Effect of Implementing a Designed Rehabilitation Nursing Intervention for Brain Surgery's Patients on their Physical and Psychological Status

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Abstract

Background: One of the most critical surgeries performed on the human body is brain surgery. Its concern potentially results in death or neurological impairment of cognitive, psychological, emotional, and behavioral skills from the brain. Also, mental health issues occur because of some dysfunction of the brain. **Aim:** This study aimed to evaluate the effect of implementing a designed rehabilitation nursing intervention for brain surgery's patients on their physical and psychological status. **Design:** A quasi-experimental research design was utilized to achieve the aim of this study. **Setting:** This study was conducted in Neurosurgery inpatient and outpatient clinics also, oncology clinics at Beni-Suef University Hospital, Egypt. **Sample:** A purposive sample of consisted of fifty adult patients undergoing brain surgery was collected within six months. **Tools of data collection:** Tool I: Brain Surgery Patients' Knowledge Assessment Sheet, Tool II: Brain Surgery Patients' Practices Assessment Questionnaire, Tool III: The short Form 12 (SF-12), Tool IV: The Hospital Anxiety and Depression Scale (HADS), and Tool V: The Impact of Event Scale (IES). **Results:** Regarding patients' knowledge, anxiety depression, and stress there a highly statistically significant differences and improvements was found between the designed rehabilitation nursing intervention and the pre-intervention among the studied patients. **Conclusion:** The results concluded that implementing a designed rehabilitation nursing intervention has a positive effect on improving physical and psychological status among brain surgery patients. **Recommendation:** It is recommended that every patient having brain surgery should get a rehabilitation program. All patients having brain surgery should have access to the prepared booklet brain surgery. Emotional support should be provided to patients undergoing brain surgery. Further research on a larger sample is recommended to achieve generalization. Further study is recommended to evaluate physical and psychological assessment before and after the surgery.

Keywords: Brain Surgery Patients, Rehabilitation nursing intervention, Physical and Psychological Status

Introduction:

Brain surgery is a difficult and crucial procedure. The ailment being treated has a significant impact on the sort of brain surgery performed. To treat patients with brain problems, a variety of neurosurgical methods have been devised, including craniectomy, craniotomy, and burr holes. The most delicate and sensitive time in a patient's life is right after surgery. In everyday practice, neurosurgical brain procedures are rather common (**Hadanny et al., 2020**).

Rehabilitation Nursing intervention for brain surgery is considered as a critical first step in ensuring the caliber of nursing care. Its main goal is to offer a framework for carrying out the many tasks involved in nursing care and for identifying the needs. The structure, process, and outcome aspects of evaluating the quality of care are widely popular frameworks for structuring rehabilitation program. It offers criteria for deciding what a nurse ought to or ought not to do (**Haddad et al., 2019**). Patients who are well-informed and educated can take an active role in their care, enhance results, prevent mistakes from happening, and shorten their hospital stay. Following brain surgery, complications could include cerebral edema, intracranial hemorrhage, further neurological damage, altered behavior, electrolyte imbalance, infection, seizures, and venous thrombosis. Within hours of surgery, there may be a hemorrhage at the surgical site. Bleeding may happen

at the lesion's bed, in the brain's ventricles, or the subdural or subarachnoid area (**Yarbro et al., 2021**).

According to **Martha (2020**), postoperative care following brain surgery may not conclude quickly; in certain circumstances, it may last for months or even years. The ideal outcomes for patients undergoing brain surgery include no or fewer complications following surgery; good neurological status; carers' capacity to manage post-operative seizures; stability of vital signs; stability of laboratory investigations; decreased anxiety; increased patient satisfaction; and the absence of patient problems (**McGlinsey & Kirk, 2019**).

According to a professional neurological assessment, nurses play a critical role in the overall patient outcome and are essential members of the health care team. They provide various degrees of intervention and health rehabilitation programs for adult patients with brain tumors. To give the best nursing care and education and so enhance the health of the patients, the nurse must have a complete awareness of the patient's needs (**McGlinsey and Kirk, 2019)**.

Patient rehabilitation is care that can help you get back, keep, or improve abilities that you need for daily life. These abilities may be physical, mental, and/or cognitive (thinking and learning). Patients have lost them because of a disease or injury or as a side effect from a medical treatment. An informed patient can actively participate in his or her treatment, improve outcomes, help identify errors before they occur, and reduce his or her length of stay in the hospital (**Janda et al., 2019**). Medical knowledge and well-being and health prevention strategies are part of the medical component of health education and rehabilitation programs. Empirical studies have indicated that the first step toward implementing successful health education and rehabilitation programs for patients is to identify their unique needs (**Haddad et al., 2019**).

Several different psychological impacts can arise from brain surgery. Depression, anxiety, rage, difficulties with thinking clearly, and difficulties controlling behavior are common problems. Either emotional regulation or difficulty performing activities used to do can create these problems. Damage to certain brain regions can also contribute to the development of these problems. So, one of the most prevalent side effects of brain surgery is a psychological shift, which occasionally gets better with time. A variety of psychological disorders, including schizophrenia, clinical depression, and anxiety disorders, are referred to as mental health disorders under a general umbrella phrase. All conditions are severe enough to interfere with daily functioning and have distinct psychological, emotional, and behavioral repercussions. In extreme cases, a person with a mental health condition may have psychosis, in which they experience things that do not exist, such as hallucinations and delusions **(Goebel et al., 2020)**.

