Quality of life, depression, and anxiety in brain tumor patients following surgical resection at a tertiary care center

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ABSTRACT

الأهداف: لمعالجة الفجوة في فهم تأثير أورام الدماغ على جودة الحياة في المملكة العربية السعودية.

المنهجية: أُجري هذا الدراسة المقطعية في مدينة الملك عبدالعزيز الطبية بجدة، المملكة العربية السعودية. شمل الدراسة 160 مريضًا بالغًا مصابين بأورام الدماغ، خضعوا لعملية استئصال جراحي بين يناير 2021 وأكتوبر 2024. تم تقييم جودة الحياة باستخدام استبيان تقييم الأمراض المزمنة (FACIT)، وقياس القلق والاكتئاب باستخدام مقياس الرهاب والاكتئاب في المستشفى (HADS).

النتائج: من بين 160 مريضًا، كانت الأورام الدبقية من الدرجة العالية الأكثر انتشارًا بنسبة 35%، تليها الأورام السحائية بنسبة 27.5%. وكان الورم من الدرجة الرابعة هو الأكثر انتشارًا وفقًا لمعايير منظمة الصحة العالمية 43.12%، يليه الدرجة الاولى 35.62%. أبلغ المرضى الذين يعانون من الأورام الدبقية من الدرجة العالية والأورام النخامية المنتقلة عن أدنى مستويات جودة الحياة. ومن المثير للاهتمام، أن مرضى الأورام الدبقية ذات الدرجة الأقل أظهروا مستويات أعلى من القلق 44.4% والاكتئاب 33.3%. في المقابل، كان لدى المرضى المصابين بالأورام السحائية والأورام النخامية نتائج أفضل من حيث جودة الحياة.

الخلاصة: يعاني المرضى المصابون بالأورام الدبقية من الدرجة العالية من تدهور في جودة الحياة بعد العملية الجراحية، غير أن جودة حياة جيدة لا تزال ممكنة، خاصةً بين من يعانون من أورام حميدة مثل الأورام السحائية والأورام النخامية.

Objectives: To address the gap in understanding post-surgical quality of life , depression , and anxiety among brain tumor patients in Saudi Arabia.

Methods: This cross-sectional study was conducted at King Abdulaziz Medical City in Jeddah, Kingdom of Saudi Arabia. A total of 160 adult brain tumor patients who underwent surgical resection between January 2021 and October 2024 were included. Quality of life (QoL) was assessed using the Functional Assessment of Chronic Illness Therapy (FACIT) questionnaire, and anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS).

Results: Among the 160 patients, high-grade gliomas were the most common tumor type (35%), followed by meningiomas (27.5%). WHO grade 4 tumors were most prevalent (43.12%), followed by grade 1 (35.62%). Patients with high-grade gliomas and metastatic tumors reported the lowest QoL scores. Interestingly, low-grade glioma patients showed higher levels of anxiety (44.4%) and depression (33.3%). In contrast, patients with meningiomas and pituitary adenomas had better QoL outcomes.

Conclusion: Patients with high-grade gliomas experienced poorer QoL postoperatively. However, good QoL is still achievable, particularly among those with benign tumors such as meningiomas and pituitary adenomas.

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Cancer accounts for more than 9.6 million fatalities across approximately 185 countries and is ranked as the second cause of death worldwide.[1] The incidence of cancer has notably increased in recent years in Saudi

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Arabia.[2] 10.82 cases for every 100,000 person-years is the total occurrence rate of brain tumors is.[3] Gliomas represent the most prevalent primary brain neoplasms among adults.[4]

The rising incidence of gliomas presents a substantial public health challenge, expected to increase significantly due to the aging population and the growing prevalence of genetic predispositions and environmental risk factors.[5]

Brain tumors can disrupt various aspects of daily functioning, including mobility, coordination, memory, and mood regulation.[6] Consistently high rates of psychosocial issues, ranging from 30% to 50%, have been reported in patients with brain tumors.[7] The concept of quality of life(QoL) for patients with brain tumors encompasses more than just physical health; it includes emotional, cognitive, and social functioning.[8] The psychological challenges associated with living with a brain tumor—such as anxiety, depression, fear of recurrence, and cognitive decline—can significantly reduce a patient's overall sense of well-being.

Thus, assessing QoL is crucial for understanding the disease burden and evaluating the effectiveness of treatment strategies and supportive care interventions aimed at improving life beyond mere survival.[9]

Studies have shown adverse psychosocial effects, including heightened levels of depression and anxiety, following a brain tumor diagnosis. Furthermore, individuals diagnosed with glioblastoma often experience significant declines in QoL, marked by motor impairments, personality changes, cognitive deficits, aphasia, and visual field impairments.[10] A study showed that not only do patients with gliomas faces symptoms of depression and anxiety, but their caregivers also experience a diminished QoL.[11]

While the physical risks of brain tumors are well known, the psychosocial impacts are less understood. This study highlights the need for clinicians to assess QoL in brain tumor patients to optimize care. In Saudi Arabia, research on the psychosocial impact and QoL post-surgical resection is limited. This study aims to explore specific QoL domains, including physical, social, emotional, and functional well-being, at a tertiary hospital in Jeddah over the past 3 years.

