

Psychological and Socioeconomic Impact of Benign and Malignant Brain Tumors in a Low-Resource Setting

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ABSTRACT

Background: Brain tumors, whether benign or malignant, can impose substantial psychological distress and socioeconomic burden, particularly in low-resource healthcare settings.

Objective: To evaluate the cognitive, emotional, and socioeconomic burden of benign and malignant brain tumors in a resource-limited setting, with the aim of informing interventions to improve patient quality of life.

Methods: The prospective cross-sectional study was carried out at two public tertiary hospitals of Lahore, Pakistan between September, 2024 and March, 2025. Structured questionnaires that measured mental strain, cognitive difficulties, life outlook, and financial burden were used to interview patients who had one or more primary brain tumors and were in the treatment process (19 years and above). Sociodemographic and clinical measures were captured. Findings were summarized using descriptive statistics.

Results: It involved 48 patients with a mean age of 38.1 ± 16.2 years; 29 (60.4) were males. There were 31 cases of benign tumors (64.6%), and 17 cases of malignant tumors (35.4). Most patients (56.3%) described that their views about life changed significantly and 25% of patients had an outlook of anxiety on a daily basis and 29.2% on a worrying daily basis. There was mild cognitive impairment (33.3%), and severe impairment in concentration (12.5%). The financial burden was huge with 45.8 reporting a very high burden. Psychosocial and financial stress was quite significant among both the patients with benign and malignant tumors.

Conclusion: Regardless of tumor histology, brain tumors present patients with severe cognitive, emotional, and financial burdens. In resource constrained environments, mental health support coupled with cognitive rehabilitation and financial counseling should become a part of regular care to enhance the quality of life and adherence to treatment.

Keywords: Brain tumors; Cognitive burden; Emotional distress; Socioeconomic impact; Resource-limited settings

INTRODUCTION

Brain tumors, both benign and malignant, are placing an unimaginable burden on the sufferers, going far beyond the physical morbidity to experiencing cognitive impairment, distress, and socioeconomic disruption¹⁻⁴. In the world, the rate of primary brain tumor steadily increases due to the development of diagnostic tools and the aging of populations, but their psychosocial effects have not gained due attention, especially in low-and-middle-income countries (LMICs)⁵⁻⁷. The non-physical effects of brain tumors might be quite acute in resource-restricted environments, in which access to specialized care and psychosocial support is constrained⁸⁻¹⁰.

Common sequelae of brain tumors include cognitive and emotional disturbance as they are caused directly by tumors, neurotoxicity caused by treatment, and responses to diagnosis¹¹⁻¹⁴. Anxiety, depression, disrupted concentration, and distorted self-perception are common conditions among patients and all of them compromise quality of life and functional independence significantly. These issues do not only occur with malignant tumors; patients with benign brain tumors should be subjected to similar cases of psychological distress because of uncertainty, chronic stress, and fear of progression or recurrence¹⁵.

Heavy and unpredictable nature of the disease course tends to aggravate the emotional shock of a brain tumor diagnosis¹⁶⁻¹⁹. The existing literature in the developed countries has shown that a proportion of 50 percent of brain tumor patients report clinically significant anxiety or depressive symptoms throughout the course of the disease²⁰. Cognitive impairments, especially attention, memory and executive function problems, even worsen the working capabilities, social interactions, and even treatment

compliance of patients. These conditions are strongly associated with poor health-related quality of life and heavier caregiver burden.

In LMIC countries like Pakistan, systemic healthcare constraints and social cultures²¹ add to the psychological burden of brain tumors. Mental illnesses are still strongly stigmatized, underdiagnosed, and untreated. Majority of patients are deprived of emotional assistance due to little availability of trained mental health professionals and emphasis on physical treatment instead of psychosocial treatment. Consequently, psychosomatic distress is usually left unattended, although it significantly influences the treatment outcomes and general well-being²².

Another important, though scarcely studied, aspect of the morbidity of brain tumors in resource-poor environments is socioeconomic burden. Financial toxicity is caused by direct medical costs, travelling, loss of income, and long-term disability, which has been reported as an independent predictor of poor health outcomes among oncology patients.²⁴ In nation where no comprehensive health insurance is provided, the most devastating health spending may lead to the impoverishment of the family, leading to increased psychological burden and diminishing adherence to therapy²³.

Although a number of studies have been conducted in high-income environments about the quality-of-life outcomes in brain tumor patients, there is limited evidence on the South Asian region²⁴. Current studies on the region are tending to concentrate on clinical outcomes of survival and recurrence only with less emphasis on cognitive, emotional and financial aspects^{25,26}. Additionally, not many studies have been able to draw comparison between the psychosocial consequences of benign and malignant brain tumors even though these two types of tumors have been shown to cause severe distress²⁷.

In light of the above omissions, there is an urgent requirement of context-based studies that can understand the multidimensional burden of brain tumors in low-resource settings. The lived experience of patients is crucial in creating comprehensive care models to achieve disease management, mental health, and socioeconomic resilience. As such, this research will assess the cognitive, emotional, and economic burden of benign and malignant brain tumor patients in a low resource environment, as

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well as the aim of informing patient centred intervention and ensuring a better quality of life.