Significance of the study:

In the early stages of treatment, 48% to 73% of patients with brain tumors report experiencing clinically significant distress, depending on the cut-off score that is applied. These individuals indicated physical symptoms, but the main source of their distress was found to be emotional pressure. According to study findings, 17% and 30% of individuals receiving treatment for brain tumors, respectively, experience anxiety and depression. Measures of distress in patients with brain tumors and other cancer populations are commonly employed, including the Hospital Anxiety and Depression Scale (HADS) and the National Comprehensive Cancer Network's (NCCN) Distress Thermometer (DT), which has been validated in patients with intracranial tumors (**Goebel et al., 2021**). An additional problem discussion with patients can provide information regarding the sources of distress, as the DT alone is insufficient to fully understand the reasons for the distress. In patients with somatic illnesses, the HADS detects signs of anxiety and depression; however, prior research was unable to demonstrate that shorter screening instruments, such as the DT, yield better outcomes **(Goebel et al., 2020)**.

Aim of the Study:

To evaluate the effect of implementing a designed rehabilitation nursing intervention for brain surgery patients on their physical and psychological status

Research hypothesizes:

H1: knowledge among brain surgery's patients regarding brain surgery will be improved after implementing the designed rehabilitation nursing intervention

H2: **Self-care behavior** among brain surgery's patients regarding brain surgery will be improved after implementing the designed rehabilitation nursing intervention.

H3: Implementing the designed rehabilitation nursing intervention regarding brain surgery will have a positive effect on reducing anxiety, depression, and stress levels among brain surgery's patients.

Subjects and Method:

Research design:

A quasi-experimental research design was used to achieve the aim of this study

Setting:

This study was conducted in Neurosurgery inpatient and outpatient clinics also, oncology clinics at Beni-Suef University Hospital, Egypt, this setting were selected due to the high prevalence of patients in the selected setting, and also it serves the biggest region of the population.

Subjects:

A purposive sample that comprised fifty adult patients undergoing brain surgery who were between the ages of 21 and less than 60, able to follow instructions, communicate verbally, free from other chronic illnesses, admitted at least one day before surgery, and willing to participate. The patients were gathered within six months of the surgery.

Sample size calculation:

The sample size was calculated based on considering the level of significance of power analysis of 0.95(β=1-0.95=0.5) at alpha .05 (one-sided) with a large effect size (0.5) was used as the significance, and 0.001 was used as the high significance.

Tools for data collection:

The required data was gathered using the following six tools:

Tool I: Brain Surgery Patients' Knowledge Assessment Sheet: To evaluate the health state of patients undergoing brain surgery, the researchers created this tool based on a thorough evaluation of related literatures (**White et al., 2019; Gavrilovic & Posner, 2020; Goebel et al., 2020**). It included 2 Parts:

Part 1: Personal characteristics of patients: It contains the following items: Age, gender, educational level, and residence.

Part II: Patients' clinical data: Diagnosis, previous neurological surgery, family history of brain disease or brain surgery, previous neurological problems, type of surgery.

Tool II: Brain Surgery Patients' Knowledge Assessment Interviewed Questionnaire: This tool consists of a series of closed-ended and open-ended questions regarding the definition of brain surgery, pre-and postoperative precautions, perioperative care, warning signs/complications to report to the doctor, managing seizures, and knowledge about prescribed medication, dietary measures, and infection control measures.

Scoring system:

A score was assigned to each correct response. Patients with scores below 60% were deemed to have "unsatisfactory" knowledge. 60% of patients were deemed to have "satisfactory" knowledge.

Tool III: Brain Surgery Patients' self-care behavior Assessment Interviewed Questionnaire: It included ten steps developed by the researchers. It was designed to assess patient's practice regarding brain surgery based on a thorough review of related literature (**Gavrilovic & Posner, 2020 and Goebel et al., 2020**) related to nutrition, weight control, rest, physical activity and exercises, smoking cessation, care of wound site, stress reduction, effective communication, chemotherapy and radiotherapy, and routine follow-up.

Scoring system:

The scoring system was calculated as zero for "no answer", and one for "yes answer". The total score was 0 – 10. The total score was categorized into adequate and inadequate practices" as follows: inadequate for less than 60% and adequate for more than 60%.

Tool IV: The Short Form 12 (SF-12): A modified version of the SF-36 in German was utilized for patient assessment (**Bullinger, 1995**). It suggests the Mental Component Summary Scale (MCS) and the Physical Component Summary Scale (PCS) (**Ware et al., 1996**). The standard Barthel Index was utilized to assess the physical result. A 10-item evaluation tool was used to assess physical reliance in everyday living activities **(Mahoney & Barthel, 1965)**. Six items were scored on a 3-point scale (0, 5, and 10 points) for feeding, toilet use, climbing and descending stairs, dressing, controlling bowels, and bladder control; two items were evaluated on a 4-point scale (0, 5, 10, and 15 points)

for moving from a wheelchair to bed and returning and walking on a level surface. Two items were assessed on a 2-points scale (0 and 5 points) for bodily pain and vitality. According to **Hung et al. (2014**), the total possible score ranges from 0 to 100, with lower values denoting greater dependency. In environments centered on the results of brain surgeries, it has been effectively used (**Ahmadi et al., 2010).**

Tool V: The Hospital Anxiety and Depression Scale (HADS): It is an example of a questionnaire created by Zigmond et al. (1983) to identify anxiety and depression. A four-point rating system, from no symptoms to the highest level of symptomatology, is used to rate each item (**Hawley, 2019**).

Scoring system:

According to a scale that ranges from 0 to 7 for mild, 8 to 10 for moderate, and 11 to 21 for severe, the clinical importance of anxiety and depression was determined (**Hawley, 2019**).

