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Selected Determinants of the Quality of Life after Surgical Treatment of Brain Tumors

Wybrane uwarunkowania jakości życia po leczeniu operacyjnym guzów mózgu

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Abstract

Introduction. The quality of life of patients with brain tumor depends on a variety of factors related to the disease as well as on socio-demographic factors.
Aim. The aim of the study was to examine the impact of demographic factors on the quality of life of patients undergoing surgery for a brain tumor.
Material and Methods. The material consisted of 236 patients who had undergone surgery for a brain tumor at the Unit of Neurosurgery of the 10th Military Research Hospital and Polyclinic Independent Public Health Care Centre in Bydgoszcz. Relevant consent was issued by the Bioethics Committee at the Ludwik Rydygier Medical College in Bydgoszcz (Consent No. KB222/2011) for carrying out the research.
The tests were carried out three times: on admission to Hospital, on the fifth day after the brain tumor removal surgery, and 30 days after the surgery. Each patient three times filled questionnaires of the quality of life: EORTC QLQ-C30 (version 3.0.) (The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire — C30) and module EORTC QLQ-BN20 (The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire — Brain Module).
Results. Age was statistically significantly correlated with the quality of life before the surgery ($r=-22$; $p<0.001$) on the 5th day after the surgery ($r=-14$; $p<0.001$) and 30 days after the surgery ($r=-16$, $p<0.001$). On the fifth day after the surgery there occurred significant differences in the quality of life between patients of different family status ($F(3.232)=4.13$; $p<0.01$) and in the level of quality of life between respondents with different professional status ($F(4.231)=3.32$; $p<0.05$).
Conclusions. The quality of life decreases with age in each observation period. Gender, place of residence, education had no significant effect on the results of the quality of life. Family situation and professional status significantly affected the quality of life on the 5th day after the surgery. **(JNNN 2016;5(4):128–135)**
Key Words: quality of life, brain tumor, demographic factors

Streszczenie

Wstęp. Jakość życia chorych z guzem mózgu zależy od wielu różnych czynników związanych z chorobą ale również czynników socjo-demograficznych.
Cel. Celem pracy było zbadanie wpływu czynników demograficznych na jakość życia pacjentów poddanych leczeniu operacyjnemu guza mózgu.
Materiał i metody. Materiał stanowiło 236 pacjentów poddanych leczeniu operacyjnemu guza mózgu w Klinice Neurochirurgii 10 Wojskowego Szpitala Klinicznego SP ZOZ w Bydgoszczy. Na przeprowadzenie badań uzyskano zgodę Komisji Bioetycznej przy Collegium Medicum im. Ludwika Rydygiera w Bydgoszczy (nr zgody KB 222/2011). Badania zostały przeprowadzone trzykrotnie: w dniu przyjęcia do Kliniki, w piątej dobie po zabiegu usunięcia guza mózgu oraz 30 dni po zabiegu. Każdy pacjent trzykrotnie wypełniał kwestionariusze jakości życia: EORTC QLQ-C30

(wersja 3.0.) (The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire — C30) oraz moduł EORTC QLQ-BN20 (The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire — Brain Module).
Wyniki. Wiek był istotnie statystycznie skorelowany z jakością życia przed zabiegiem (r=-22; p<0,001), w 5 dobie po operacji (r=-14; p<0,001) oraz 30 dni po operacji (r=-16; p<0,001). W piątej dobie po zabiegu były istotne różnice w poziomie jakości życia między osobami o różnym statusie rodzinnym (F(3,232)=4,13; p<0,01) oraz w poziomie jakości życia między osobami z różnym statusem zawodowym (F(4,231)=3,32; p<0,05).
Wnioski. Jakość życia maleje wraz ze wzrostem wieku w każdym okresie obserwacji. Płeć, miejsce zamieszkania, wykształcenie nie miały istotnego wpływu na wyniki jakości życia. Sytuacja rodzinna i status zawodowy istotne wpływały na jakość życia w 5 dobie po zabiegu operacyjnym. **(PNN 2016;5(4):128–135)**
Słowa kluczowe: jakość życia, guz mózgu, czynniki demograficzne

Introduction

Interest in the quality of life in medical sciences appeared in the late 70's and 80's of the twentieth century, getting more important with the development of medicine and various methods of treatment, which have not always had an impact on health perceived by the patient. Taking into account the quality of life in medicine was a major breakthrough in the perception of the patient. Attention was focused not only on prolonging one's life but also on patients' independence and activity, their satisfaction with life. Assessment of the quality of life, where patient's opinion on treatment and its effects is taken into account resulted in the situation in which patients have become partners in the therapeutic process, also studies on the quality of life have found practical application in modern medicine [1].