METHODOLOGY

The study is a prospective cross-sectional study that was carried out at two tertiary level government hospitals in Lahore, Pakistan. Data were collected in six weeks between September, 2024 and March, 2025 based on the activities of ordinary clinical practices in resource-based agendas.

The inclusion criteria entailed patients aged 19 years and above with a confirmed diagnosis of one or more primary intracranial solid tumors benign or malignant, who were currently under medical/surgical care. The patients not included in the study were those with severe cognitive impairment, changed consciousness, and reluctance to participate. Sampling was conducted using a consecutive approach where the participants were recruited during the outpatient visits and inpatient admissions.

Psychological and emotional burden was measured by using structured interviewer-administered questionnaires designed to measure, mental strain, emotional distress, concentration problems, perceived life changes and financial burden associated with the illness. The interviews have been held in a serene clinical environment to ensure that the participants are comfortable and that their privacy is not compromised. Sociodemographic factors such as age, sexual orientation, type of tumor, and treatment were also noted.

All the data collected was inputted in a standardized data collection form and the data analysed descriptively through statistical methods. Continuous variables were summarized as means and standard deviations whereas categorical variables were summarized as frequency and percentages. Analytical workflow Data analysis was conducted based on an artificial intelligence-assisted analytical workflow (ChatGPT, OpenAI). The investigators independently verified all the outputs to guarantee the data integrity and the accuracy of the analysis. Results were studied to understand the socioeconomic and psychological outcomes of brain tumors in a low-resource health facility setting.

RESULTS

The patients analyzed were 48 with primary brain tumors. The age of the respondents was 38.1 ± 16.2 years (19 to 67 years). Two-thirds of the population of the study 29 (60.4) were male with 19 (39.6) being female. The most common one was benign tumors, which included 31 cases (64.6%), and 17 patients (35.4%) had malignant brain tumors.

Table 1: Demographic and Clinical Characteristics of Participants (n = 48)

Variable	Frequency (%)
Mean Age (years)	38.1 ± 16.2
Male	29 (60.4%)
Female	19 (39.6%)
Benign Tumors	31 (64.6%)
Malignant Tumors	17 (35.4%)

Evaluation of the patient perceptions showed that 27 respondents (56.3) indicated that they had changed their perception of life dramatically upon diagnosis. The number of patients who reported a partial change was 9 (18.8%), whereas 10 (20.8) individuals reported no change in their outlook. The other 2 participants (4.1 percent) had no idea what change was perceived by them.

Table 2: Perceived Impact of Brain Tumor on Outlook toward Life

Response	Frequency (%)
Significant Change	27 (56.3%)
Somewhat Changed	9 (18.8%)
No Change	10 (20.8%)
Unsure	2 (4.1%)

On the issue of emotional distress, 12 patients (25.0) said they experienced nervousness or anxiety on a daily basis, and 14 patients (29.2) said they experienced worrying on a daily basis. Cognitive test revealed that 23 participants (47.9) could maintain normal focus, and 16 (33.3) had some occasional problems. 3 patients (6.3%) reported severe concentration impairment, and 6 patients (12.5%) could not perform such activities as reading or watching television.

Table 3: Emotional and Cognitive Difficulties Among Participants

Parameter	Frequency (%)
Daily Anxiety/Nervousness	12 (25.0%)
Daily Worries	14 (29.2%)
Normal Concentration	23 (47.9%)
Some Difficulty Concentrating	16 (33.3%)
Unable to Concentrate	3 (6.3%)
Unable to Focus on Activities	6 (12.5%)

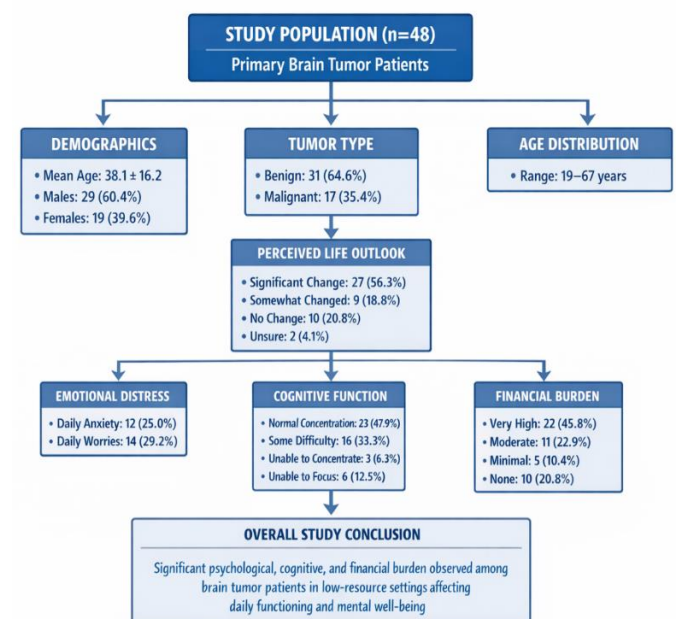
Commonly reported was financial strain. Twenty-two patients (45.8 percent) perceived a very high financial burden and 11 patients (22.9 percent) a moderate financial burden. 5 participants (10.4%), and 10 patients (20.8) reported minimal (also no) financial impact and no financial burden respectively with regards to their illness.

