The Quality of Life and Associated Factors in Indonesian Meningioma Clients after Surgery: A Cross-Sectional Study

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ABSTRACT

***Purpose**: The quality of life (QOL) of meningioma clients in Indonesia is poorly understood. This study aimed to investigate and examine the factors associated with the QOL of these meningioma clients after surgery, in order to help create an appropriate post-operative nursing intervention.*

***Method**: This was a cross-sectional study. The QOL data was collected from a sample of 118 clients, using a EuroQol-5D-5L (EQ-5D-5L) questionnaire. Functional status, fatigue, illness perception and social support were assessed by the Barthel Index, FACIT-Fatigue Scale, Brief Illness Perception Questionnaire, and Medical Outcome Study Social Support Survey-6, respectively. Statistical analyses were conducted using the Chi-square test, Fisher's exact test, and logistic regression test.*

***Results**: After surgery, more than half of the 118 clients reported " problems" in the EQ-5D dimensions of mobility (65%), self-care (57%), usual activities (70%), pain/discomfort (84%), and anxiety/depression (70%).The average postoperative EQ-5D index value (±SD) was 0.55 ± 0.26 while the median of EQ-VAS was 69.2 (IQR 40–90).Factors related to low QOL were age (p = 0.014), tumour grade (p = 0.0001), functional status (p = 0.0001), fatigue (p= 0.001), illness perception (p = 0.0001), and social support (p = 0.001). Multivariate analysis showed that the most dominant factor associated with QOL was functional status (OR 6.728; Confidence interval=95%; p=0.008).*

***Conclusion and Implications:**There is a correlation between age, tumour grade, functional status, fatigue, illness perception, and social support with the*

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QOL of postoperative meningioma clients. The study recommends that these be included in their nursing assessment and an appropriate nursing rehabilitation programme be planned in order to improve their QOL.

Key words: *meningioma, client, nursing, quality of life, surgery*

INTRODUCTION

Meningioma is the most common primary intracranial tumour, constituting about one-third of all tumours that attack the central nervous system (Najafabadi et al, 2018). Meningiomas originating from arachnoid cap cells that grow on meninges can be found in the spinal cord and brain (Backer-Grøndahl et al, 2012), with an incidence rate of 8.9 per 100,000 persons (Batista et al, 2011; Najafabadi et al, 2017; Benz et al, 2018). About 90% of meningioma cases are benign and can cause symptoms in the form of seizures, visual disturbances, cognitive impairments, emotional disorders, and neuropathy (Najafabadi et al, 2017).

Meningioma can affect the physiological, psychological, and social domains of life. The neurological symptoms most often experienced by meningioma clients are headache, impaired vision, cognitive impairment, epilepsy, motor disorders, and speech disorders (Alkemade et al, 2012). That explains why the QOL of clients with postoperative meningioma shows worse results than a healthy population, both physically, cognitively, psychologically, and in social function (Najafabadi et al, 2018). Surgery is the main management of meningioma clients (McFaline-Figueroa & Lee, 2018). Nevertheless, in the management of clients with meningioma as a primary brain tumour, both surgery and further radiation therapy can aggressively reduce some domains in clients' QOL (Jalali & Dutta, 2012).

In Indonesia, at present, studies on the quality of life of meningioma clients after surgery are still limited in number (McAllister et al, 2017). A study on 65 Indonesians with several different types of brain tumours found that while there was improvement, many clients were still reporting problems about quality of life at 3 months post-discharge, highlighting the need for ongoing support and care to ensure the best possible outcomes (Ganefianty et al, 2019). However, there is no research that explains the factors related to their condition.

Factors related to the quality of life of meningioma clients need to be studied and managed comprehensively. Armed with this knowledge, nurses can determine appropriate nursing interventions, compile discharge planning programmes,

and rehabilitate clients based on their needs. Assessment of the quality of life of meningioma clients is also very important because it can serve to recognise the initial changes in clinical conditions subjectively to meningioma clients, and their relationship to disease progression (Ooi & Mazlina, 2013). Further research on the quality of life of meningioma clients in Indonesia is urgently needed.