Tool VI: The Impact of Event Scale (IES) (**Zilberg et al., 1982**): It was examined to gauge the psychological responses to stress after brain surgery. A validated 15-item self-report scale is used to measure two symptoms of post-traumatic stress disorder (PTSD): intrusion (7 items) and avoidance (8 items) **(Sundin et al., 2003)**. While IES intrusion scores range from 0 to 35 points, avoidance scores vary from 0 to 40 points. It has been found that patients with PTSD can be identified by their summarized mean IES score (**Greenspan et al., 2019**).

Methods of data collection:

Fieldwork:

The study included 50 adult patients. The researchers attended previously selected settings three days / a week from 9 am to 1 pm. Data was collected within 6 months from October 2023 until the end of March 2024. Approximately, 20-30 minutes were taken to complete each interview questionnaire.

The Preparatory Phase*:*

Tools of data collection development. First, tools of data collection were developed and adopted by the researcher based on the relevant literature of review.

Tools validity:

Five experts, three from the Faculty of Nursing's medical-surgical nursing field, one from the community health nursing department, and one from the psychiatric mental health nursing department, evaluated the tools' face and content validity to determine whether they met the study's trustworthiness criteria. The experts also assessed the tools' content for completeness, accuracy, clarity, and applicability. Absolutely no changes were made.

Tools reliability:

Reliability testing for the study tools was estimated using Cronbach's Alpha test of the study tools. Results indicated that the tool I had Cronbach's Alpha coefficient of: 0.87. Tool II had Cronbach's Alpha coefficient of: 0.78. Tool III had Cronbach's Alpha coefficient of: 0.79, and Tool IV had Cronbach's Alpha coefficient of: 0.895. Tool V had Cronbach's Alpha coefficient of: 0.856. Tool IIV had Cronbach's Alpha coefficient of: 0.872.

A pilot study

A pilot study was conducted on 10% (5 patients undergoing brain surgery) of the total sample to test clarity and testing of the feasibility of the research process. No modifications were carried out to develop the final form of the tools. Patients who were in the pilot were included in the research study.

Ethical considerations:

- The study protocol was approved by the Post Graduate and Ethical Research committees, faculty of nursing, Sohag University.

- An official letter was submitted to the general directors of the head of the previously selected settings. The enrolled patients gave their written agreement to participate in the trial, and confidentiality and privacy were protected. The study took into consideration and respected the participant's choice to withdraw at any moment.

Administrative Design:

An official letter including the aim of the study was sent from the Dean of the Faculty of Nursing to the director of the selected setting seeking his approval to carry out the study.

- The study was conducted in four phases:

• Assessment phase:

Using the tools designed for the patients under study, the preliminary evaluation was completed. Before the application of the nursing rehabilitation intervention, an assessment was conducted to evaluate their knowledge, practices, and physical, and psychological status about brain surgery.

• Planning phase:

Based on the results of the assessment phase and a review of relevant research, the contents of the nursing rehabilitation intervention were devised and put into implementation.

• Implementation phase:

Following the patient selection process, the purpose and significance of the research project were discussed. The following questionnaires were given to the patients under study who were having brain surgery twice: (1) a pre-test to gauge their level of knowledge, practices, stress, anxiety, and depression before the start of a specially designed nursing rehabilitation program. (2) A post-test to evaluate adult patients' knowledge, practices, stress, anxiety, and depression following the implementation of a planned nursing rehabilitation program.

After reviewing the relevant literature in light of the assessment of the actual needs of the patients under study, a simplified booklet was used as a supportive tool and provided to adult patients in the Arabic language. It covered all topics regarding the knowledge and self-care behavior of brain surgery. Various instructional techniques, including talks, debates, and images were employed.

The brain surgery nursing rehabilitation intervention was created by the researchers and was divided into two sections: theory and practice. Patients' knowledge of brain surgery was covered in the theoretical section. It has been put into practice with the use of talks, posters, instructional movies, role-plays, and situations. Patients received an informational pamphlet about brain surgery from the researchers, which was written in plain Arabic and included descriptive photos.

The nursing rehabilitation intervention included knowledge regarding brain surgery as follows:

- Anatomy of the brain
- meaning of brain surgery
- Various diagnostic procedures and how to be prepared for it
- Perioperative care and warning signs
- Benefits of surgical management
- Systemic and neurosurgical postoperative complications after brain surgery
- Information about how to reduce or prevent postoperative complications through medical therapy after surgery
- pre and postoperative precautions
- seizures care
- Prescribed medication
- Dietary measures
- Infection control measures.

The practical part contained information regarding brain surgery. The interview took approximately 25-35 minutes for each patient to answer and fill out the questionnaire to assess the practices of the studied patients. It was implemented through lectures, posters, and educational films.

The nursing rehabilitation intervention included self-care behavior regarding brain surgery as follows:

- Nutrition
- Weight control
- Rest
- Physical activity and exercises
- Smoking cessation
- Care of wound site
- Stress reduction
- Effective communication
- Chemotherapy and radiotherapy
- Routine follow up

The researcher's design was concentrated on the following sessions:

The researcher introduces herself, describes the nature and goal of the study, and discusses that the program is crucial in session one. At the beginning of the session, the researcher welcomed all patients and thanked them for their participation in Session 1.

Presentation of information on the anatomy of the brain, meaning of brain surgery, various diagnostic procedures and how to be prepared for it, perioperative care and warning signs, benefits of surgical management, and systemic and neurosurgical postoperative complications after brain surgery included in Session 2.