In the medical literature, there are many definitions, theories, concepts of the quality of life, focusing on the phenomena of health and disease. Attempts to clarify a uniform definition of the quality of life related to health contributed to the formulation by Schipper and his colleagues of the term of 'the quality of life of the conditioned by the state of health' (Eng. — Health Related Quality of Life — HRQOL). According to this definition, the quality of life is the "functional effect of the disease and its treatment perceived (experienced) by the patient [1–5]. It emphasizes, however, that the quality of life related to health is a concept narrower than the quality of life [6].

The quality of life is affected by various factors, which can vary both quantitatively and qualitatively, also may vary over time. The quality of life evaluation can be assessed in an objective manner (by third parties), or more often subjectively by patients themselves 6].

Studies on the quality of life are the expression of a holistic approach to the patient, particularly important in chronic diseases. Currently, the quality of life of patients is as important as clinical parameters [7]. This "parameter" is a sensitive measure of therapies applied these days and relevant expectations of the patient in this area, whereas indirectly of the efficiency in the functioning of the healthcare system [6].

Brain tumors represent 9% of all tumor lesions in adults. In Poland, the incidence of primary brain tumors is 6.6/100 thousand/year for women and 7.9/100 thousand for men [8,9]. Primary brain tumors are a heterogeneous group of tumors of different origin. Due to their location and biology they tend to have unfavorable prognosis and are the 10th cause of death from cancer in men and 9th in women [9]. These tumors disrupt the sense of independence and self-determination of the patient, contributing to the occurrence of neurological deficits, seizures, cognitive impairment and personality changes [10]. Due to the variety of neoplastic lesions in the brain, it is required to apply specialized and multidisciplinary approach. Surgery is the basic practice in the treatment of highly diverse gliomas (WHO G II) (astrocytomas, oligodendroglioma mixed gliomas), malignant-anaplastic gliomas (WHO G III) (astrocytomas, oligodendrogliomas mixed gliomas), glioblastoma multiforme (WHO G IV) and meningiomas (WHO G I) [9].

All efforts to extend the life of patients with brain tumors should not be implemented in isolation from the quality of life [11].

The aim of this research was to investigate the relationship between demographic factors and the quality of life of patients undergoing surgery for a brain tumor.

Material and Methods

The research material consists of patients with brain tumors, scheduled for surgery at the Unit of Neurosurgery of the 10th Military Research Hospital and Polyclinic Independent Public Health Care Centre in Bydgoszcz. Relevant consent was issued by the Bioethics Committee at the Ludwik Rydygier Medical College in Bydgoszcz (Consent No. KB222/2011) for carrying out the research.

The study group consisted of 236 patients, including 124 women (52.5%) and 112 men (47.5%). In terms of age the most numerous group consisted of respondents aged between 41 and 60 — 103 patients (43.6%), the second group included patients aged from 21 to 40 years

— 75 (31.8%). Taking into account the place of residence the most numerous groups consisted of respondents living in rural areas (72 patients — 30.5%) and those living in cities with the population exceeding 100 thousand residents (79 persons — 33.5%). In terms of education the most numerous group included patients with the secondary (89 persons — 37.7%) and higher education (72 persons — 30.5%), the smallest group consisted of those with primary education (16 — 6.8%). Taking into account the family situation of patients, the largest group consisted of patients who are in stable relationships — 176 persons (74.6%), the smallest — the divorced and widowed — 11 respondents in each category (9.4% in total). In terms of professional status, the largest groups consisted of economically active patients — 105 (44.5%) as well as of patients who are retired or pensioners — 105 (44.5%) (including those working additionally).