Disclosure. The study was approved by the Institutional Review Board (IRB) of King Abdullah International Medical Research Center (KAIMRC), Jeddah, Kingdom of Saudi Arabia

Methods. This study adhered to the ethical principles outlined in the Declaration of Helsinki. The Institutional Review Board (IRB) of the King Abdullah International Medical Research Center (Approval No. NRJ24/008/5) approved the research. Informed consent was obtained from all participants prior to their inclusion. All data collected were kept confidential and were used solely for the purposes of this research. The main objective of this study was to evaluate the QoL in patients with brain tumors following surgical treatment.

Data collection utilized two well-established and validated instruments: the Functional Assessment of Chronic Illness Therapy (FACIT) questionnaire and the Hospital Anxiety and Depression Scale (HADS). Patients completed these questionnaires after their surgical treatment, rather than at the time of diagnosis.

The FACIT questionnaire, has been specifically created to evaluate the health-related quality of life in individuals suffering from chronic conditions, such as cancer, and evaluates multiple dimensions such as physical well-being, emotional health, functional status, and social well-being. It employs a 5-point Likert scale ranging from 0 ("Not at all") to 4 ("Very much"), allowing patients to self-report their health status. The FACIT is a reliable tool widely applied in clinical oncology research due to its sensitivity in capturing the nuanced impacts of illness on a patient's life.

Additionally, the Hospital Anxiety and Depression Scale (HADS) was employed to assess psychological status, focusing specifically on anxiety and depression. This questionnaire is comprised of 14 items categorized into two subscales: anxiety and depression. Each item is rated on a scale from 0 to 3, leading to a score range of 0 to 21 for each subscale. Elevated scores suggest greater severity of symptoms. A score ranging from 0 to 7 is deemed normal, while scores between 8 and 10 fall into the borderline category, and those from 11 to 21 are classified as abnormal. The HADS is frequently used in cancer research to ensure a comprehensive evaluation of the psychological well-being of patients, providing valid and reliable assessments of mood disorders.

The study included all adult patients diagnosed with brain tumors and treated with surgery at King Abdulaziz Medical City in Jeddah over the past three years (January 2021– October 2024). Additionally, patients under 18 years of age and those who passed away were excluded. Patients were included if they had histopathology reports available, regardless of whether these were conducted at the hospital or outside.

Demographic and clinical data, including tumor type and treatment details, were extracted from electronic medical records using the BestCare system.

A total of 314 adult patients at King Abdulaziz Medical City in Jeddah were diagnosed with brain tumors and underwent surgical treatment. Among them, 73 patients who had passed away were excluded from the study, including 33 with glioblastoma (GBM), 26 with brain metastases, 5 with diffuse large B cell lymphoma, 4 with WHO grade 1 meningioma, 1 with WHO grade 2 meningioma, and 1 with pituitary macroadenoma. This left 241 eligible patients, of whom 160 agreed to complete the questionnaire, yielding a response rate of 61%.

Statistical analysis. Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize demographic and clinical characteristics, including means and standard deviations for continuous variables, and frequencies and percentages for categorical variables. The normality of continuous data was assessed using the Shapiro-Wilk test. For bivariate analysis, independent-sample t-tests or Mann-Whitney U tests were used for continuous variables, and Chi-square tests or Fisher's exact tests for categorical variables, as appropriate. To identify factors independently associated with quality of life, anxiety, and depression scores, multivariate logistic regression analysis was performed, adjusting for potential confounders such as age, sex, tumor type, and WHO grade. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported. A p-value of <0.05 was considered statistically significant.

Results. Table 1 provides an overview of the demographics and tumor classifications of the study cohort, comprising 160 patients who underwent surgical treatment for brain tumors. The average age of the participants was 48.01 years, with a standard deviation of 16.92 years. The sample had a slightly higher representation of female patients (54.37%) than male patients (45.62%). Most participants were married (65.00%), while (26.88%) were single.

High-grade gliomas were the most prevalent tumor type, affecting (35.00%) of the patients. This group included 43 cases of glioblastoma, 3 cases of anaplastic astrocytoma, and 10 cases of oligodendroglioma. Meningiomas were the next most common tumor type, comprising (27.50%) of the cases, followed by metastatic tumors at (14.37%). Metastatic tumors originated from various primary sites, including the breast, lung, esophagus, lymphoma, sarcoma, and parotid gland.

Other tumor types represented in the cohort included benign brain tumors (6.88%), such as schwannomas, craniopharyngiomas, choroid plexus tumors, gangliomas, and cavernous angiomas. Low-grade gliomas accounted for (5.62%) of the cases, comprising pilocytic astrocytoma and ependymomas. Medulloblastomas and pituitary adenomas each represented (3.75%) of the sample, while germ cell tumors made up (3.12%).

According to the WHO classification, the majority of tumors were Grade 4 (43.12%). Grade 1 tumors were observed in (35.62%) of patients, while Grades 2 and 3 were each found in (10.62%) of cases. This distribution reflects the diverse range of tumor types and severities encountered in the study population.