Session 3 covered topics such as how to deal with seizures, reduce or prevent postoperative complications through medical therapy following surgery, pre and postoperative precautions, knowledge of prescribed medication, dietary measures, and knowledge of infection control measures.

As part of the deep breathing exercises covered in session four. The researcher gave deep breathing techniques to the patients. The researcher shows pictures and a video that walks viewers through deep breathing exercises. The researcher asks patients to do deep breathing exercises.

Session 5 covered the use of relaxation training as a technique for progressive muscle relaxation. The researcher introduced the patients to progressive muscle relaxation. The investigator presents still photos and short videos that show the steps involved in gradual muscle relaxation. The researcher asks patients to practice progressive muscle relaxation.

In session six, practice meditation as part of your relaxation training. The researcher offered meditation to the patients. The researcher shows pictures and a video that shows how to meditate. The researcher asks patients to exercise meditation.

Session 7 included practical information about diet, weight control, rest, physical activity, exercise, quitting smoking, wound care, stress reduction, effective communication, chemotherapy, radiotherapy, and routine follow-up.

Session 8 evaluated the impact of a developed nursing rehabilitation program on patients' physical and psychological status using a post-test.

Evaluation phase:

Three months later, each patient had a follow-up interview to review their knowledge, self-care behavior, stress, anxiety, depression, and current state of physical and mental health. The identical instruments used for the pretest and post-test were utilized to reevaluate the patients under study.

Statistical Analysis:

"SPSS" software, version 20, was used to analyze data. The generated tools' reliability was assessed using the Cronbach's alpha reliability test. The quantitative variables were tested using the Mann-Whitney U test, while the qualitative variables were compared using the Chi-Square ($\chi 2$) and Monte Carlo tests. The connection between two quantitative variables was examined using the t-test. To compare the distributions of two qualitative variables, the Fisher's exact test (FET) was employed.

Results:

Table 1 revealed that 58% of the patients who having brain surgery were in the age range of 40 to 60 years old. 56% of the sample consisted of men, 36% of whom could read and write, 52% of whom were employed, and 58% of whom lived in rural areas.

Table (2) revealed that 6% of the patients who previously having brain surgery had neurological issues before the study. Of them, seventy percent did not have a family history of brain surgery or illness. Additionally, 84% of them underwent cranial osteotomies (craniotomy) as a form of surgery.

Figure (1) shows that more than three-quarters of brain surgery patients (78%) were diagnosed with brain tumors

Figure (2) shows that more than half of the studied brain surgery patients (52%) had headaches followed by 24% of them had visual disturbances

Figure (3): Portrays that 69% of the studied brain surgery patients reported that their main source of information regarding brain surgery was doctors.

Table (3) revealed a highly significant statistical difference ($P<0.001$) in the knowledge of brain surgery patients before and after the implementation of a nursing rehabilitation program.

Figure (4) demonstrates that when compared to pre and post--three- months of the nursing rehabilitation program being implemented, the total knowledge level of the patients who had brain surgery had improved. It was found that 89% of the patients who underwent brain surgery in the study had unsatisfactory knowledge before the rehabilitation program, and that number had dropped to 7 % three months later of the implementation of the nursing rehabilitation program. However, compared to 93% three months after the nursing rehabilitation program was implemented, only 11% of them had satisfactory expertise before its implementation.

Figure (5) portrays the patients' overall practices before and three months after the nursing rehabilitation program was put into place for brain surgery patients. When the nursing rehabilitation program was implemented, it was found that 90% of the patients had inadequate brain surgery procedures. Three months later, this percentage had dropped to 15%. However, compared to 85% three months after the start of the nursing rehabilitation program had adequate practice, only 10% of the adult patients in

the study had adequate practice before the program's implementation.

From **Table 4,** it was observed that there was a statistically significant improvement at p=<0.001 in patients' physical status component summary scale (PCS) and mental component summary scale (MCS) mean scores pre and post-three-month nursing rehabilitation program implementation.

Table 5 shows that among the patients who underwent brain surgery, there was a statistically significant (p=<0.001) drop in HADS anxiety and depression mean scores before and after a three-month nursing rehabilitation program.

Table 6 illustrates that among the brain surgery patients under study, there was a statistically significant (p=<0.001) decrease in psychological stress **(**Impact of Event Scale (IES) mean scores responses after the surgery, both before and after a three-month nursing rehabilitation program was put in place.

Figure 6 shows that both before and after a three-month nursing rehabilitation program was implemented, there was a considerable improvement in the overall levels of HADS sadness and anxiety among the patients who had brain surgery.

Table (1): Personal Characteristics Distribution of The Studied Brain Surgery Patients (n=50)

Items	No.	%
Patients ' age in years		
21≤ 30 years	5	10
30≤ 40 years	16	32
40 ≤ 60 years	29	58
Gender		
Male	28	56
Female	22	44
Education level		
Illiterate	10	20
Read and write	18	36
Secondary education	12	24
Higher education	10	20
Occupation		
Working	26	52
Not working	24	48
Residence		
- Rural	29	58
- Urban	21	42

Table (2): Clinical Data Distribution of the Studied Brain Surgery Patients (N=50)

Item	No.	%
Previous neurological surgery:		
- Yes	3	6
- No	47	94
Presence of family history of brain disease		
- Yes	15	30
- No	35	70
Type of surgery		
- Craniotomy	42	84
Craniectomy	3	6
burr holes	5	10

