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MENTAL HEALTH OUTCOMES IN PAKISTANI ADULTS DIAGNOSED WITH BRAIN CANCER: A QUANTITATIVE ANALYSIS

Original Article

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ABSTRACT

Background: Psychological distress is a frequent but underrecognized complication in patients with life-threatening illnesses. While depression, anxiety, and stress are well-documented among cancer patients globally, limited data exist from low- and middle-income countries like Pakistan, particularly concerning individuals diagnosed with brain cancer. Understanding the mental health profile of this population is essential for developing integrated care strategies that address both physical and emotional well-being.

Objective: This study aimed to examine the prevalence and interrelationship of depression, anxiety, and stress among adults diagnosed with brain cancer in Pakistan and to explore gender-based differences in psychological outcomes.

Methods: A cross-sectional correlational design was employed, enrolling 100 adult patients aged 18 to 60 years with a confirmed diagnosis of brain cancer. Participants were recruited using stratified sampling from neurology and oncology departments of hospitals in Lahore, Karachi, Gujranwala, Islamabad, and Multan. Mental health outcomes were assessed using the Depression Anxiety Stress Scale (DASS-21), a validated 21-item self-report measure. Data analysis was conducted using SPSS version 29, applying Pearson correlation and independent samples t-tests.

Results: The mean age of participants was 37.81 years (SD = 11.24), with 57% men and 43% women. Strong positive correlations were found among depression, anxiety, and stress: depression with anxiety ($r = .34$, $p < .01$), depression with stress ($r = .97$, $p < .01$), and anxiety with stress ($r = .35$, $p < .01$). Gender-based comparisons showed no significant differences across depression ($p = .85$), anxiety ($p = .52$), or stress ($p = .64$), although mean scores were slightly higher in women.

Conclusion: The findings underscore the significant psychological burden faced by brain cancer patients in Pakistan. These results support the urgent need to incorporate mental health services into routine oncology care and advocate for awareness campaigns aimed at destigmatizing psychological support in cancer settings.

Keywords: Anxiety, Brain Neoplasms, Depression, DASS-21, Oncology, Psychological Stress, Quality of Life.

Psychological Distress in Brain Cancer Patients

Background

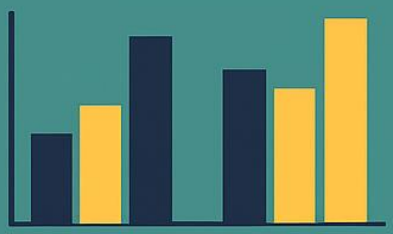
Depression, **anxiety**, and **stress** are common in brain cancer patients, but data from Pakistan are limited

Methods

Cross-sectional study of 100 adults aged 18–60 with brain cancer in Pakistan

Depression Anxiety Stress Scale -2 (DASS-21)

Results



- Depression, anxicty, and stress were positively correlated
- No significant gender differences in mental health outcomes

Anxiety | Stress

Conclusion

Findings emphasize the need for mental health services in oncology care

INTRODUCTION

Brain cancer encompasses both primary tumors originating within the brain and secondary (metastatic) tumors that spread from malignancies in other organs. These tumors may be either benign, which are typically slow-growing and non-invasive, or malignant, characterized by aggressive growth and tissue infiltration. Clinically, brain tumors often present with a constellation of symptoms including persistent headaches, seizures, motor weakness, personality and cognitive changes, visual disturbances, balance impairment, and nausea. Diagnosis commonly involves comprehensive neurological assessments and neuroimaging techniques such as magnetic resonance imaging (MRI), computed tomography (CT), positron emission tomography (PET), and single-photon emission computed tomography (SPECT). In certain cases, lumbar punctures are used to evaluate cerebrospinal fluid. Treatment is individualized based on tumor histology, size, anatomical location, and molecular features, and may involve surgical resection, radiotherapy, chemotherapy, or palliative interventions aimed at symptom relief. A multidisciplinary team—comprising neurologists, neurosurgeons, oncologists, specialized nurses, and allied healthcare professionals—plays a crucial role in managing these complex cases. Despite advancements in diagnosis and therapy, outcomes vary significantly depending on the tumor's biological behavior and the patient's overall condition. There are currently no established national screening or prevention programs, making early symptom recognition and supportive care essential for optimizing quality of life (1–3).