The tests were carried out three times: on admission to the hospital, on the fifth day after the surgery to remove a brain tumor, and 30 days after surgery. Each patient three times filled questionnaires of the quality of life: EORTC QLQ-C30 (version 3.0.) (The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire — C30) and module EORTC QLQ-BN20 (The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire — Brain Module). The quality of life was assessed on a scale from 0 to 1, where 0 meant a very low quality of life, 1 — very good quality of life.

Statistical analyses were performed using the statistical package IBM SPSS Statistics 20. For the purpose of the analysis of the results, the following tests were carried out: Pearson correlation test, t-Student's test for independent tests and the parametric single-factor analysis test ANOVA. The level of significance $p<0.05$ was adopted.

Results

The quality of life in the studied group of patients was assessed in general on a scale of 0 to 1 based on the answers provided in the quality of life questionnaires applied. Before surgery, the quality of life of patients reached the level of 0.706 (SD 0.150), on the fifth day after the surgery it decreased to the level of 0.614 (SD 0.169), whereas on the 30th day after the surgery the level of the quality of life among respondents increased to 0.707 (SD 0.158).

Taking into account demographic factors the relationship between the quality of life and age was investigated in the first turn. Pearson correlation analysis revealed that age was statistically significantly correlated with the quality of life before the surgery ($r=-22$; $p<0.001$), with the quality of life after 5 days after the surgery ($r=-14$; $p<0.001$) and with the quality of life 30 days following the surgery ($r=-16$; $p<0.001$). With the growth of age the quality of life decreased in each of these observation periods and the association was strongest on day five after the surgery (Table 1).

Table 1. Correlation between the quality of life and age

Variable	Age
Quality of life before surgery	-0.14***
Quality of life 5 days after surgery	-0.22***
Quality of life 30 days after surgery	-0.16***

$p<0.05$*; $p<0.01$**; $p<0.001$***

Next, dependence of the quality of life on gender was examined. T-Student test did not detect statistically significant differences between women and men in terms of the quality of life in those three periods of observation (Table 2).

Another factor taken into account in the analysis was the place of residence of the respondents. ANOVA test analysis showed no statistically significant differences in the period preceding brain tumor surgery ($F(3.232)$

Table 2. Quality of life and gender

Variable	N (%)	Min	Max	Median	Average	SD	t-test
Comparison of the quality before the surgery							
Women	124 (52.5)	0.16	0.99	0.71	0.70	0.14	t=-0.83
Men	112 (47.5)	0.23	1	0.72	0.71	0.16	p=0.41
Comparison of the quality 5 days after the surgery							
Women	124 (52.5)	0.16	0.99	0.63	0.61	0.18	t=-0.76
Men	112 (47.5)	0.13	0.98	0.64	0.62	0.16	p=0.446
Comparison of the quality 30 days after the surgery							
Women	124 (52.5)	0.30	0.99	0.70	0.70	0.15	t=-0.77
Men	112 (47.5)	0.22	0.98	0.73	0.72	0.17	p=0.443

=0.39; p=0.760), on the 5th day after the surgery (F(3.232)=0.81; p=0.489) and 30 days following the surgery (F(3.232)=0.83; p=0.479) (Table 3).

Another factor considered in the analysis was the education of patients. The analysis showed no statistically significant differences between the groups of patients surveyed in the preoperative period (F(3.232)=0.82; p=0.487), as well as 5 days after the surgery F(3.232) =0.98; p=0.403. On the 30th day after the surgery the analysis also showed no statistically significant differences, F(3.232)=2.37; p=0.072 (Table 4). In contrast, based on the results of comparisons post hoc NIR it was proved that there were differences between respondents with vocational and secondary education (M=0.67; SD=0.18; Vs M=0.73; SD=0.15).