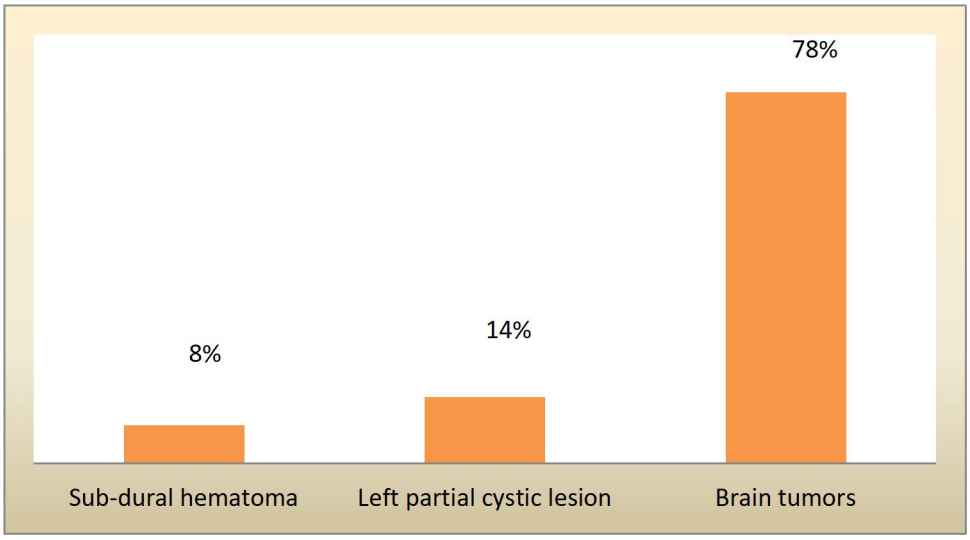


Figure (1): Diagnosis Distribution among The Studied Brain Surgery Patients (n=50)

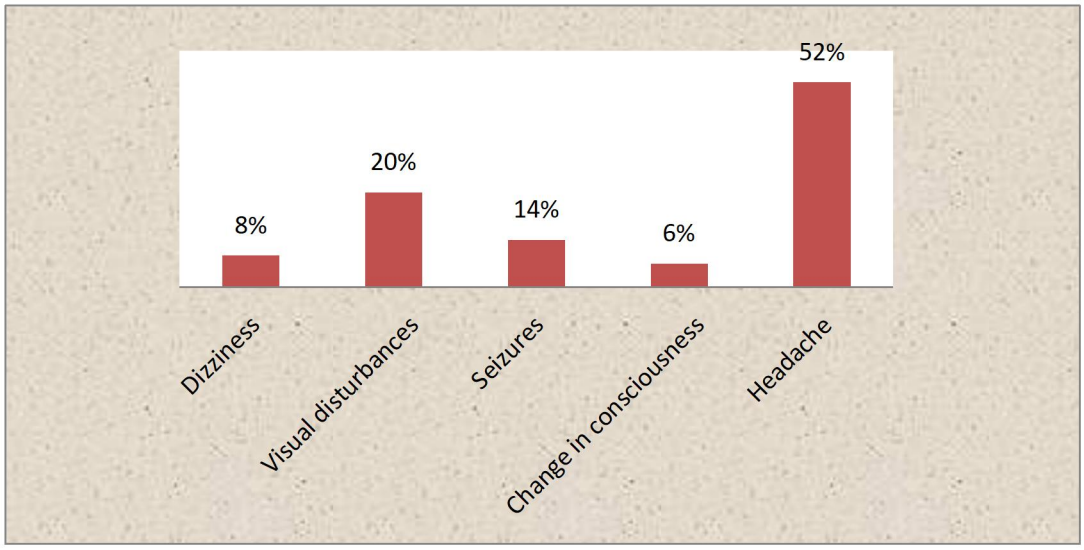
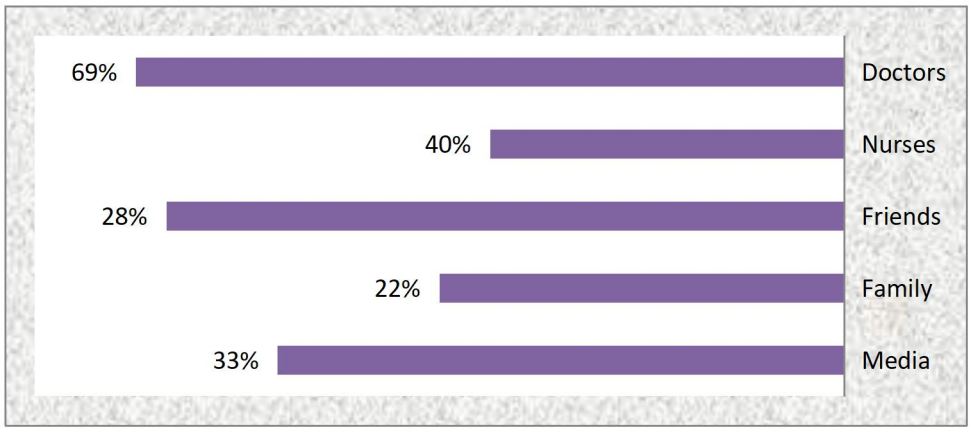


Figure (2): Previous Neurological Problems Distribution among the Studied Brain Surgery Patients (n=50)



More than one answer

Figure (3): Source of Knowledge Regarding Brain Surgery among the Studied Brain Surgery Patients (n=50)ǀ

Table (3): Brain Surgery Patients' Knowledge Distribution Regarding Brain Surgery Pre and Post Three Months Nursing Rehabilitation Program Implementation