While the physiological burden of brain tumors is well acknowledged, their psychological impact is often underappreciated, particularly in resource-limited settings. Depression, anxiety, and stress are among the most common psychiatric conditions observed in patients diagnosed with brain cancer. Depression is a mood disorder marked by prolonged periods of sadness, hopelessness, altered appetite, disturbed sleep, diminished interest in activities, and impaired decision-making, often interfering with daily functioning (4). Stress, although a normal physiological response to perceived challenges, becomes detrimental when persistent, leading to symptoms such as fatigue, headaches, gastrointestinal disturbances, muscle tension, lowered immunity, mood fluctuations, and maladaptive coping behaviors like substance misuse or social withdrawal (5). Anxiety disorders are similarly prevalent and are characterized by excessive worry, restlessness, palpitations, dizziness, and avoidance behaviors, all of which can significantly hinder recovery if left untreated (6). Brain cancer patients are particularly susceptible to these mental health challenges due to both biological factors—such as tumor effects on brain structures regulating emotion—and psychosocial stressors related to diagnosis, uncertainty about prognosis, and the debilitating nature of treatment. However, psychiatric symptoms in this population are frequently underrecognized and undertreated, despite the availability of screening tools and interventions. Integration of palliative care and psychological support from the time of diagnosis is therefore recommended to address this unmet need and improve overall care (7).

A Research highlighted that, female patients, those with lower-grade tumors, limited education, or a history of psychiatric illness were more likely to exhibit symptoms of anxiety and depression, underscoring the role of demographic and clinical variables (8). A prospective assessment, found significant mood disturbances prior to neurosurgery in patients with solitary intracranial tumors, with improvement postoperatively—indicating both the psychological impact of the tumor and the therapeutic potential of surgical intervention (9). Another study emphasized that, anxiety—rather than depression—is the predominant mood disturbance in cancer survivors, affecting both patients and their spouses, which highlights the need for routine anxiety screening (10). Similarly, a study demonstrated that, long-term survivors of childhood brain cancer experience elevated psychological distress, influenced more by sociodemographic disadvantages than by treatment variables, suggesting the importance of comprehensive psychosocial rehabilitation strategies (11). Despite the growing body of literature globally, there remains a notable scarcity of research addressing the mental health implications of brain cancer within the Pakistani sociocultural framework. Cultural perceptions, healthcare disparities, and limited mental health infrastructure may further complicate timely diagnosis and treatment of psychiatric comorbidities in this population. This study aims to investigate the associations between depression, anxiety, and stress among brain cancer patients in Pakistan, with the objective of identifying context-specific challenges and informing culturally appropriate clinical practices.

METHODS

This study adopted a cross-sectional correlational design to assess the relationship between depression, anxiety, and stress among individuals diagnosed with brain cancer. A total of 100 participants, aged between 18 and 60 years, were recruited from neurology and oncology departments of both private and public tertiary care hospitals located in Lahore, Karachi, Gujranwala, Islamabad, and Multan. Stratified sampling was employed to ensure representation across different hospital settings and demographic backgrounds. Participants were required to have a confirmed diagnosis of brain cancer, verified through medical records, and a minimum educational level of intermediate (12th grade) to ensure adequate comprehension of the study questionnaire. Patients with severe cognitive impairment,

unstable medical conditions, or critical illness that could interfere with their ability to provide informed responses were excluded to maintain the validity of the data. Data collection involved the use of the Depression Anxiety Stress Scale-21 (DASS-21), a widely validated self-report instrument designed to measure the severity of core symptoms associated with depression, anxiety, and stress. The tool consists of 21 items, with each item scored on a four-point Likert scale ranging from 0 ("Did not apply to me at all") to 3 ("Applied to me very much or most of the time"), producing subscale scores for each domain. The DASS-21 has demonstrated strong psychometric properties, including internal consistency coefficients of 0.88 for depression, 0.82 for anxiety, and 0.90 for stress (12). Participants completed the questionnaire in a quiet, private hospital setting, with the average completion time being approximately 20 minutes. The presence of a trained research assistant ensured that participants could seek clarification if needed, thereby minimizing potential misinterpretation of items.