Another factor taken into account in the study was the family situation of the respondents (Table 5). The analysis showed no statistically significant differences between the quality of life and the family situation of patients in the preoperative period — F(3.232)=1.51; p=0.212. On the fifth day after the surgery however, there were statistically significant differences in the

Table 3. Quality of life and the place of residence

Variable	N (%)	Min	Max	Median	Average	SD	ANOVA
Comparison of the quality before the surgery							
Country	72 (30.5)	0.16	0.96	0.71	0.70	0.16	
City up to 25 thousand inhabitants	49 (28.8)	0.25	1.00	0.72	0.69	0.16	F=0.39 df=3.232 p=0.760
City up to 26–100 thousand inhibitants	36 (15.3)	0.39	0.99	0.71	0.71	0.13	
City over 100 thousand inhabitants	79 (33.5)	0.37	0.99	0.71	0.72	0.15	
Comparison of the quality 5 days after the surgery							
Country	72 (30.5)	0.13	0.92	0.63	0.61	0.16	
City up to 25 thousand inhabitants	49 (28.8)	0.19	0.92	0.63	0.59	0.19	F=0.81 df=3.232 p=0.489
City up to 26–100 thousand inhibitants	36 (15.3)	0.38	0.98	0.66	0.65	0.15	
City over 100 thousand inhabitants	79 (33.5)	0.15	0.99	0.63	0.62	0.18	
Comparison of the quality 30 days after the surgery							
Country	72 (30.5)	0.17	0.95	0.70	0.69	0.16	
City up to 25 thousand inhabitants	49 (28.8)	0.31	0.96	0.71	0.69	0.16	F=0.83 df=3.232 p=0.479
City up to 26–100 thousand inhibitants	36 (15.3)	0.48	0.98	0.76	0.73	0.13	
City over 100 thousand inhabitants	79 (33.5)	0.2	1	0.72	0.72	0.17	

Table 4. Quality of life and education

Variable	N (%)	Min	Max	Median	Average	SD	ANOVA
Comparison of the quality before the surgery							
Primary	16 (6.8)	0.23	0.99	0.72	0.72	0.18	
Vocational	59 (25.0)	0.31	1	0.70	0.68	0.15	F=0.82 df=3.232 p=0.487
Secondary	89 (37.7)	0.16	0.99	0.73	0.72	0.16	
Higher	72 (30.5)	0.43	0.96	0.70	0.71	0.13	
Comparison of the quality 5 days after the surgery							
Primary	16 (6.8)	0.15	0.82	0.59	0.55	0.18	
Vocational	59 (25.0)	0.13	0.99	0.63	0.60	0.16	F=0.098 df=3.232 p=0.403
Secondary	89 (37.7)	0.19	0.98	0.64	0.62	0.18	
Higher	72 (30.5)	0.25	0.92	0.64	0.63	0.16	
Comparison of the quality 30 days after the surgery							
Primary	16 (6.8)	0.49	1	0.70	0.72	0.15	
Vocational	59 (25.0)	0.17	0.93	0.67	0.67	0.18	F=2.37 df=3.232 p=0.072
Secondary	89 (37.7)	0.3	0.98	0.76	0.73	0.15	
Higher	72 (30.5)	0.36	0.98	0.71	0.70	0.14	

quality of life between people of different family status F(3.232)=4.13; p<0.01. In order to examine the accurate differences a series of NIR multiple comparisons were performed, which showed that single persons had a significantly higher level of the quality of life than those in the permanent relationship and the widowed (M=0.68; SD=0.14; Vs M=0.60; SD=0.17 & M=0.50; SD=0.22). Those widowed also had a lower quality of life than those in a permanent relationship and the divorced (M=0.50; SD=0.22; Vs M=0.60; SD=0.17 & M=0.64; SD=017). On the 30th day after the surgery the analysis showed no statistically significant differences between people with different family situation F(3.232)=2.17; p=0.092. Based on the results of post hoc NIR comparisons it was demonstrated that there were differences between those widowed and the divorced and lonely. Those widowed on the 30th day following the surgery had a lower quality of life than the divorced and lonely respondents (M=63; SD=0.14; Vs M=0.77; SD=0.18 & M=0.74; SD=0.13).