Objective

The purpose of this study was to identify the factors related to quality of life among clients with meningioma after surgery, in Indonesia.

METHOD

Study Sample

This cross-sectional study was carried out with a total of 118 clients who underwent meningioma surgery in the neurosurgery department of Hasan Sadikin Hospital, between January 2018 and January 2019.

Meningioma clients with integrated medical records, 3 months to 1 year after surgery, who were able to answer the questionnaires postoperatively and could give informed consent, were included in the study.

Measures

Demographic and Medical Variables - The sociodemographic variables assessed were gender and age, while medical variables consisted of the type of brain tumour. Imaging evaluation of brain tumours was carried out by CT scans or MRIs. Histological grading was performed according to the World Health Organisation (WHO) classification.

Quality of Life - Postoperative evaluation of surgical outcomes in terms of quality of life was performed using a EuroQol-5D-5L (EQ-5D-5L) questionnaire. It is a generic measure of health-related quality of life, widely used across many countries (Brooks & De Charro, 1996). In EQ-5D, five dimensions of HRQL are scored: mobility, self-care, usual activities, pain/discomfort and anxiety/depression, with 5 possible answers to each dimension, i.e., 'no problem', 'slight problem', 'moderate problem', 'severe problem', and 'extreme problem'. These results on the state of health were transformed into a single index value based on a large survey in the Indonesian population (Purba et al, 2018). The EQ-5D index

has a score of 0.865 for the worst state, and a score of 1 for full health. A Visual Analog Scale (EQ-VAS) was also used, forming the second part of the EuroQol questionnaire. For the Indonesian language, the corrected item-total correlation of all subscales was reported to be above 0.306. The test-retest reliability for all subscales was above 0.910.

Functional Status - The Barthel Index (BI) was used to assess functional status (Collin et al, 1988). Items were scored on the level of assistance required for an individual to perform activities of daily living. The Scale included 10 items, with each item scored from 0 - 3 based on the level of independence. Possible scores range from 0 - 19, with higher scores indicating more independence. A score of 19 is categorised as being independent; 12-18 as a mild dependence; 9-11 as a moderate dependence; 5-8 as severe dependence; and 0-4 as total dependence. For Indonesian clients, the BI has shown good reliability and validity. The corrected item-total correlation of all subscales was reported to be above 0.306 and the reliability test for all subscales was above 0.871.

Fatigue - FACIT-Fatigue Scale was used to measure the severity of fatigue (Al-shair et al, 2012). It has been established as a valid and reliable tool for assessing fatigue for neurology clients (Butt et al, 2013). The FACIT-Fatigue Scale is a 13-item client-reported measure of fatigue. Severity of fatigue symptoms is rated from 0 - 52. The calculation is performed using the FACIT-Fatigue subscale Scoring Guidelines (Version 4). The lower the score on the FACIT-Fatigue Scale, the more severe are the client's fatigue symptoms. The corrected item-total correlation of all subscales was reported to be above 0.306, and the reliability test for all subscales was above 0.902.

Illness Perception - Possible illness perception was measured by the Brief Illness Perception Questionnaire (Broadbent et al, 2015). The questionnaire has 9 items that use a 0 - 10 numeric Scale, has good data reliability and validity, and can be completed in a few minutes. Higher scores of BRIEF-IPQ reflect an individual's more negative perceptions about his/her illness. The corrected item-total correlation of all subscales was reported to be above 0.306, and the reliability test for all subscales was above 0.859.

Social Support - The social support was measured using the Medical Outcome Study Social Support Survey-6 , which contained 6 questions on a 1- 5 Likert scale (Holden et al, 2014). The MOS-SSS-6 is a good instrument for measuring social support in cancer clients (Singh et al, 2017). Answers are given scores of 1

for 'never', 2 for 'ever', 3 for 'sometimes', 4 for 'frequent', and 5 for 'very often'. The measurement results are stated in the total score, where the lowest score is 6 and the highest score is 30. It is stated that social support is good if the total score is ≥ 24 (Holden et al, 2014).The corrected item-total correlation of all subscales was reported to be above 0.306, and the reliability test for all subscales was above 0.909.