Brain surgery patients' knowledge	No =(50)		p-value
	Pre-nursing rehabilitation program implementation (No/%)	Post Three Months Nursing Rehabilitation Program implementation (No/%)	
Brain anatomy	0 (0)	37 (74)	<0.001*
Meaning of brain surgery	7(14)	34(68)	<0.001*
Diagnostic procedures	12(24)	45 (90)	<0.001*
Pre and postoperative precautions	17 (34)	38 (76)	<0.001*
Perioperative care and warning signs	8(16)	33(66)	<0.001*
Benefits of surgical management	13 (26)	42 (84)	<0.001*
Postoperative complications	17 (34)	39 (78)	<0.001*
Prevention of postoperative complications	9(18)	35(70)	<0.001*
Seizures care	11 (22)	40(80)	<0.001*
Knowledge related to prescribed medication	14 (28)	41 (82)	<0.001*
Dietary measures	18 (36)	37 (74)	<0.001*
Knowledge related to infection control measures	6(12)	34(68)	<0.001*

**: Statistically significant at $p \leq 0.05$*

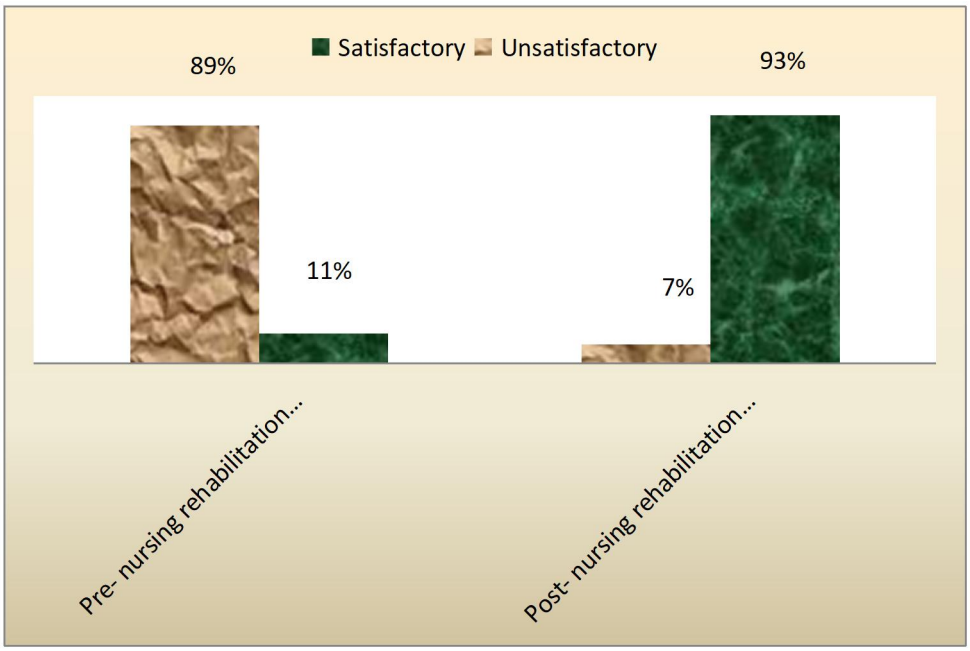


Figure (4): Total Knowledge Level of The Studied Brain Surgery Patients' Knowledge Pre and Post Three Months Nursing Rehabilitation Program Implementation

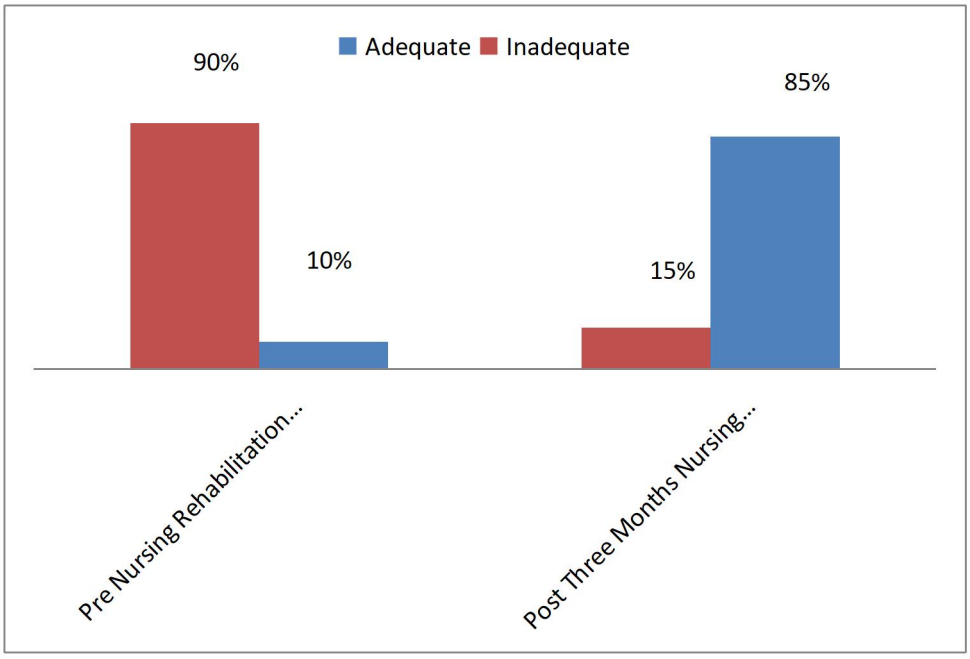


Figure (5): Total Practice Level of The Studied Brain Surgery Patients' Practice of Pre and Post Three Months Nursing Rehabilitation Program Implementation