Another factor which was analysed in connection with the quality of life of patients with brain tumor was the professional situation of the respondents (Table 6). In the preoperative period the analysis showed no statistically significant differences between the quality of life and professional status of respondents — F(4.231)=1.88;

Table 5. Quality of life and family situation

Variable	N (%)	Min	Max	Median	Average	SD	ANOVA
Comparison of the quality before the surgery							
Lonely	38 (16.1)	0.52	1	0.71	0.75	0.12	
In permanent relationship	176 (74.6)	0.16	0.99	0.70	0.70	0.15	F=1.51 df=3.232 p=0.212
Divorced	11 (4.7)	0.53	0.94	0.73	0.74	0.12	
Widowed	11 (4.7)	0.31	0.92	0.73	0.67	0.18	
Comparison of the quality 5 days after the surgery							
Lonely	38 (16.1)	0.36	0.92	0.68	0.68	0.14	
In permanent relationship	176 (74.6)	0.13	0.99	0.63	0.60	0.17	F=4.13 df=3.232 p=0.007
Divorced	11 (4.7)	0.3	0.91	0.64	0.64	0.17	
Widowed	11 (4.7)	0.15	0.78	0.56	0.50	0.22	
Comparison of the quality 30 days after the surgery							
Lonely	38 (16.1)	0.49	1	0.74	0.74	0.13	
In permanent relationship	176 (74.6)	0.17	0.98	0.72	0.70	0.16	F=2.17 df=3.232 p=0.092
Divorced	11 (4.7)	0.42	0.98	0.78	0.77	0.18	
Widowed	11 (4.7)	0.47	0.83	0.66	0.63	0.14	

Table 6. Quality of life and professional status

Variable	N (%)	Min	Max	Median	Average	SD	ANOVA
1	2	3	4	5	6	7	8
Comparison of the quality before the surgery							
Student	14 (5.9)	0.55	0.98	0.71	0.73	0.13	
Professionallyactive	105 (44.5)	0.39	0.99	0.72	0.73	0.14	F=1.88 df=4.231 p=0.115
Retired/Pensioner	91 (38.6)	0.16	1	0.70	0.68	0.17	
Retired/Pensioner+professional work	14 (5.9)	0.43	0.88	0.74	0.74	0.12	
Unemployed	12 (5.1)	0.43	0.99	0.70	0.68	0.14	
Comparison of the quality 5 days after the surgery							
Student	14 (5.9)	0.36	0.92	0.65	0.66	0.16	
Professionallyactive	105 (44.5)	0.3	0.99	0.67	0.65	0.15	F=3.32 df=4.231 p=0.011
Retired/Pensioner	91 (38.6)	0.13	0.91	0.60	0.57	0.18	
Retired/Pensioner+professional work	14 (5.9)	0.19	0.81	0.61	0.57	0.18	
Unemployed	12 (5.1)	0.23	0.9	0.64	0.65	0.18	

Table 6. Continued

1	2	3	4	5	6	7	8
Comparison of the quality 30 days after the surgery							
Student	14 (5.9)	0.49	1	0.80	0.76	0.16	
Professionallyactive	105 (44.5)	0.2	0.98	0.73	0.73	0.14	
Retired/Pensioner	91 (38.6)	0.17	0.98	0.67	0.67	0.17	F=2.08 df=4.231 p=0.084
Retired/Pensioner+professional work	14 (5.9)	0.36	0.94	0.78	0.73	0.19	
Unemployed	12 (5.1)	0.33	0.93	0.80	0.72	0.19	

p=0.115. On the fifth postoperative day the analysis showed that there were statistically significant differences in the level of the quality of life between respondents with different professional status — $F(4.231)=3.32$; $p<0.05$. In order to examine exact differences, series of multiple comparisons NIR were carried out, which showed that students, respondents economically active and also the unemployed had a significantly higher quality of life than those who had already retired, pensioners or even those working additionally (M=0.66; SD=0.16 & M=0.65; SD=0.15 & M=0.65; SD=0.18; Vs M=0.57; SD=0.18 & M=0.57; SD=0.18). On the 30th day after the surgery no statistically significant differences were shown between people of different professional status, $F(4.231)=2.08$; $p=0.084$. In contrast, based on the results of post hoc NIR comparisons it was demonstrated that there were differences between students and those already retired/on pension. The students had a higher quality of life compared to those who had retired (M=0.76; SD=0.16; Vs M=0.67; SD=0.17).