Ethical approval was obtained from the Institutional Review Board (IRB) of the corresponding research-affiliated institution, and formal permission was granted by the original authors for the use of DASS-21. All participants were thoroughly briefed on the study's purpose, procedures, and voluntary nature. Written informed consent was obtained before participation, with assurance of confidentiality and the right to withdraw from the study at any stage without any repercussions. Data were analyzed using IBM SPSS Statistics for Windows, Version 29. Descriptive statistics were computed to summarize demographic and clinical characteristics. Pearson's correlation coefficient was used to examine associations among depression, anxiety, and stress scores. Additional subgroup analyses were conducted based on relevant demographic variables, where applicable. All statistical tests were performed at a significance level of $p < 0.05$.

RESULTS

The analysis included data from 100 participants with a mean age of 37.81 years (SD = 11.24). Of these, 57% were men and 43% were women. Regarding socioeconomic background, 58% of participants were from the lower class, 23% belonged to the middle class, and 19% were categorized as upper class. A Pearson correlation analysis revealed significant positive associations among the study variables. Depression was moderately correlated with anxiety ($r = .34$, $p < .01$) and strongly correlated with stress ($r = .97$, $p < .01$). Additionally, anxiety was significantly associated with stress ($r = .35$, $p < .01$), indicating that increases in one domain of psychological distress were consistently linked with elevations in the others. Independent sample t-tests were conducted to explore gender-based differences in depression, anxiety, and stress levels. The mean depression score for men was 10.03 (SD = 5.24), while for women it was slightly higher at 10.23 (SD = 5.14), though the difference was not statistically significant ($t(98) = -0.18$, $p = .85$, Cohen's $d = -0.03$). Similarly, anxiety scores were 5.38 (SD = 4.14) for men and 5.90 (SD = 3.92) for women, with no significant difference observed ($t(98) = -0.67$, $p = .52$, Cohen's $d = -0.12$). Stress scores also showed a non-significant difference, with men scoring 9.73 (SD = 5.42) and women scoring 10.23 (SD = 5.14) ($t(98) = -0.46$, $p = .64$, Cohen's $d = -0.09$).

Although female participants exhibited slightly higher mean scores across all three psychological domains, none of these differences reached statistical significance. Further subgroup analysis revealed notable variations in psychological distress based on age groups, socioeconomic status, and tumor type. Participants aged 31–45 years exhibited the highest levels of depression (M = 10.8, SD = 4.9), anxiety (M = 6.1, SD = 4.0), and stress (M = 10.6, SD = 5.5) compared to those in the 18–30 and 46–60 age brackets. Regarding socioeconomic status, individuals from the lower class demonstrated slightly elevated mean scores for depression (M = 10.4, SD = 5.2), anxiety (M = 5.9, SD = 3.9), and stress (M = 10.4, SD = 5.3), compared to their middle- and upper-class counterparts. In terms of clinical characteristics, patients diagnosed with primary brain tumors showed higher mean scores across depression (M = 10.5, SD = 5.2), anxiety (M = 5.8, SD = 4.0), and stress (M = 10.5, SD = 5.3) than those with metastatic tumors. Although these subgroup differences were not tested for statistical significance due to limited sample stratification, they suggest potential demographic and clinical trends that warrant further investigation in larger samples.

Table 1 Characteristics of the Participants (N=100)

	Frequency	Percentage	M	SD
Age			37.81	11.24
Gender				
Men	57	94		
Women	43	46		
Socioeconomic Status				
Lower Class	58	58		

Middle Class	23	23
Upper Class	19	19

Table 2 Correlational Matrix Showing Relationships Among Depression, Anxiety, and Stress in Brain Cancer Patients (N = 100)

Variables	Depression	Anxiety	Stress
Depression	-	.34**	.97**
Anxiety		-	.35**
Stress			-

Note: p < .01 (2-tailed)

Table 3 Gender-Based Comparison of Depression, Anxiety, and Stress Scores Among Brain Cancer Patients (N = 100)