Statistical Analysis

Data was analysed using SPSS version 21.0. All data was summarised as means, standard deviations (SD), medians, and interquartile ranges (IQR) for continuous variables, and as frequencies and percentages for categorical variables. The associations between age, tumour grade, functional status, fatigue, illness perception, and social support were confirmed by the Chi-square test and Fisher's exact test. The logistic regression analyses were then conducted to identify the factors most related to the quality of life. The level of statistical significance was set at p-value< 0.05 (Polit & Beck, 2013).

Ethics Approval

This study was approved by the Ethics Committees of the Universitas Indonesia, Depok, Indonesia (Reference No. 01/UN2.F12.D/HKP.02.04/2019), and the Hasan Sadikin Hospital, Bandung, Indonesia (No. LB.02.01/X.2.2.2/4458/2019).

RESULTS

Client and Clinical Characteristics

Client and clinical characteristics are summarised in Table 1. The mean age at surgery was 45 years and there was a female predominance (80 %) among the clients in the sample. In 57 % of clients the tumour was diagnosed as Grade II meningioma and most had a mild functional dependence status based on the Barthel Index category (59.3%). Furthermore, more than half of the respondents experienced fatigue (72%) with negative illness perception (53.4%), and received poor social support(72.9%).The average EQ-5D index value (±SD)was 0.55 ± 0.26, while the median of EQ-VAS was 69.2 (IQR 40–90).

Table 1: Client and Clinical Characteristics (n = 118)

Characteristics	n (%)
Age (year), mean ±SD	45±12
Female (%)	94 (80%)
Histopathology (%)	
Grade I	39 (33.1%)
Grade II	67 (56.9%)
Grade III	12 (10.2)
Functional status (%)	
Independence	36 (30.5%)
Mild dependence	70 (59.3%)
Moderate dependence	7 (5.9%)
Severe dependence	3 (2.5%)
Total dependence	2 (1.7%)
Fatigue (%)	85 (72%)
Illness perception (negative)	63 (53.4%)
Social support (poor)	86 (72.9%)
EQ-5D Index, mean ± SD	0.55 ± 0.26
EQ-VAS (range)	69.2 (40–90)

Dimensions of Quality of Life

After surgery, more than half of the 118 clients reported " problems" in the EQ-5D dimensions of mobility (65%), self-care (57%), usual activities (70%), pain/discomfort (84%), and anxiety/depression (70%). Additionally, a number of clients reported extreme problems with EQ-5D mobility (2.5%), self-care (0.8%), and usual activities (7.6%) (see Figure 1).

Factors related to Quality of Life

The bivariate analysis was conducted for QOL measured as dependent variables; age as sociodemographic variables, and tumour grade as medical variables, were associated with quality of life ($p < 0.05$, CI 95%). Determination of tumour grade in this study was carried out by looking at the histology results and the category of WHO-based meningioma grade from the client's medical record. In this study,

clinical characteristics involve functional status, fatigue, illness perception, and social support. All of the clinical characteristics were related to the quality of life ($p < 0.05$, CI 95%). The result of bivariate statistical analysis can be seen in Table 2.