Table 2 presents the correlation matrix that illustrates the relationships between different dimensions of QoL and psychological well-being among patients with brain tumors. The Physical Well-Being (PWB) score shows a strong positive correlation with the overall FACTG score (r=0.771), indicating that better physical health is closely associated with higher overall quality of life. Emotional Well-Being (EWB) also demonstrates a strong positive correlation with the FACTG score (r=0.854), underscoring the significant impact of emotional health on overall QoL. Social Well-Being (SWB) has a moderate positive correlation with the

Table 1 - Demographics characteristic.

Characteristic	n (%)
Age Mean (SD)	48.01 (16.92)
Gender	
Female	87 (54.37)
Male	73 (45.62)
Marital Status	
Unmarried	43 (26.88)
Married	104 (65.00)
Widow	13 (8.12)
Tumor category	
High grade glioma	56 (35.00)
Meningioma	44 (27.50)
Metastatic Tumor	23 (14.37)
Other benign brain tumor	11 (6.88)
Low grade glioma	9 (5.62)
Medulloblastoma	6 (3.75)
pituatry adenoma	6 (3.75)
Germ cell tumor	5 (3.12)
WHO category	
WHO 4	69 (43.12)
WHO 1	57 (35.62)
WHO 2	17 (10.62)
WHO 3	17 (10.62)

FACTG score (r=0.776), highlighting its contribution to patients' overall QoL. Functional Well-Being (FWB) exhibits the strongest correlation with the FACTG score (r=0.870), emphasizing its critical role in determining overall QoL.

Conversely, the HADS-A (anxiety) and HADS-D (depression) scores show strong negative correlations with the FACTG score (r=-0.726 and r=-0.796, respectively), indicating that higher levels of anxiety and depression are associated with poorer overall QoL. Additionally, negative correlations are observed between the HADS scores and each well-being subscale, suggesting that increased levels of anxiety and depression adversely impact physical, emotional, social, and functional aspects of well-being. Lastly, the WHO tumor grade category exhibits negative, albeit weaker, correlations with the various QoL and psychological well-being scores. This implies that higher-grade tumor classifications are associated with lower QoL and higher anxiety and depression levels.

Table 3 provides detailed insights into the correlations between tumor categories and QoL scores, demonstrating how different types of brain tumors affect various aspects of patient well-being. Notably, pituitary adenomas were positively correlated with PWB (r=0.197, p=0.012, EWB (r=0.159, p=0.044), and SWB (r=0.16, p=0.044), suggesting that patients with pituitary adenomas may experience a higher overall QoL compared to those with other tumor types. This could be attributed to the typically more manageable clinical outcomes and lower psychosocial burden associated with pituitary adenomas.

In contrast, high-grade gliomas exhibited negative correlations with most well-being measures, including PWB (r=-0.159, p=0.044) and FWB (r=-0.112, p= 0.159), although not all correlations reached statistical significance. These findings emphasize the considerable impact high-grade gliomas have on patient health, affecting both physical and emotional aspects. This aligns with the aggressive nature of high-grade gliomas, characterized by rapid progression and significant detriments to QoL.

Metastatic tumors also demonstrated substantial negative correlations, particularly with EWB (r=-0.292, p=0.002) and SWB (r=-0.224, p=0.004), underscoring the extensive psychosocial challenges faced by these

Table 2 - Correlation domain of quality of life.

Domain of quality of life	PWB_Score	EWB_Score	SWB_Score	FWB_Score	FACTG_Score	HADS_A_Score	HADS_D_Score
PWB_Score	1	0.61095	0.355291	0.528089	0.77187	-0.656404	-0.674713
EWB_Score	0.61095	1	0.56383	0.682088	0.854736	-0.736335	-0.73711
SWB_Score	0.355291	0.56383	1	0.623656	0.77695	-0.390388	-0.485602
FWB_Score	0.528089	0.682088	0.623656	1	0.869566	-0.61053	-0.71448
FACTG_Score	0.77187	0.854736	0.77695	0.869566	1	-0.726134	-0.796164
HADS_A_Score	-0.656404	-0.736335	-0.390388	-0.61053	-0.726134	1	0.74012
HADS_D_Score	-0.674713	-0.73711	-0.485602	-0.71448	-0.796164	0.74012	1
who category	-0.209882	-0.288461	-0.304952	-0.280333	-0.329619	0.158824	0.280804

PWB = Physical Well-Being, EWB = Emotional Well-Being, SWB = Social Well-Being, FWB = Functional Well-Being, FACT-G = Functional Assessment of Cancer Therapy – General, HADS-A = Hospital Anxiety and Depression Scale – Anxiety, HADS-D = Hospital Anxiety and Depression Scale – Depression

Table 3 - Correlation between Tumor Categories and quality of life scores.