	Men(n=57)		Women(n=43)				
	M ± SD		*M ± SD*		*t(98)*	*P*	Cohen's d
Depression	10.03	5.24	10.23	5.14	-.18	.85	-.03
Anxiety	5.38	4.14	5.90	3.92	-.67	.52	-.12
Stress	9.73	5.42	10.23	5.14	-.46	.64	-.09

Table 4 Subgroup Analysis by Age Group

Age Group	Depression (M ± SD)	Anxiety (M ± SD)	Stress (M ± SD)
18–30	9.5 ± 5.1	5.0 ± 3.8	9.2 ± 4.7
31–45	10.8 ± 4.9	6.1 ± 4.0	10.6 ± 5.5
46–60	10.2 ± 5.3	5.6 ± 4.3	10.0 ± 5.3

Table 5 Subgroup Analysis by Socioeconomic Status

Socioeconomic Status	Depression (M ± SD)	Anxiety (M ± SD)	Stress (M ± SD)
Lower Class	10.4 ± 5.2	5.9 ± 3.9	10.4 ± 5.3
Middle Class	9.8 ± 5.1	5.4 ± 4.1	9.8 ± 5.0
Upper Class	9.7 ± 5.3	5.1 ± 4.2	9.3 ± 5.1

Table 6 Subgroup Analysis by Tumor Type

Tumor Type	Depression (M ± SD)	Anxiety (M ± SD)	Stress (M ± SD)
Primary Tumor	10.5 ± 5.2	5.8 ± 4.0	10.5 ± 5.3
Metastatic Tumor	9.6 ± 5.0	5.2 ± 4.2	9.5 ± 5.1

