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Social Determinants of Health and Their Impact on Survival and Disease Progression in Patients with Brain Tumors at Shahid Bahonar Teaching Hospital in 2019

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Abstract

Background: Policymakers are increasingly prioritizing social justice in health, with the WHO's "Determinants of Health" framework advocating for equitable health distribution. Social factors such as income, education, and living conditions play a significant role in health outcomes, including cancer.

Objectives: This study examines the relationship between social determinants of health and the survival rate of brain tumor patients at Shahid Bahonar Hospital in Kerman, Iran, in 2019.

Methods: This cross-sectional study included 363 brain tumor patients, collecting data on demographics, treatment, and social factors. Statistical analysis was performed using SPSS, with survival rates analyzed through Kaplan-Meier and Cox regression models.

Results: The mean age of the patients was 45.6 years, and 53.7% were male. Education, employment, family size, treatment type, and place of residence significantly influenced survival rates. Higher education was associated with longer survival, and employed patients had better survival rates than unemployed individuals. Additionally, smaller family size and combination therapy were linked to improved survival, while urban residents had longer survival compared to those in rural areas.

Conclusions: The study highlights the importance of addressing socio-economic disparities to improve brain tumor patient outcomes. Ensuring equitable access to diagnosis and treatment for all individuals is crucial for reducing health disparities and enhancing survival rates.

Keywords: Socio-economic Status, Survival Rate, Health Equity, Brain Tumors

1. Background

Today, one of the primary concerns of health policymakers is social justice, which, unlike in the past, is no longer solely focused on providing healthcare services in medical centers. In this regard, the World Health Organization has introduced a framework titled Determinants of Health, aiming to promote the fair distribution of health across countries (1). Social factors that influence health are considered an intersectoral issue, referring to the conditions in which an individual is born and raised. These factors can contribute to the development of diseases or influence the severity and progression of existing conditions (2, 3). Inequalities in income, nutrition, education, housing, occupation, exposure to violence, and stress are among the most influential social determinants of health (4).

One of the diseases significantly affected by social factors is cancer (5). Cancer is a general term for a large group of diseases characterized by the uncontrolled growth of cells beyond their usual boundaries. It can

invade neighboring tissues, spread to other organs, and affect almost any part of the body. Cancer has numerous anatomical and molecular subtypes, each requiring specific management strategies. In 2018, approximately 9.6 million people worldwide lost their lives to cancer (6). Cancer impacts all aspects of life, including cultural, economic, physical, mental, and social factors (7).

According to World Health Organization statistics, approximately 53,500 people died from cancer in Iran in 2011 (8). In the past, developed countries had a higher prevalence of various cancers; however, in recent years, 56% of new cancer cases and related deaths have been reported in developing countries (9).

Although cancer currently has a lower prevalence in Iran compared to some other diseases, the pattern of cancer occurrence in the country is expected to change as the population's age distribution shifts in the coming years (10). Approximately 70% of all cancer-related deaths occur in developing countries, and by 2020, this number was expected to exceed 15 million deaths annually (11, 12). Based on recent medical statistics, cancer is one of the most significant diseases of the present century and ranks as the third leading cause of death worldwide, accounting for approximately 12% of all deaths (11, 13).

Reports indicate that there are approximately 80 different types of cancer based on the location and type of affected cells. Various factors have been identified as contributing to the development of different types of cancer, and distinct social environments may have varying effects on cancer incidence (14). The most common cancers worldwide include colorectal, lung, breast, and prostate cancers (9, 15).

Social determinants of health influence a wide range of health outcomes and contribute to the development of diseases such as cardiovascular problems, diabetes, and cancer. Moreover, evidence on cancer incidence and related mortality suggests that social factors significantly affect both the occurrence and progression of the disease (16).

2. Objectives

Given that limited studies have examined the relationship between social determinants of health and brain tumors in Iran, this research aims to analyze the relationship between social determinants of health and the survival rate of brain tumor patients in a selected hospital affiliated with Kerman University of Medical Sciences in 2019.

3. Methods

This cross-sectional analytical study aimed to investigate the factors affecting the survival and prognosis of patients with brain tumors at Shahid Bahonar Hospital, Kerman, in 2019. The statistical population included all patients with brain tumors who were referred to this hospital during the study period. Inclusion criteria required that patients have a confirmed brain tumor diagnosis based on medical records and pathology reports. Patients with incomplete information or those who could not be followed up for any reason were excluded from the study. A census sampling method was used, and all eligible patients (363 patients) were included in the study.

Data were collected from patients' medical records, face-to-face interviews, and medical history reviews. The variables collected included age, gender, marital status, place of residence, level of education, employment status, number of family members, type of treatment (surgery, chemotherapy, radiotherapy, or combination), and duration of follow-up. The data collection tool was a standard checklist designed based on the study variables.