Brain tumors types	PWB Corr	EWB Corr	SWB Corr	FWB Corr	FACTGCorr	HADS A Corr	HADS D Corr	PWB p value	EWB P value	SWB p value	FWB P value	FACTG P value	HAD A P value	HADS D P value
Germ cell tumor	-0.115	-0.019	-0.021	-0.051	-0.066	-0.007	0.01	0.149	0.811	0.796	0.525	0.406	0.93	0.902
High grade glioma	-0.159	-0.038	0.004	-0.112	-0.098	-0.007	0.109	0.044	0.63	0.959	0.159	0.217	0.933	0.172
Low grade glioma	-0.111	-0.128	-0.06	0.038	-0.076	0.151	0.093	0.162	0.106	0.453	0.629	0.342	0.056	0.24
Medulloblastoma	-0.045	0.054	-0.031	0.077	0.014	-0.068	-0.021	0.573	0.501	0.695	0.331	0.862	0.392	0.796
Meningioma	0.143	0.162	0.075	0.187	0.173	-0.042	-0.176	0.071	0.041	0.349	0.018	0.029	0.597	0.026
Metastatic Tumor	-0.029	-0.292	-0.224	-0.265	-0.24	0.168	0.202	0.717	0	0.004	0.001	0.002	0.034	0.01
Other benign brain tumor	0.153	0.162	0.144	0.138	0.182	-0.148	-0.156	0.053	0.04	0.069	0.081	0.021	0.063	0.048
pituitary adenoma	0.197	0.159	0.16	0.068	0.178	-0.107	-0.126	0.012	0.044	0.044	0.394	0.024	0.18	0.114

PWB = Physical Well-Being, EWB = Emotional Well-Being, SWB = Social Well-Being, FWB = Functional Well-Being, FACT-G = Functional Assessment of Cancer Therapy General, HADS-A = Hospital Anxiety and Depression Scale – Anxiety, HADS-D = Hospital Anxiety and Depression Scale – Depression, Corr = Correlation coefficient, p-value = Statistical significance ,Values less than 0.05 indicate a significant relationship.

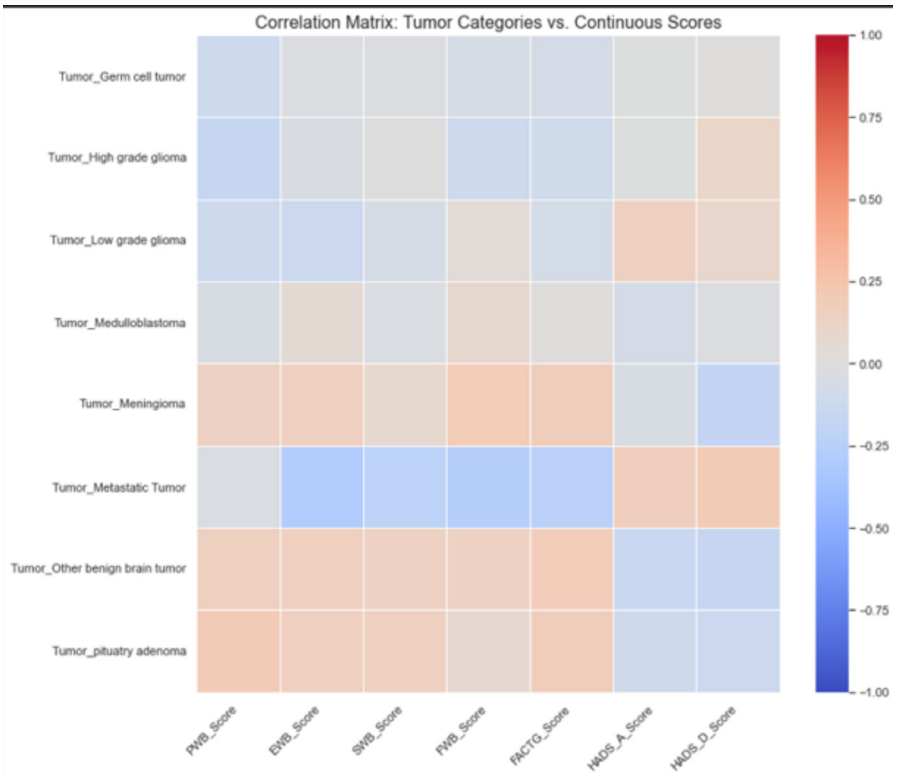

Figure 1 - Correlation matrix of tumor categories vs. continuous clinical scores. PWB_Score: Physical Well-Being, EWB_Score: Emotional Well-Being, SWB_Score: Social Well-Being, FWB_Score: Functional Well-Being, FACTG_Score: Functional Assessment of Cancer Therapy-General, HADS_A_Score: Hospital Anxiety and Depression Scale-Anxiety , HADS_D_Score: Hospital Anxiety and Depression Scale-Depression.