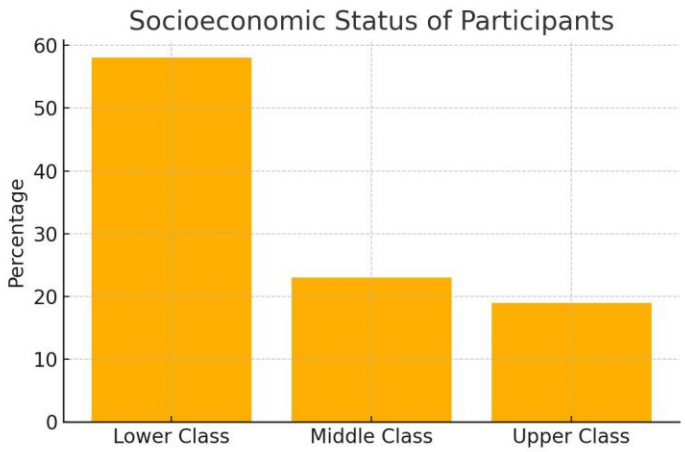


Figure 1 Socioeconomic Status of Participants

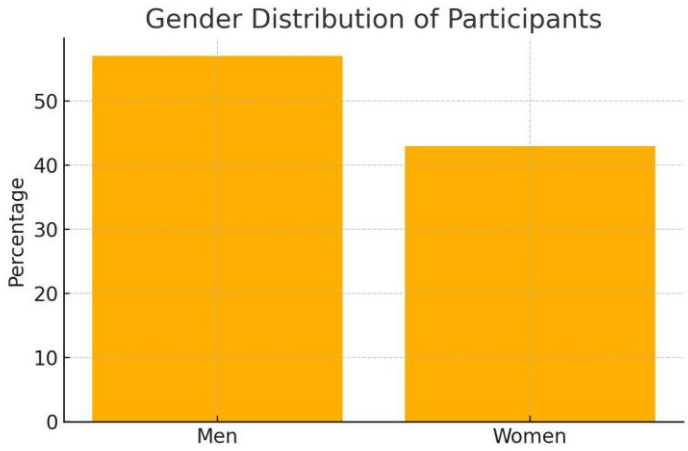


Figure 2 Gender Distribution of Participants

DISCUSSION

The present study confirmed that depression, anxiety, and stress are significantly interrelated psychological outcomes among adults diagnosed with brain cancer. These findings resonate with earlier research that has consistently demonstrated the psychological vulnerability of brain tumor patients, which arises both from the neuropsychiatric consequences of tumor pathology and the psychological toll of confronting a life-threatening illness (13). Despite the availability of validated screening tools and clinical guidelines, mental health conditions in this population often remain underdiagnosed, particularly in low-resource healthcare systems where psychiatric services are scarce and mental health literacy is limited. Within the Pakistani context, this issue is further compounded by entrenched cultural stigma and inadequate awareness surrounding psychological well-being. Most participants in the current sample belonged to lower socioeconomic strata, a factor strongly associated with increased psychological distress and diminished access to mental health care. Socioeconomic disadvantage has been consistently linked to higher mental health burden, poorer health outcomes, and reduced utilization of psychological services (14,15). Additionally, prior studies have identified predictors of psychiatric morbidity in brain cancer patients such as female gender, lower education, and a history of mental illness—factors particularly prevalent and impactful in Pakistani society, where structural gender inequality and health illiteracy persist (16,17).

Interestingly, while no statistically significant gender differences were observed in mean levels of depression, anxiety, and stress, women reported slightly higher scores across all domains. This observation may reflect the sociocultural dynamics of a male-dominated society in which women often face systemic barriers, restricted autonomy, and increased caregiving responsibilities, all of which contribute to heightened psychological burden (18). Such findings contrast with studies conducted in other regions where men reported greater functional impairments and fewer social resources, suggesting that cultural and societal frameworks significantly influence psychological responses to illness (19-21). The study's subgroup analyses further highlighted that, individuals aged 31–45 years and those with primary tumors demonstrated higher distress levels, potentially due to the dual pressures of disease and mid-life responsibilities. Similarly, participants from the lower socioeconomic class reported more pronounced symptoms, emphasizing the need for equitable and accessible psychological support across different sociodemographic backgrounds. While these trends were not subjected to inferential statistical testing due to the sample's stratification limitations, they offer meaningful insights into potential at-risk subpopulations.

The implications of these findings are far-reaching. Integrating psychological screening and interventions into routine oncology care could greatly enhance patient outcomes. Mental health professionals have a crucial role in providing psychoeducation, early symptom identification, and culturally sensitive interventions. The involvement of governmental bodies, healthcare institutions, and media is also critical in deconstructing stigma and establishing accessible, community-level mental health support systems. These structural changes are essential to address the psychological dimensions of cancer care in a context where they are routinely neglected. Despite its contributions, the study had notable limitations. Its cross-sectional nature precluded causal interpretations, and the use of self-reported instruments may have introduced bias due to social desirability or emotional underreporting. Additionally, the sample was regionally limited and did not incorporate moderating variables such as treatment phase, disease severity, or psychiatric history, all of which could

influence mental health outcomes. Future studies should employ longitudinal designs to examine psychological trajectories over time and include broader samples that reflect Pakistan's geographic and cultural diversity. Nonetheless, the study's strengths lie in its timely focus on a clinically overlooked population and its attempt to bridge the psychological care gap in oncology within a low-resource setting. Incorporating mental health professionals into multidisciplinary oncology teams and promoting awareness among patients, families, and providers can foster early intervention and improve quality of life. Policy-level changes are equally imperative, ensuring that mental health care is not a luxury but a standard component of cancer management—adequately funded, insured, and universally accessible.

CONCLUSION

This study adds meaningful insight to the limited research on the psychological health of adults living with brain cancer in Pakistan. By establishing strong associations among depression, anxiety, and stress, it emphasizes the considerable emotional toll experienced by this patient group. Although gender differences were not significant, the findings reinforce the urgent need to embed mental health care within standard oncology practices. Addressing psychological distress should be a shared responsibility among healthcare providers, mental health specialists, and policymakers to ensure holistic, compassionate, and effective cancer care that genuinely improves patients' quality of life.

Author Contribution

Author	Contribution
Mashiat Zahra	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Muhammad Fahad Munir	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Awais Khalid	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Bashir Ahmed	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Marium Zafar Arain	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Sadia Fazal	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Ahmed Javed	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Asim Ashfaq	Writing - Review & Editing, Assistance with Data Curation

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