Table (4): Differences in Physical Status Based on the Physical Component Summary Scale (Pcs) and Mental Component Summary Scale (Mcs) Mean Scores Pre and Post Three Month Nursing Rehabilitation Program Implementation

Brain surgery patients' Physical status	Pre-nursing rehabilitation program implementation	Post-three-months nursing rehabilitation program implementation	T-test	P-value
Physical Component Summary Scale (PCS)	41.8 ± 4.9	45.4 ± 4.3	36.48	<0.001*
Mental Component Summary Scale (MCS)	51.3 ± 8.7	56.5 ± 6.6	46.22	<0.001*

**: Statistically significant at p ≤ 0.05*

Table (5): Differences in Psychological Status Based on HADS Anxiety and HADS Depression Mean Scores Pre and Post Three Months Nursing Rehabilitation Program Implementation

Brain surgery patients' psychological status	Pre-nursing rehabilitation program implementation	Post-three-months nursing rehabilitation program implementation	T-test	P-value
HADS anxiety M ± SD	4.1 ± 4.2	1.7 ± 2.4	26.33	<0.001*
HADS depression M ± SD	6.2 ± 12.3	1.8 ± 5.4	28.45	<0.001*

**: Statistically significant at p ≤ 0.05*

Table (6): Differences in Psychological Stress Mean Scores Reactions Following Brain Surgery Based on The Impact of Event Scale (IES) Pre and Post Three Months Nursing Rehabilitation Program Implementation

Brain surgery patients' psychological status	Pre-nursing rehabilitation program implementation	Post-three-months nursing rehabilitation program implementation	T-test	P-value
Impact of Event Scale (IES)	6.2 ± 12.3	3.5 ± 5.9	30.21	<0.001*

**: Statistically significant at p ≤ 0.05*

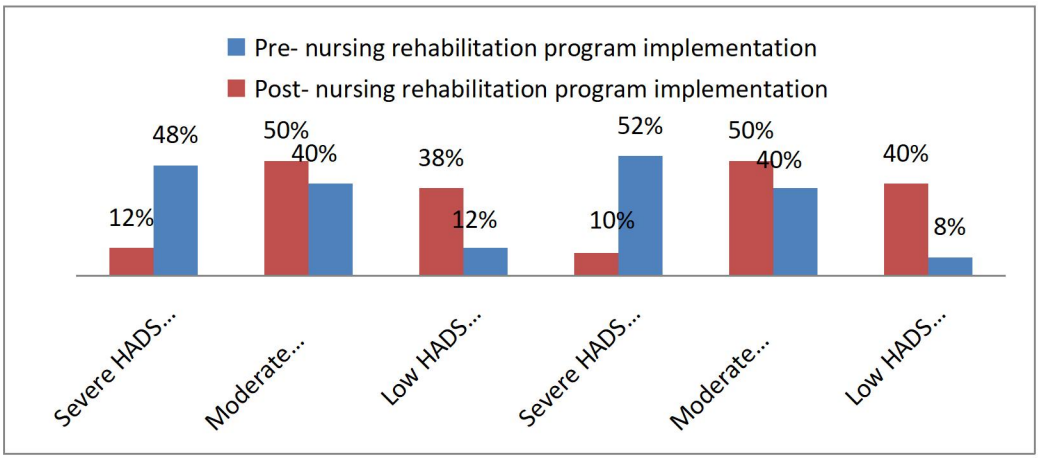


Figure (6): Total HADS Anxiety and HADS Depression Levels of the Studied Brain Surgery Patients' Knowledge of Pre and Post Three Months Nursing Rehabilitation Program Implementation

Discussion:

Brain surgery is a procedure that treats brain abnormalities or issues within your brain and the surrounding areas. The brain is part of your central nervous system. It controls your ability to speak, move, think, and remember. Brain surgery treats underlying conditions in, on, or around brain without disrupting body's important functions (**Yarbro et al., 2021**).

According to the current study's findings, less than two-thirds of the patients who underwent brain surgery lived in rural areas, between the ages of 40 and 60, and more common in men. According to a study by **Bin-Madhi (2019**) titled "Brain Tumors Excision Guided by Neuronavigation: Practical Application and Results," brain tumors are more common in men than in women, with a mean age of 47. These findings are comparable to the study's findings.

The current study's conclusion demonstrated that the majority of the individuals who underwent brain surgery had neurological issues in the past. These findings are corroborated by research on brain tumors conducted by **Urden et al. (2019) and Krucik (2018**), who found that headache, sleepiness, visual problems, altered consciousness, seizures, and motor deficiency are among the more typical clinical manifestations of brain tumors.

The current study's findings demonstrated that craniotomies are present in the majority of the individuals who underwent brain surgery. According to **Van De Beek et al. (2020**), craniotomies are frequently performed in neuroscience to access brain tissue that needs to be removed. Similar findings were also observed in that investigation. Also, it was discovered that a large number of the study's control subjects had smoked in the past. According to **Mandelzweig et al. (2019**), smoking increases the risk of brain tumors, particularly gliomas.

According to the current study's findings, brain tumors were identified in the shows that more than three-quarters of patients undergoing brain surgery. According to **Amit (2019**), brain tumors are among the conditions that warrant brain surgery.