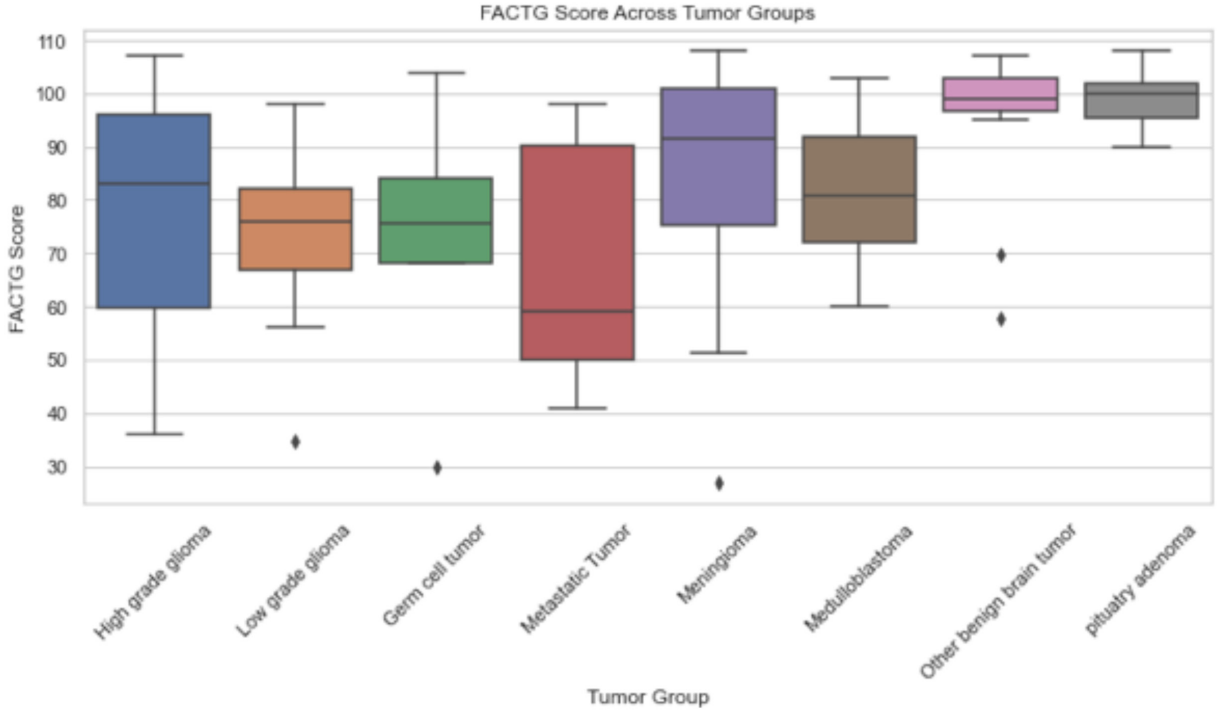

Figure 2 - Distribution of FACTG Scores Across Tumor Groups. FACTG Score: Functional Assessment of Cancer Therapy-General.

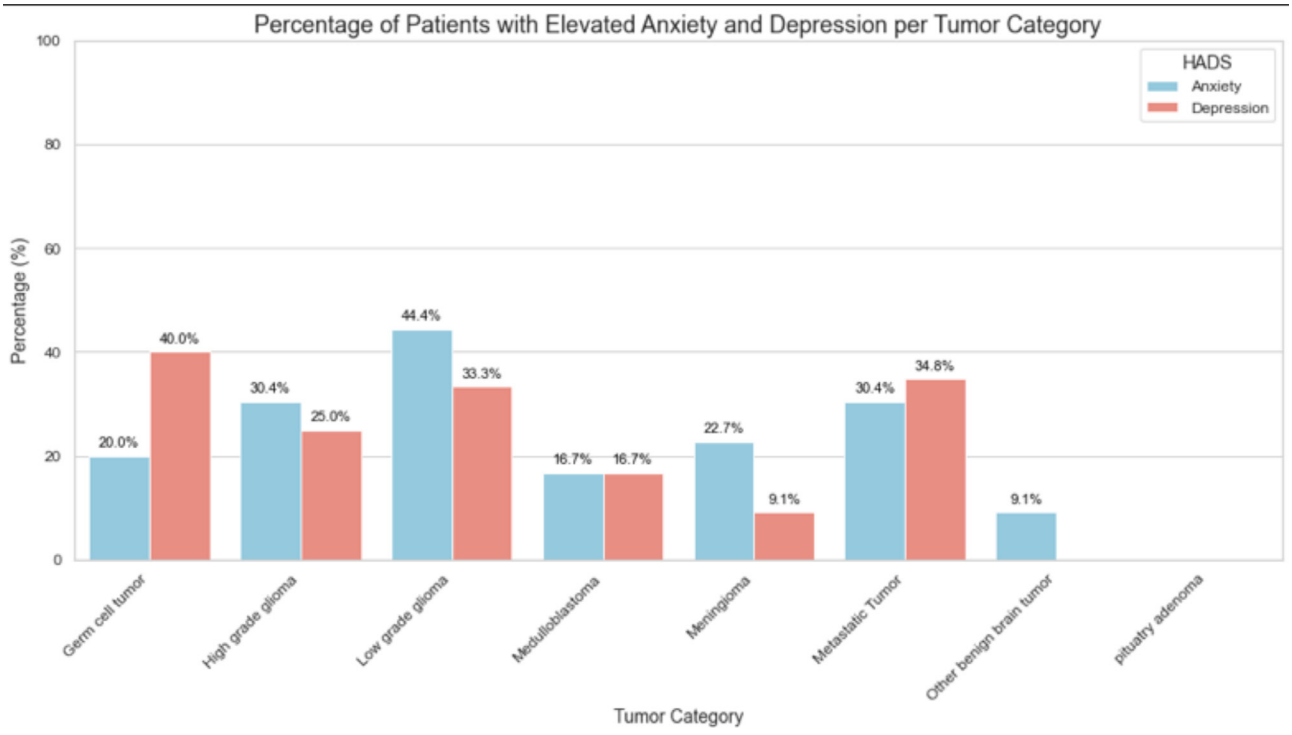

Figure 3 - Percentage of patients with elevated anxiety and depression per tumor category.

patients. The significant *p*-values indicate a strong association between metastatic tumor diagnoses and reduced emotional and social functioning, likely due to the advanced disease stage and poor prognosis typically associated with metastatic cases.