Discussion

The quality of life is a subjective sensation, conditioned on individual needs, beliefs, values, attitudes, which, to be noted, change in time [1]. Furthermore, they are affected by various external and internal factors [12]. Laszczewska [12] points out that the quality of life of a patient with cancer is on one hand affected by pain and the concern about its occurrence, on the other hand however, there is a chance to cure the disease and minimize its symptoms. According to the author, anxiety and depression are common problems in these patients, which result from the concern about suffering, death and fear about the fate of the family. She also draws attention to the fact that some of the therapeutic and diagnostic actions raise anxiety in patients, particularly when the patient does not have sufficient knowledge about them, or have doubts about their usefulness and effectiveness [12].

The quality of life has become an important part in the final clinical research, among patients with brain tumors, particularly primary tumors, as they struggle with an incurable disease. The quality of life of patients may be affected by the disease, as well as by the side effects of treatment. It should also be noted that the surgery, radiotherapy or chemotherapy may improve patients' functional capacity, their quality of life, and extend length of life. The median of the time of survival with a glioblastoma of low grade of malignancy is approximately 10 years, whereas with and a high-grade glioma it amounts for 1–3 years. Surgical treatment by reducing the tumor mass can relieve neurological symptoms and cognitive deficits, which will improve the quality of life. On the other hand, the operation may cause neurological and cognitive deficits as a result of damage to healthy tissues located around the change. These deficits are often transient, but they lower the quality of life in the postoperative period [13].

In our study the quality of life of respondents was similar in the preoperative period and 30 days after the surgery. The quality of life was reduced on the 5th day after the surgery, which may be related to the general weakness of the patient, possible deficits, pain in the area operated, anxiety associated with waiting for the result of histopathological diagnosis. Jakola et al. [14] emphasize that time in the assessment of the quality of life of patients is an important issue, because an early assessment after the surgery can be substantially influenced by short-term post-operative symptoms, whereas a late assessment may be impaired by the development of cancer and supplementary treatment included (radiotherapy, chemotherapy).

According to Jakola et al. [15] the quality of life of patients with brain tumors is affected by the factors associated with brain cancer (location of the tumor, size of changes, seizure of important brain structures) as well as by gender, age, social, economic and cultural factors [14].

In our study, the analysis showed that with the increase of age the quality of life decreased. Gender of respondents had no effect on the results of the quality of life, as well as place of residence or education of the respondents. Cheng et al. evaluated the quality of life in patients with glial brain tumors preoperatively. The study showed no difference between male and female patients. However, age of the respondents was a differ-

entiating factor. Patients over 50 years of age had worse functioning and lower quality of life compared to younger respondents, those under 50 years of age [16]. In a study by Jakola et al. lower quality of life was observed in female patients in the preoperative period (p=0.030), which was not observed 6 weeks after the surgery. In female patients there were identified significantly more symptoms of such dimensions as "pain/discomfort" and "anxiety/depression" (p=0.001 and 0.033) [14]. In the research by Mainio et al. the quality of life level was also lower in women than in men. Lowering of the quality of life was related to depression, particularly in patients suffering from brain tumor growth [17].

On day five after the surgery significant differences were observed between the quality of life and family situation. Respondents living in a permanent relationship and those widowed had lower quality of life. These results may suggest that the effect of lowering the quality of life was affected by the concern about their future fate and future of the family, which is mentioned by Laszczewska [12].

On the 5th day following the surgery significant differences were observed between the quality of life and professional status of respondents. The lowest quality of life was assessed in patients who were retired or pensioners. It can be assumed that these were elder people, which confirms the results regarding the relationship between age and the quality of life — with age there is observed a decline in the quality of life of patients with brain tumor.

Conclusions

The quality of life decreases with the increase of age in each observation period. Gender, place of residence, education had no significant effect on the results of the quality of life. Family situation and professional status significantly affected the quality of life on the 5th day following the surgery.

Implications for Nursing Practice

The quality of life of patients is affected by numerous factors. These include clinical and socio-demographic factors. Nursing interventions through education and conscientious performance of care and treatment measures can positively affect the quality of life of patients undergoing surgical treatment of brain tumors.

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