Figure 1: Relative Distribution for each Dimension in EQ-5D-5L

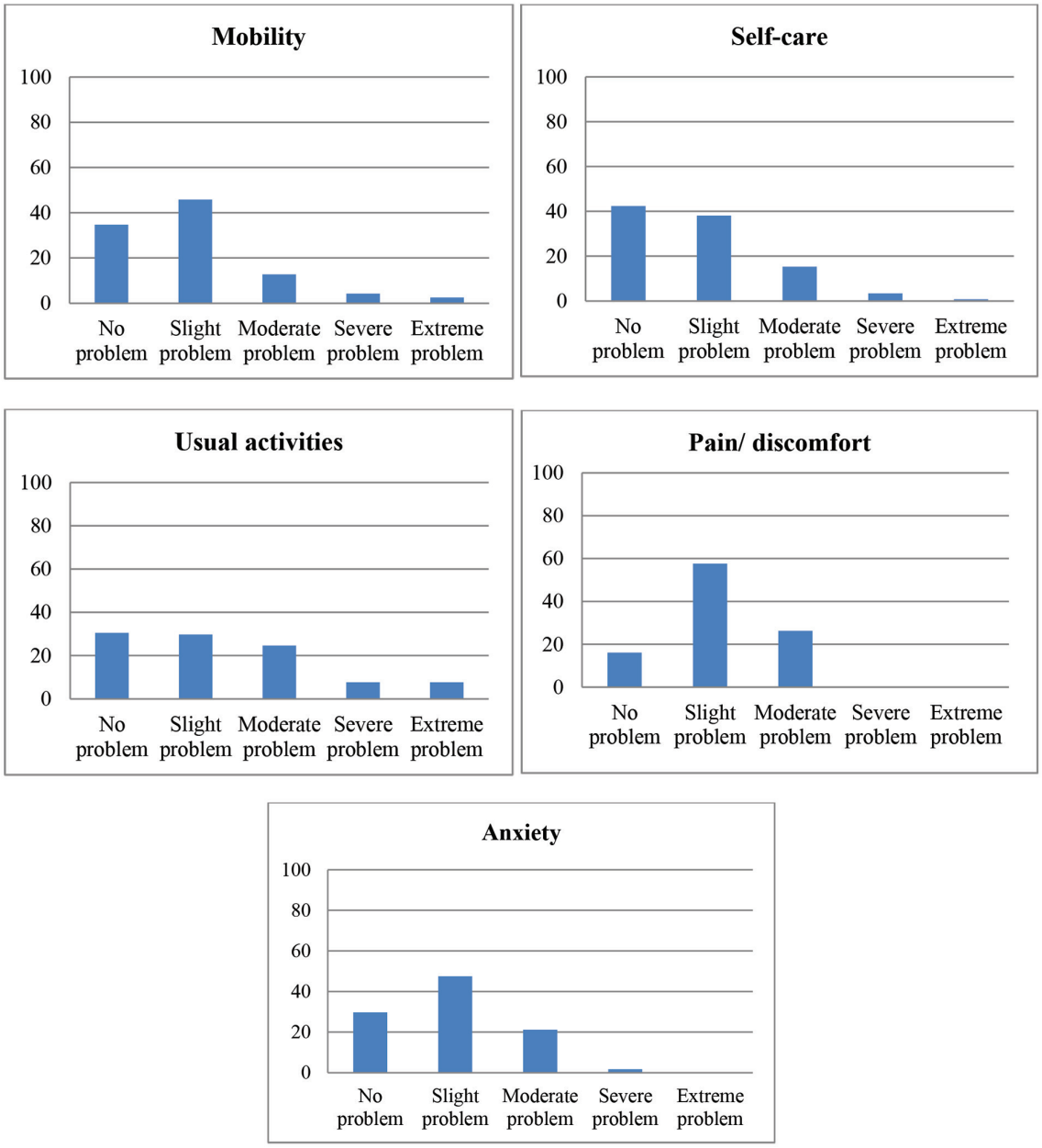

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Table 2: Correlations between Age, Tumour Grade, Functional Status, Fatigue, Illness Perception, Social Support, and Quality of Life (n=118)

Variable	P-value	OR (95% CI)
Age	0.014	0.108
Tumour grade	0.0001	0.162
Functional status	0.0001	12.667
Fatigue	0.001	4.373
Illness perception	0.0001	12.353
Social support	0.001	4.665

Regression analyses excluded age, tumour grade, and fatigue as influencing variables since there were no significant associations with QOL in multivariate analysis. Illness perception was entered in the first step, functional status in the second step, and social support in the third step. The results indicated that the most dominant factor associated with the quality of life of postoperative meningioma clients was functional status OR = 6.728 (95% CI = 1.655; 27.348). We obtain an OR for quality of life of meningioma patients of 6.728 for people who have good functional status. This means that the odds of quality of life of meningioma patients are 6.728 times as high for patients with good functional status (Table 3).