Meningiomas presented a more nuanced profile, showing slight positive correlations with PWB (r=0.143, *p*=0.071) and EWB (r=0.162, *p*=0.041). Notably, the HADS-D score for depression was negatively correlated with meningiomas (r=-0.176, *p*=0.026), suggesting a modest protective effect against severe depressive symptoms compared to more aggressive tumor types. This may reflect the typically slower-growing nature of meningiomas, which could contribute to lower psychological distress.

Other benign brain tumors showed positive correlations across various well-being scores, although statistical significance was not consistently achieved. These findings imply that patients with benign brain tumors may experience relatively better QoL, likely due to their more favorable prognosis and treatment outcomes. However, the psychological impact should not be underestimated, as correlations with HADS-A (anxiety) and HADS-D (depression) scores were still present, though less severe than those seen with high-grade or metastatic tumors

The heatmap provides a visual representation of the correlations between tumor categories and QoL scores, offering an at-a-glance overview of the relationships between different tumor types and continuous well-being measures. Lighter shades indicate weaker correlations, while darker hues signify stronger positive or negative correlations. High-grade gliomas exhibit predominantly negative correlations with all dimensions of well-being, represented by blue hues, highlighting their significant detrimental impact on physical and emotional health. Metastatic tumors similarly display negative associations, particularly with emotional and social well-being, as well as heightened anxiety and depression, underscoring the substantial psychosocial challenges faced by these patients.

In contrast, pituitary adenomas are represented by lighter orange shades, suggesting weak to moderate positive correlations with well-being scores, indicating a less severe impact on overall quality of life. Meningiomas present a mixed profile with both positive and negative associations, reflecting variability in their impact on well-being and psychological outcomes. Tumors such as low-grade gliomas and other benign brain tumors show neutral to weak correlations, suggesting a relatively milder influence on QoL.

This visual representation underscores the nuanced relationship between tumor type and patient well-being, emphasizing that more aggressive and metastatic tumors are associated with poorer QoL, while benign tumors have a less pronounced or even favorable effect.

The box plot of FACTG scores across different tumor groups provides a clear visualization of how the QoL varies among patients with different types of brain tumors. Patients with pituitary adenomas and other benign brain tumors exhibit higher median FACTG scores with narrower interquartile ranges, indicating relatively better and more consistent QoL. In contrast, high-grade gliomas and metastatic tumors show lower median FACTG scores and broader interquartile ranges, reflecting poorer QoL and greater variability within these groups. Meningiomas are associated with a higher median FACTG score, reinforcing their generally more favorable outcomes compared to more aggressive tumor types. Low-grade gliomas and germ cell tumors present moderate median scores with noticeable variability, highlighting the heterogeneity within these categories (**Figure 1**).

This visual representation corroborates the detailed findings from **Tables 2 and 3**, enhancing the understanding of the impact different tumor types have on patient quality of life (**Figure 2**).

The bar chart illustrates the percentage of patients experiencing increase levels of anxiety as well as depression across various tumor categories, as assessed by the Hospital Anxiety and Depression Scale (HADS). In the Hospital Anxiety and Depression Scale (HADS) scoring system, a score of 0–7 indicates normal levels, 8–10 suggests borderline abnormality, and 11–21 reflects abnormal levels. For patients with low-grade gliomas, 44.4% had abnormal anxiety scores of 11-21, meaning that (55.6%) had normal or borderline results of 0-10. Similarly, (33.3%) of these patients had abnormal depression scores, with (66.7%) displaying normal or borderline scores.

Germ cell tumor patients exhibited (40.0%) abnormal anxiety scores, indicating that (60.0%) had normal or borderline results. For depression, (20.0%) were in the abnormal range, with (80.0%) having normal or borderline scores. High-grade gliomas had (30.4%) of patients with abnormal anxiety scores, meaning (69.6%) had normal or borderline scores. For depression, (25.0%) were abnormal, while (75.0%) had normal or borderline scores.

Metastatic tumors showed (30.4%) of patients with abnormal anxiety scores, indicating that (69.6%) had normal or borderline results. For depression, (34.8%) had abnormal scores, leaving (65.2%) with normal or borderline results. Meningiomas had (22.7%) of patients with abnormal anxiety scores, meaning (77.3%) had normal or borderline scores. For depression, (9.1%) were abnormal, with (90.9%) showing normal or borderline results.

