 (0)	0.3

Table 6: Quality of Life Score (QOL–C30 and QLQ–BN20) categorized by location of brain tumor.

Furthermore, they arrived at a comparable conclusion, akin to our observation, suggesting that histopathological diagnoses have a direct influence on the QoL.

Zahid et al. study used translated and validated the Urdu version of EORTC QLQ–C30 and QLQ–BN20 amongst patients with primary brain tumors in Pakistan, and assessed the correlation of QoL with resilience, depression, and anxiety. [28] The researchers confirmed the validity of Urdu versions of the EORTC QLQ–C30 and QLQ–BN20 as significant clinical tools, which revealed negative correlations with depression and anxiety in their patients. In our study, we translated the EORTC QLQ–C30 and QLQ–BN20 to Arabic, as there is no validated version available in the Arabic language.

Cheng JX et al. conducted A study in China utilizing the EORTC QLQ–C30 scale as a baseline QoL of different subgroups of glioma patients prior to surgery. [29] Most glioma patients exhibited significant impairment in their emotional, social, cognitive, physical, and role functioning. Common symptoms included fatigue, pain, appetite loss, insomnia, and nausea/vomiting. The researchers reached a similar conclusion to our study, indicating that fatigue, pain, and all aspects of functioning significantly impacted the overall health status and QoL. Additionally, advanced age, poor performance status, WHO grade IV tumor classification, and tumor recurrence were associated with detrimental effects on QoL.