Table 3: Multivariate Statistical Test for Factors related to Quality of Life (n=118)

Variable	p-value	OR	95%CI Min	95% CI Max
Illness perception	0.003	5.874	1.819	18.962
Functional status	0.008	6.728	1.655	27.348
Social support	0.02	2.043	0.616	6.773

DISCUSSION

Quality of life can be influenced by several factors.The results indicated that more than half of the postoperative meningioma clients in this study experienced low quality of life. The average value of the EQ-5D index score is 0.555 with EQ-VAS of 69.32. The average value is lower as compared to the quality of life of the general population in Indonesia, because the index score for the general population is 0.86-0.91 with an average EQ-VAS of 79.39 (Purba et al, 2018). This is in line with other studies that explain that meningioma clients have a

significantly decreased quality of life when compared with similar demographic groups (Benz et al, 2018). The index scores in this study are lower than those of meningioma clients in Norway, where the value is 0.73 - 0.76 (Drewes et al, 2016). This can occur because the determination of the index score in each country is different (Purba et al, 2018).

The current study indicated that most clients still experienced problems in the domains of mobilisation, self-care, usual activity, pain, and anxiety/ depression. Clients experience impaired mobilisation due to the effects of long-term suppression of tumour mass on hemispheric function in the brain (Capabianca et al, 2018). Besides, some meningioma clients in this study experienced a decrease in postoperative visual function due to the suppression of long-term meningioma in the optic nerve which regulates vision function. The decrease in visual function also results in impaired mobilisation. Clients in the study sample had difficulty in walking, moving, or ascending stairs and difficulty in carrying out daily activities, resulting in decreased quality of life.

The results of the study showed that the pain dimensions of quality of life were low because most of the clients experienced headaches. There are several mechanisms of headache that can occur in meningioma clients (Capabianca et al, 2018). First, headaches are caused by suppressing the tumour mass against the arteries and veins surrounding the meninges. Both relate to the inflammatory process. In this process, macrophages will produce cytokines (interleukin-1, ILG, alpha TNF, and NGT), neurons will produce ATP and protons, and mast cells will produce histamine, prostaglandin and serotonin. These substances will stimulate the release of vanilloid-1 receptors, neurokinin A, substance P, and calcitonin gene-related peptide (CGRP) which will stimulate the nocireceptor to cause pain. Furthermore, headaches can also be associated with cerebral oedema conditions. Other literature explains that despite surgery, 36% of meningioma clients can have headache complaints (Benz et al, 2018). In the current study, postoperative meningioma clients who experienced headaches had difficulty in carrying out daily activities. Some individuals also said that their rest periods were disturbed due to headaches.

Patients with meningiomas in the frontal lobes can experience symptoms in the form of impaired concentration, depression, and decreased motivation (Jordan et al, 2018). The results of this study are in line with other studies that found that about 30% of meningioma clients experience depression (Litofsky & Resnick, 2009). Meanwhile, the literature explains that when a person experiences depression,

there will be an over-reactive state of the sympathetic nerve, adrenal cortical dysfunction, and inflammation that can underlie changes in the body's biology (Kumar & Nayak, 2017). Physiological changes that occur with depression made the postoperative meningioma clients in this study feel sad, thereby affecting their quality of life. In line with this, literature explains that depressive conditions in brain tumour clients are responsible for about 26% decrease in quality of life and 56% decrease in functional status abilities (Fox et al, 2007).These conditions caused a decrease in the quality of life of the postoperative meningioma clients in this study.