Medulloblastoma patients reported (16.7%) with abnormal anxiety scores, meaning (83.3%) had normal or borderline results. For depression, (16.7%) were abnormal, with (83.3%) displaying normal or borderline scores. Other benign brain tumors had (9.1%) of patients with abnormal anxiety scores, indicating that (90.9%) had normal or borderline results. For depression. No cases were reported.

Pituitary adenomas showed (0%) of patients with abnormal anxiety or depression scores, indicating that 100% of these patients had normal or borderline results for both anxiety and depression (**Figure 3**).

Discussion. In this study, we evaluated the QoL, depression, and anxiety following the surgical resection of brain tumors. This study aims to determine whether all brain tumors are associated with poor QoL or if a good QoL can still be achieved following the surgical resection of the tumor. The data underscore the multifaceted impact of tumor type on patient outcomes, highlighting significant variations in physical, emotional, social, and functional aspects of well-being.

The assessment of QoL has become an essential component of clinical trials, often serving as an indicator of disease severity or as an outcome measure.[12]

In the present study, 160 patients met the inclusion criteria. The majority of patients were female and married, having a median age of 48 years. High-grade gliomas, particularly glioblastoma, represent the most frequently diagnosed brain tumors, followed by meningiomas. These findings align with information provided from the Central Brain Tumor Registry of the United States (CBTRUS),[13] supporting the representativeness of the study sample. The distribution of brain tumor grades, as classified by the WHO, offer critical insights into the study population and its implications for patient QoL. In this study, the majority of patients (43.12%) had WHO Grade 4 tumors, which are known to be the most aggressive, associated with poorer prognoses, and linked to significant impacts on QoL. This high representation of Grade 4 tumors, particularly glioblastomas, correlates with the observed lower quality of life scores and increased levels of anxiety and depression reported by this subgroup. The aggressive nature of WHO Grade 4 tumors often necessitates intensive treatment regimens, which can

exacerbate physical and psychological burdens and contribute to these adverse outcomes.

Patients with WHO Grade 1 tumors accounted for (35.62%) of the cohort, indicating a substantial portion of the study population with more benign or less aggressive tumor types. These patients generally have better prognoses, as evidenced by higher QoL scores and lower levels of psychological distress. These findings align with previous research, including a study by Taha, M.S., which similarly reported a higher prevalence of WHO Grade 4 tumors (44.3%), followed by Grade 1 tumors (9.3%).[14] The more favorable outcomes associated with Grade 1 tumors can be attributed to their slower growth rates, lower recurrence risks, and less invasive treatment protocols, which collectively contribute to improved physical and emotional well-being.

This study provides significant insights into how different brain tumor types affect patient well-being. For instance, pituitary adenomas were positively correlated with various aspects of QoL, including PWB, EWB, and SWB. Notably, in this study, patients with pituitary adenomas scored 0 on both the depression and anxiety scales, indicating that these patients can potentially maintain a normal life post-resection.

However, contrasting findings have been reported in other studies. For example, one study demonstrated Individuals with pituitary adenomas exhibited notably lower quality of life (QoL) scores compared to the general population in both physical and psychological domains (p<0.05).[15] It is essential to highlight that the variation between the findings of this study and those of earlier research may be attributed to the timing of QoL assessment. While this study evaluated QoL after surgical resection of the adenoma, the other study assessed it prior to surgery. This difference underscores the importance of considering the timing of assessment when interpreting QoL outcomes in brain tumor patients. Another study done by Page et al found There were no substantial differences in the QoL scores between the pituitary patients and the control subjects.[16]

On the other hand, high-grade gliomas and metastatic tumor showed negative correlations with most QoL measures, including PWB and FWB. This finding is consistent with existing literature that highlights the profound impact of high-grade gliomas, such as glioblastomas, on patient health and QoL.[17-18] The negative correlations emphasize the significant physical and emotional toll these aggressive tumors exert on patients, often due to rapid disease progression and the invasive nature of treatment. Notably, while the correlations with HADS-A (anxiety) and HADS-D (depression) were not statistically significant in all cases, the trend suggests that patients with high-grade gliomas experience substantial psychological challenges that warrant comprehensive mental health interventions.

On the other hand, meningiomas, typically considered less aggressive, showed a mixed profile in this study, with slight positive correlations in PWB and EWB. Interestingly, the negative correlation with HADS-D scores suggests that meningiomas may be associated with lower levels of depression compared to more aggressive tumors, potentially due to their slower growth rate and generally favorable treatment outcomes. In our study, the majority of meningioma patients reported feeling happy and having a good quality of life post-surgery.

This finding contrasts with several studies that have reported ongoing limitations in quality of life for meningioma patients even after surgical resection, particularly in cognitive, emotional, and social functioning.[19-20] One possible reason for this difference is the timing of the QoL assessment. Our study assessed patients after they had undergone surgery and potentially completed their recovery, which may have contributed to their positive self-reported outcomes. Additionally, the comprehensive postoperative care and support provided to patients in this study may have contributed to better psychological outcomes compared to other studies where such support might have been limited or varied.