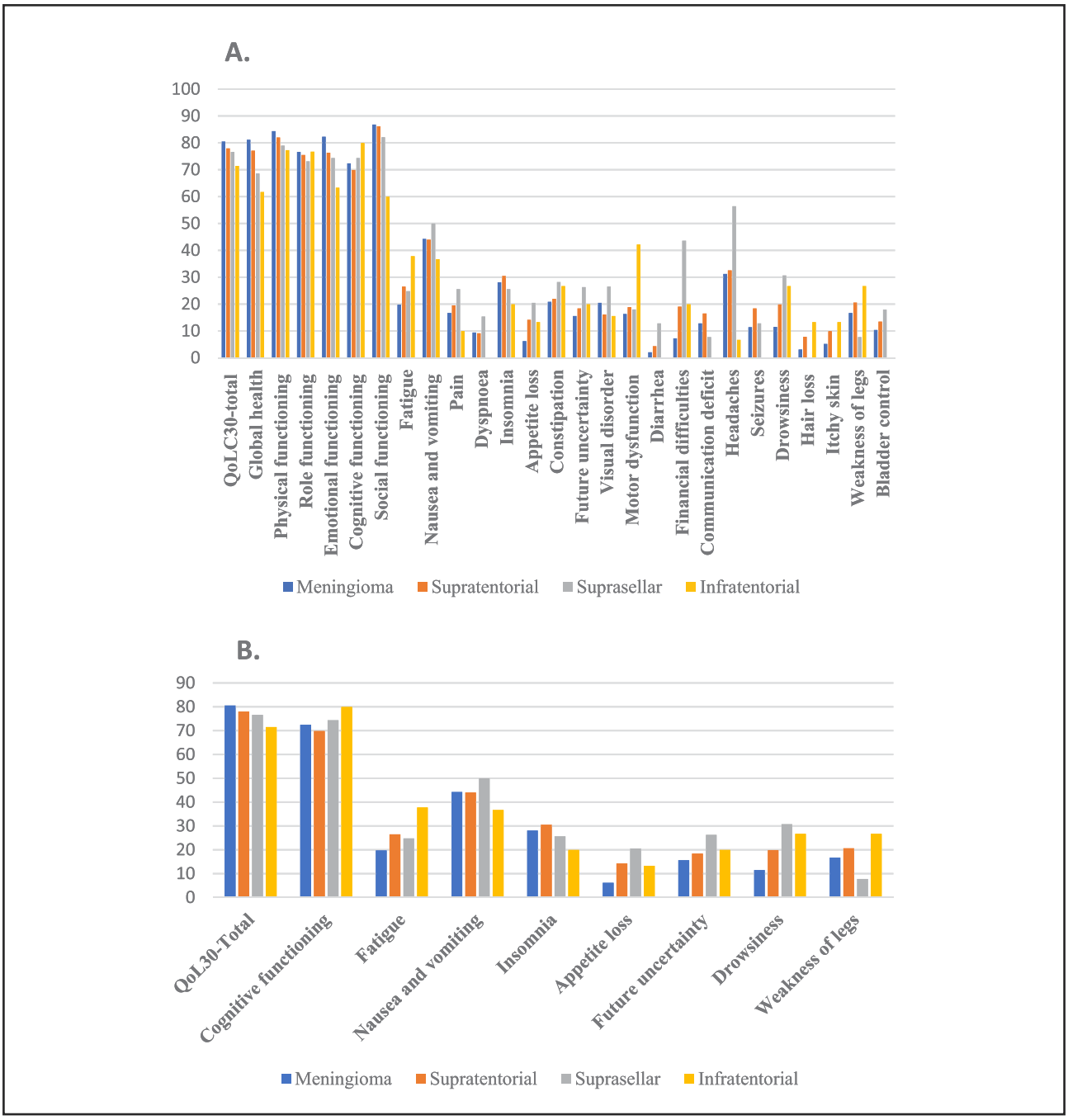


Figure 3: A. Comparison of the score summation between different studied groups according to tumor location. **B.** Significant QoL score between different studied groups according to tumor location.

In contrast, a study conducted by Wolf et al. examined the impact of postoperative neurological and neuropsychological alterations on QoL in 22 patients who underwent glioma resection. The study utilized the EORTC–QLQ C30 and QLQ BN20 questionnaires. [30] The researchers observed that up to 57.1% of patients experienced some form of neuropsychological deterioration. Notably, the majority of these functions recovered within a three–month period. The study concluded that there was no significant correlation between QoL and a patient's neurological or neuropsychological condition.

Patients suffering from Primary malignant brain tumor (PMBT) frequently experience psychological distress, which negatively impacts their vitality due to the early onset of radiotherapy–related side effects. This was studied by Dinapoli L et al. in 59 PMBT patients receiving postoperative RT to evaluate distress, anxiety, depression, and QoL over time to identify patients with difficulties in these areas who required more intense psychological support. [31] It was discovered that in distressed patients, increased psychological support positively impacted distress, mood, and QoL. Conversely, psychological well–

being was maintained in patients with PMBT who were not distressed. This finding underscores the significance of early assessment and provision of QoL support in brain tumor patients.

This is also evident in Tan et al.'s study, which assessed the cognitive function and emotional states of 22 patients who underwent brain tumor resection under awake surgery. [32] The study found that higher preoperative cognitive scores were associated with better QoL, while patients who reported more preoperative depressive and stress symptoms experienced worse QoL.

In our cohort study, patients with nonfunctioning pituitary adenomas exhibited a higher QoL compared to those with meningiomas and gliomas. A study conducted by Santos A et al. indicated that patients with functioning pituitary adenomas (acromegaly or Cushing's syndrome) experience the most significant impairment in QoL. Additionally, concomitant hypopituitarism exacerbates this impairment. [33]

To determine if there are any differences in QoL between patients with primary and metastatic brain neoplasms, a systematic review conducted by Chiu et al. demonstrated that, despite cognitive function being significantly impaired in patients with primary brain tumors, patients with metastatic brain tumors and those with primary brain tumors exhibit remarkably comparable poor quality of life profiles, which is consistent with the findings of our study. [34] Cheng et al, emphasized the important of pre–surgical evaluation of QoL in patient with primary and metastatic brain tumors. The study revealed that the baseline QoL in primary brain tumor patients preoperatively was superior to that in metastatic tumor patients postoperatively. [35]

The literature unequivocally demonstrates a significant correlation between QoL improvements following brain tumor resection. A study conducted by Kim et al., which included 258 patients undergoing brain tumor resection, demonstrated a significant improvement in both global and emotional functions following surgery. A significant correlation was identified between preoperative neurologic deficits and tumor diameter, as well as poor global QoL outcomes among patients following surgery. Role function, appetite loss, financial difficulties, and future uncertainty were identified as crucial factors contributing to the decline in QoL. [36]

Study limitations

In addition to being a single–center retrospective study and involving a small sample size, we encountered several limitations. These included language barriers that resulted in the exclusion of many patients and difficulties in accessing patients. Additionally, approximately 50 patients were excluded due to unreachability. Additionally, a validated version of the Arabic questionnaire, akin to the validated Urdu and Chinese versions, would facilitate the recruitment of a larger patient population compared to a translated questionnaire, which necessitates in–person interaction.

Conclusion:

Quality of life in cancer patients has become a crucial indicator of treatment efficacy and holds paramount significance. Our study revealed that the QoL experienced by brain tumor patients, irrespective of the specific type of tumor, consistently exhibited a poor state. To comprehensively evaluate the QoL of brain tumor patients globally, it is imperative to conduct longitudinal or prospective studies utilizing larger sample sizes.

Acknowledgments

None.

Conflicts of interest

None.

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