The mean age of respondents in the study sample was 45 years, which was lower than the average age of meningioma clients in other developing countries (Deltour et al, 2016; Drewes et al, 2016). In this study, older clients had poorer quality of life. These conditions can be analysed based on the results of previous studies on brain tumour clients in the same place, whereby younger clients experience an increase in their ability to mobilise, care and fulfil their daily needs, as compared to older clients, and this will affect clients' quality of life (Ganefianty et al, 2019). These results are in line with some existing literature. In several studies that have been conducted, age is considered to be one of the factors that affect the quality of life of meningioma clients (Miao et al, 2010; Tsay et al, 2012; Poon et al, 2014) .

Tumour grade is a factor related to the quality of life of postoperative meningioma clients. Signs and symptoms experienced by meningioma clients are highly dependent on the level of meningioma (Raizer, 2011). For example, if an individual has grade II meningioma (as per WHO) affecting the optic nerve, the clinical manifestation that occurs is loss of vision, even though surgery has been performed on the person (Alkemade et al, 2012). A systematic review explains that the grade of meningioma can affect the rate of recurrence among clients. Recurrence rates range from 0.00 to 2.36 per 100 people per year for WHO grade I meningiomas and 7.35 -11.46 per 100 people per year for WHO class II meningioma, which will certainly affect the quality of life of clients(Lam Shin Cheung et al, 2018).

Functional status and fatigue are physical factors related to the quality of life of meningioma clients (Bunevicius et al, 2014; Tankumpuan et al, 2015). In this study, functional status was the dominant factor associated with quality of life. This happens because clients who have functional dependence status will have problems in the domains of self-care and usual activities at various levels of quality of life. The worse the condition of the functional status, the greater will be

the disturbances to the quality of life of meningioma clients. For example, clients who are dependent for mobilisation, eating, bathing, or dressing are considered to have a poorer quality of life than independent clients (Tsay et al, 2012). The same is true of fatigue. The results showed that higher levels of fatigue will further worsen the quality of life of meningioma clients (Tankumpuan et al, 2015).

Illness perception is also related to the quality of life. This is supported by the results of a meta-analysis study which explains that illness perception has an important role in causing symptoms of distress and emotional conditions that affect the physical health of cancer clients (Drewes et al, 2016; Krok & Telka, 2018). Social support has a relationship with quality of life because it has a positive impact on the body's immune system. A cross-sectional study that examined the relationship of social support with levels of lymphocytes and cytokines, involved 232 samples and the results concluded that there was a relationship between social support and the immune system, as samples that had low social support increased CD8 + CD57 + and TNF-◎ lymphocyte levels significantly (Copertaro et al, 2014).

Limitations

The findings of the present study have some limitations. Despite being a multicentre study, purposive sampling and the relatively small sample size limit the generalisability of the study. Also, almost all the clients were accompanied by their families when filling in the research questionnaire and the social support questionnaire. This could lead to bias when answering questions about social support.

CONCLUSION

Factors related to the clients' quality of life were age, tumour grade, functional status, fatigue, illness perception, and social support. Multivariate test results demonstrated that functional status factors are the dominant factors related to the quality of life of postoperative meningioma clients. Nursing assessment and discharge planning were carried out regarding factors related to the quality of life of postoperative meningioma clients.

The results of the current study can be referred to in the development of nursing assessments of meningioma clients based on predictors of quality of life which include age, tumour grade, functional status, fatigue, illness perception, and

social support. Subsequently, nurses can take preventive measures against the quality of life problems that might occur in post-operative situations. In addition, the study findings can be used for developing a discharge planning programme and a neuro-restorative treatment unit that is intended for postoperative meningioma clients. The restoration unit can function as a unit to optimise client independence. Nurses should develop an appropriate nursing rehabilitation programme for the recovery of postoperative meningioma clients. A nursing rehabilitation programme, from 3 months to 1 year after surgery, is needed for meningioma clients.

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