Table 4: Perceived Financial Burden of Brain Tumor Diagnosis

Financial Impact	Frequency (%)
Very High Burden	22 (45.8%)
Somewhat High Burden	11 (22.9%)
Minimal Burden	5 (10.4%)
No Burden	10 (20.8%)

On the whole, the results indicate a significant psychological, cognitive, and financial load on patients with brain tumors in a low-resource environment, and significant effects on mental health and normal functioning.

Figure 1: A Hierarchical Summary of Patient Characteristics and Perceived Impacts of Brain Tumors is Illustrated



DISCUSSION

This paper shows that patients with brain tumors in a low-resource context have a significant psychological, cognitive, and socioeconomic load, which prompts the necessity to focus on delivering patient-centered care that goes beyond tumor-based therapy. The results prove that both benign and malignant brain tumors can have a strong influence on the emotional well-being of

patients, their cognitive functioning, and financial stability, which supports the idea that the histology of tumors by itself cannot influence psychosocial outcomes^{16,22}.

Over fifty percent of the respondents indicated that their attitude towards life had significantly changed after being diagnosed, which indicates the high existential distress levels that accompany brain tumors¹⁷. This is consistent with other research findings that show that brain tumor diagnosis can be viewed as life altering regardless of the prognosis. The lack of awareness of disease progression, treatment and recovered functions probably adds to emotional weakness.

A significant percentage of the patients stated that they experienced chronic anxiety and daily concerns, which were in line with the international literature that found out that anxiety was one of the most common mental symptoms among patients with brain tumors^{1,2}. In low resources conditions, limited access to psychological counseling and psychometric services could also increase emotional distress. Mental illness cultural stigma can also depress patients to seek assistance and therefore lead to poor recognition and treatment of psychological arrangements²².

Another serious problem that appeared in this cohort was cognitive impairment. Almost fifty percent of the patients had problems with concentration, with only mild impairment to being simply unable to engage in routine tasks. The results are similar to neuro-oncology studies pointing out that cognitive impairment is prevalent even in patients with benign tumors and can be long term^{11,14}. The impact of cognitive deficit can have significant influence on employability, social participation, and independence, increasing emotional and financial stress.

The quality of financial strain was mentioned by most participants, with almost half of them feeling the cost of sickness to be daunting. The observation represents the larger issue of financial toxicity in cancer care, especially in LMICs with the out-of-pocket payment playing a significant role in healthcare funding^{25,27}. The financial burden that comes with prolonged care, travelling to tertiary care facilities and loss of work can further intensify the psychological distress and adversely affect the treatment compliance and result.

Vitally, the burden was not limited to patients with malignant tumors. Patients experience a similar degree of emotional and monetary stress when having benign brain tumors, indicating the inefficiency of the term benign to define tumors in the view of psychosocial stress¹⁶. This reinforces emerging evidence that benign brain tumors may have long term effects on quality of life like malignant disease.

This study highlights the necessity to include mental health screening, psychosocial support, and financial counseling as part of every case of neuro-oncology, especially in facilities where such

services are limited²². Even basic interventions like distress screening tools, referral pathways to mental health services, and social welfare support can significantly help to improve patient outcomes^{5,9}.

Although the study shows useful information, it is cross-sectional, and causal inferences cannot be made; the sample size could restrict the ability to generalize. However, it also provides valuable real-life data on a context where such data is often lacking.

To sum up, the neurological impairment is only one of the many dimensions of brain tumor burden. Considering the psychological and socioeconomic concerns of patients, in addition to physical treatment, is crucial to enhancing the quality of life and reaching an important level of comprehensive neuro-oncological care.

CONCLUSION

This paper shows that brain tumor patients are greatly affected in terms of sudden cognitive, emotional, and financial alterations regardless of the benign or malignant nature of the tumor. The multidimensional effect of the disease is highlighted by psychological distress, daily anxiety, changed life perspective, lack of concentration, and extreme financial burden. The implications of these findings mean that in low-resource environments, where mental health services are not well-provided and the financial aid is lacking, patients experience even more challenges on top of the clinical handling of the tumor. To be able to handle these unmet needs, it is crucial to integrate structured mental health checks, psychosocial counseling, cognitive rehabilitation, and financial aid into regular neuro-oncology care. The incorporation of holistic, patient-focused care incorporating both medical and psychosocial interventions can lead to better treatment adherence, greater life quality, and possibly decreased long-term morbidity on brain tumor patients in an environment with limited resources.

Authors' Contribution

AR: Concept & study design, data collection and drafting of the manuscript.

SS: Data entry, statistical analysis, interpretation of the results.

SS: Manuscript editing and critical revision of the manuscript.

All authors approved the final version of the manuscript to be published.

Conflict of Interest

The authors declared no conflict of interest.

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Data Availability

Data is available with authors and can be provided on request.

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