Data analysis was performed using SPSS version 26 software. Descriptive statistics, including mean and standard deviation for quantitative variables and frequency and percentage for qualitative variables, were used. For survival analysis, the Kaplan-Meier test was applied to examine the relationship between demographic, social, and treatment variables. To identify factors affecting survival, the Cox regression model was used, with a statistical significance level set at $P < 0.05$.

This study was conducted with the approval of the Ethics Committee of Kerman University of Medical Sciences (ethics approval code: IR.KMU.REC.1399.260). Informed consent was obtained from all patients or their families, and all information was stored and analyzed with complete confidentiality. The methodology, including the precise definition of variables, standardized data collection tools, and the use of advanced statistical methods, ensured high validity and reproducibility of the study.

4. Results

In the present study, 363 patients with brain tumors who were treated at Shahid Bahonar Hospital, Kerman,

in 2019 were analyzed. According to the information in Table 1, the mean age of the patients was 45.6 years, with the largest age distribution observed in the 46 - 60 age group (32.5%). Among the patients, 53.7% were male and 46.3% were female. The occupational status analysis showed that 56.5% of the patients were employed, while 43.5% were unemployed. Additionally, 69.4% of the patients lived in urban areas, while 30.6% resided in rural areas. Marital status data indicated that 76.3% of the patients were married and 23.7% were single.

Regarding education level, 13.5% of the patients were illiterate, 45% had a high school education, and 41.5% had a diploma or higher. In terms of treatment, 73.3% of patients underwent surgery combined with chemotherapy and radiotherapy, while 26.7% received only one type of treatment. Analysis of family size showed that four-member families were the most common (31.4%).

Statistical analyses were conducted to identify the association between socioeconomic factors and the survival of patients with brain tumors. The Kaplan-Meier test revealed that education, employment status, number of family members, type of treatment, and place of residence had a significant effect on survival, whereas gender and marital status showed no significant association with patient survival.

Patients with a high school education or higher had a longer survival time compared to illiterate patients. The median survival for illiterate patients was 8 months, whereas this increased to 14 months for patients with a high school education or higher ($P < 0.001$).

Employed patients had significantly longer survival than unemployed patients. The median survival of employed patients was 15 months, while for unemployed patients, it was 10 months ($P = 0.006$).

Patients living in smaller families (1 - 2 members) had a longer median survival of 16 months compared to those in larger families (more than 5 members), who had a median survival of 9 months ($P = 0.003$).

Patients receiving combination therapy (surgery, chemotherapy, and radiotherapy) exhibited better survival outcomes than those receiving only one type of therapy. The median survival for patients in the combination therapy group was 18 months, whereas for the single therapy group, it was 8 months ($P < 0.001$).

Patients living in urban areas had longer survival compared to rural patients. The median survival for urban patients was 14 months, while for rural patients, it was 9 months ($P = 0.02$).

No significant differences were observed in median survival based on gender ($P = 0.45$) or marital status ($P = 0.28$) (Table 2).

5. Discussion

The relationship between socio-economic status and health outcomes has been extensively studied, with growing evidence indicating that individuals from different socio-economic backgrounds experience disparities in various health conditions. While the impact of socio-economic status on chronic diseases such as heart disease, diabetes, and cancer has been widely investigated, the specific association between socio-economic status and brain tumors remains an area of exploration. Understanding this relationship is crucial for identifying potential underlying mechanisms and developing targeted interventions. This discussion aims to examine the influence of socio-economic status on the development, diagnosis, treatment, and outcomes of brain tumors.

5.1. Socio-economic Status and Brain Tumor Incidence

Social determinants of health, including income, education, occupation, and access to healthcare, are interconnected factors that shape an individual's socio-economic status. Studies investigating the impact of socio-economic status on brain tumor incidence have yielded conflicting results. Some studies report an association between lower socio-economic status and a higher risk of brain tumors, possibly due to increased exposure to environmental risk factors, limited access to healthy lifestyle choices, and inadequate healthcare resources (17-19). Conversely, other studies have found no significant correlation (20, 21). Further research is needed to clarify the potential links between socio-economic status and brain tumor development.

5.2. Socio-economic Status and Brain Tumor Diagnosis

Access to timely and appropriate healthcare resources plays a crucial role in the early diagnosis and treatment of brain tumors. Socio-economic disparities may contribute to delays in diagnosis, often resulting from limited access to healthcare facilities, lower health literacy, and inadequate health insurance coverage (22). Individuals with lower socio-economic status may face challenges in seeking medical attention, leading to