Moreover, the histopathology grade and location of the tumor could also explain the differences observed. Higher-grade meningiomas or those located in areas affecting critical brain functions may lead to more significant postoperative impairments and limitations in QoL. In our study most of the meningioma were WHO category 1 .

Cultural and regional differences in patient resilience, social support systems, and healthcare practices could also play a role in explaining these discrepancies

Low-grade gliomas demonstrated moderate correlations with QoL scores, reflecting their chronic nature and the uncertainty associated with potential progression. Although low-grade gliomas are less aggressive than high-grade gliomas, this study found that patients with low-grade gliomas reported greater levels of anxiety and depression compared to those with high-grade gliomas and metastatic tumors. This outcome may initially seem counterintuitive, as high-grade gliomas are associated with poorer overall QoL due to their aggressive nature and rapid progression. The necessity for thorough mental health evaluations and psychiatric referrals is highlighted by the increased psychiatric burden in patients with low-grade gliomas.

To provide comprehensive treatment and enhance overall quality of life, it is imperative that psychological distress in these patients be addressed. Both mental and physical health can be enhanced by psychiatric referrals for counseling, cognitive-behavioral therapy (CBT), and, if required, pharmaceutical treatment.

A separate investigation demonstrated that depression and a decline in QoL in patients with low-grade gliomas are associated with reduced long-term survival.[21]

One possible explanation for the higher anxiety and depression scores in patients with low-grade gliomas is the prolonged disease trajectory and the persistent uncertainty regarding tumor progression. Unlike high-grade gliomas, which often have a more predictable and severe course with limited survival time, low-grade gliomas present a chronic condition where patients live with the ongoing fear of transformation into a more aggressive form or recurrence over many years. Additionally, in our study, many patients with low-grade gliomas were younger, which may further explain the heightened anxiety and depression levels observed. Younger patients may experience greater psychological impact due to concerns about long-term implications on their life plans, career, and family responsibilities. This age-related factor aligns with findings in previous research, which indicate that younger patients often report higher emotional distress when faced with chronic or life-altering health conditions.[22]

Additionally, patients with high-grade gliomas may receive more comprehensive palliative and psychological support due to the recognized severity of their condition, potentially mitigating the reported levels of anxiety and depression compared to those with lower-grade tumors.

Another important factor that may influence psychological outcomes and quality of life in brain tumor patients is the anatomical location of the tumor. While our study focused on tumor type and histopathological grade, tumor location—particularly in eloquent regions such as the frontal lobe, temporal lobe, or areas responsible for speech, vision, and motor function—can profoundly affect cognitive and emotional functioning. Lesions in these regions may result in language difficulties, behavioral changes, memory deficits, or motor impairments, all of which can contribute to increased anxiety, depression, and decreased quality of life. Although we did not analyze anatomical location in the current study due to time and data constraints, we recommend that future research incorporates tumor localization as a variable, as it may provide deeper insight into the neuropsychological burden faced by this population.

The importance of tailoring post-surgical care plans that focus on psychological support cannot be overstated for all brain tumor patients, regardless of tumor type. Brain tumors, whether aggressive or more benign, can lead to significant psychological distress due to the inherent uncertainty, potential for recurrence, and the profound life changes they bring.

It is crucial to develop individualized care plans that address both the physical and psychological needs of brain tumor patients after surgery. Comprehensive psychological support, including counseling, cognitive-behavioral therapy, and consistent mental health monitoring, can help alleviate the emotional burden these patients face.

Integrating a multidisciplinary approach that includes oncologists, Neurosurgeon, psychologists, and social workers is essential to ensure that the psychological well-being of patients is prioritized alongside their physical recovery.

Overall, these findings underscore the necessity of personalized care strategies that address the unique challenges posed by different brain tumor types. High-grade glioma and metastatic tumor patients, who face lower QoL and higher psychological distress, would benefit from integrative care that includes mental health resources and physical rehabilitation. In contrast, patients with less aggressive tumors, such as pituitary adenomas or meningiomas, may require tailored support to maintain their QoL post-treatment. This study reinforces the need for a comprehensive, multidimensional approach to care that prioritizes both physical and psychological well-being in brain tumor patients.

Limitation. This study's cross-sectional design restricts the capacity to establish causal links between tumor type and QoL outcomes. Conducting longitudinal studies is suggested to monitor QoL changes over time and explore how treatment and disease progression affect patient well-being. Additionally, future research should aim to include multi-center data to improve generalizability.

Moreover, this study did not adjust for several potentially confounding variables that may significantly impact quality of life and psychological well-being, such as socioeconomic status, neurocognitive deficits, post-surgical complications, and disability (e.g., blindness or hemiparesis). Future research should aim to incorporate these variables to provide a more comprehensive and accurate understanding of patient experiences following brain tumor surgery.

Conclusion. The present study underscores the substantial influence of tumor type on the QoL and psychological well-being of patients with brain tumors.

High grade glioma were the most common type of brain tumor followed by meningioma. High-grade gliomas and metastatic tumors were associated with the poorest quality of life, while Low grade glioma showed more anxiety and depression score. Interestingly in this study Patients with meningiomas and pituitary adenomas exhibited better QoL outcomes, pointing to the potential benefits of continuous monitoring and supportive care.

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