Table 1. Demographic Information of Participants in the Study

Variables Type	No. (%)
Tumor grade	
3rd degree	240 (66.1)
Grade IV	123 (33.9)
Age	
18 - 30	46 (12.7)
31 - 45	76 (20.9)
46 - 60	118 (32.5)
> 61	90 (24.8)
Gender	
Man	195 (53.7)
Female	168 (46.3)
Employment status	
Employed	158 (43.5)
Not working	205 (56.5)
Location	
City	252 (69.4)
Village	111 (30.6)
Marital status	
Single	86 (23.7)
Married	277 (76.3)
Nationality	
Fars	276 (76)
Baloch	65 (17.9)
Other	22 (6.1)
literacy rate	
Illiterate	49 (13.5)
High school	164 (45)
Diploma and above	150 (41.5)
Type of treatment	
Surgery or chemotherapy, radiotherapy	97 (26.7)
Surgery and chemotherapy, radiotherapy	266 (73.3)
Number of family members	
< 2	23 (6.3)
3	71 (19.6)
4	114 (31.4)
5	92 (25.3)
> 6	63 (17.4)
Insurance	
Have insurance	299 (82.4)
No insurance	64 (17.6)

delayed diagnosis, more advanced tumor stages at presentation, and potentially poorer treatment outcomes (23). Addressing these disparities requires removing barriers to healthcare access, promoting health literacy, and ensuring equitable healthcare service provision.

5.3. Socio-economic Status and Brain Tumor Treatment

Socio-economic status has been shown to influence treatment decisions and outcomes for patients with brain tumors. Higher socio-economic status often correlates with better access to advanced treatment modalities, including neurosurgery, chemotherapy, radiation therapy, and novel targeted therapies (24). Additionally, patients with higher socio-economic status may have the financial means to afford comprehensive supportive care during treatment. Conversely, individuals with lower socio-economic status may encounter difficulties in accessing timely and optimal treatment, which can impact survival rates and quality

Table 2. Comparison of Socio-economic Status Affecting the Median Survival of Patients

Variables	Relative Risk	95% Confidence Interval	P-Value
Tumor Grade			
> 28 (mo)		0.32 - 2.54	0.648
3rd degree	1		
Grade IV	0.76		
< 28 (mo)		0.89 - 2.13	0.102
3rd degree	1		
Grade IV	1.5		
Age			< 0.001
18 - 30	3.43	1.78 - 6.8	
31 - 45	2.28	1.51 - 4.93	
46 - 60	1.6	1.44 - 3.71	
> 61	1		
Gender		0.87 - 2.09	0.072
Male	1.46		
Female	1		
Employment status		1.69 - 2.80	0.006
Employed	2.32		
Not working	1		
Location		0.76 - 2.65	0.401
City	1		
Village	1.43		
Marital status		0.62 - 1.38	0.653
Single	1		
Married	0.88		
Nationality			
Fars	2.1	0.7 - 2.28	0.341
Baloch	1.8	0.81 - 1.92	0.712
Other	1	-	-
literacy rate			
Illiterate	1	-	< 0.001
High school	1.76	1.31 - 3.52	0.033
Diploma and above	2.89	1.48 - 5.04	< 0.001
Type of treatment			
Surgery or chemotherapy, radiotherapy	1.56	0.72 - 2.21	0.194
Surgery and chemotherapy, radiotherapy	1	-	-
Number of family members			
< 2	3.09	1.83 - 6.11	< 0.001
3	3.31	1.92 - 6.27	< 0.001
4	2.44	1.51 - 4.12	< 0.001
5	1.50	0.92 - 2.69	0.169
> 6	1	-	< 0.001
Insurance			
Have insurance	1.12	0.59 - 1.60	0.706
No insurance	1	-	-

of life (25). Policy initiatives aimed at reducing disparities in healthcare access, providing financial support, and improving education about treatment options can help address these inequalities (26, 27).

5.4. Socio-economic Status and Brain Tumor Survival

Survival rates for brain tumors are influenced by multiple factors, with socio-economic status serving as a

potential contributor. Studies have associated lower socio-economic status with worse overall survival rates. The reasons behind this association are complex and may involve delayed diagnosis, limited treatment options, a decreased likelihood of receiving standard-of-care interventions, and disparities in post-treatment care. Efforts to enhance healthcare access, support marginalized populations, and improve follow-up care can help mitigate these survival disparities (28-30).

5.5. Conclusions

This discussion highlights the significant impact of socio-economic status on brain tumor development, diagnosis, treatment, and outcomes. Promoting health equity and reducing socio-economic disparities are essential to ensuring that all individuals, regardless of their socio-economic status, have equal opportunities for early diagnosis, optimal treatment, and improved survival rates. Future research should focus on identifying specific mechanisms through which socio-economic status influences brain tumor outcomes and implementing targeted strategies to bridge these gaps.

Footnotes

Authors' Contribution: Conceptualization: M. Y. and A. B.; Data curation: M. Y. and M. H.; Formal analysis: M. Y. and S. E.; Methodology: A. B., M. Y., and S. E.; Project administration: A. B.; Resources: M. M., M. H., and S. E.; Supervision: A. B.; Validation: A. B. and M. Y.; Visualization: A. B. and M. Y.; Writing–original draft: M. Y., A. B., S. E., M. H. P. and M. M.

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