The results of the current investigation showed that headaches and visual abnormalities affected almost half of the patients who had brain surgery. According to **Urden et al. (2019) and Krucik (2018**), headache, drowsiness, visual disturbances, changes in consciousness level, seizures, and motor deficiency are the most frequent clinical manifestations of brain tumors, brain abscess, subdural hematoma, and cystic lesion within the intracranial cavity.

According to **McHugh et al. (2021),** headaches are associated with elevated intracranial pressure as a result of compression of pain-sensitive structures within the intracranial compartment. The most crucial thing to remember following brain surgery is to avoid straining factors that raise intracranial pressure.

The study's findings showed that more than two-thirds of the patients who were the subject of the investigation stated that doctors were their primary source of information on brain surgery. This indicates that individuals are appropriately oriented when

looking for assistance and resources for such chronic illnesses.

According to the study's findings, patients who had brain surgery had better knowledge of the procedure before and after nursing rehabilitation programs were implemented, with a highly statistically significant difference. The outcomes of the nursing rehabilitation programs, which satisfied the demands of patients who had brain surgery and gave them the knowledge they needed to keep themselves healthy, are shown in this result.

The current study's findings showed that when compared to pre- and three months after the nursing rehabilitation program was implemented, the examined brain surgery patients' overall knowledge level had improved. This could be explained by the fact that the medical staff did not provide patients with adequate information. While some patients had little interest in learning anything, others were curious but were unable to locate a physician, medical staff, and nurses with the time to adequately enlighten them. This enhancement emphasizes the fact that the majority of patients have a strong desire to demonstrate the program's impact and learn more about their ailments.

The present study results revealed an improvement in brain surgery patients' practices and the majority of them had adequate practices post-three-month nursing rehabilitation program implementation. From the researchers' point of view, it reflected the good impact of the nursing rehabilitation program implementation in improving practices. These confirmed the significant modifications in the patient's practices that reflected the main goals of the implementation of the nursing rehabilitation program. This result agreed with the study by **Fan et al., (2020**) about the "KAP theory" and reported that health behavior changes when gaining the right knowledge and adopting the practice. Also, a recent study by **Rana et al., (2020**) illustrated that sufficient individual knowledge is associated with effective management of disease and promotion of a patient's health. A study by **Ricardo et al., (2018**) supported that; a knowledge deficit is associated with poor health and maladaptive disease preventive behavior. This reflected the importance of improving adult patients' knowledge and practices to help them learn and acquire good knowledge and apply it. This association is explained by that when the studied adult patients had sufficient knowledge, they could have adequate practice.

The current study's findings demonstrated statistically significant improvements in the mean ratings for patients' physical status component summary scale (PCS)and mental component summary scale (MCS) before and after a three-month nursing rehabilitation program was put in place. The current study's purpose and hypotheses validated these findings. These outcomes are consistent with the research conducted by **Parth et al. (2020)** on the "Rehabilitation of Patients with Primary Brain Tumours." The study found that following the rehabilitation program, patients' physical status improved, indicating the efficacy of the nursing rehabilitation program in treating brain tumors.

The findings of **Piper and Stewart (2019**), who showed that an efficient health education program will produce changes that exhibit enhanced knowledge about particular medical and health-related concerns for a prolonged period, corroborated these findings. Good health education can reduce risky behavior and minimize or prevent several postoperative problems by producing both short- and long-term behavioral changes. Learner feedback and assessor observations can be used to document these behavioral shifts.

The study's findings demonstrated that both before and after a three-month nursing rehabilitation program was put into place, there was a statistically significant decline in the mean scores for HADS anxiety and depression among the patients who had brain surgery.

Goebel et al. (2021) looked at the postoperative distress levels of individuals with primary intracranial cancers; it's important to remember that the anguish level may change after surgery for a primary intracranial cancer. When **Hinz et al. (2020**) examined patients with various cancer forms, including brain tumors, they found that cancer patients had almost twice as high levels of anxiety and depression as the overall population. Cancer patients completed the HADS both before and after treatment with radiotherapy in the **Takahashi et al. (2018**) study.

According to **Mertz et al., (2021)** study results, emotional issues were more common among those patients than physical illnesses. Women who have just received a breast cancer diagnosis emphasize the need to treat these symptoms and prioritize emotional concerns over physical illnesses.

Physical issues should receive more care than emotional problems.

The study's findings demonstrated that both before and after a three-month nursing rehabilitation program was put into place, there was a statistically significant decrease in the mean scores of psychological stress among the brain surgery patients under investigation. From the perspective of the researchers, it demonstrated the efficacy of the nursing rehabilitation program's implementation, which equipped the patients under study with adequate knowledge and practices regarding brain surgery, thereby lowering their level of stress after the procedure.

According to **Kramer et al. (2020**), patients who enter rehabilitation fully dependent on others for all daily tasks may show notable progress in their functioning by the time, they are discharged and in the months that follow. Our findings are also consistent with **Greenspan et al.'s (2019**) inability to find a relationship between the IES score and the degree of brain surgery. On the other hand, **Hawley (2019**) discovered a greater prevalence of anxiety and depression among the patients under study when comparing HADS scores.

The results of the present study demonstrated that there was a significant decrease and improvement in total HADS anxiety and HADS depression levels observed among the studied brain surgery patients pre and post-three-month nursing rehabilitation program implementation. From the researchers' point of view, it confirmed the success of nursing rehabilitation program implementation.

Conclusions:

Based on the findings of the present study, it can be concluded that implementing a developed nursing rehabilitation program has a positive effect on improving physical and psychological status among brain surgery's patients.

Recommendations:

Based on the current study results, the following recommendations are proposed:

- It is recommended that every patient having brain surgery should get a rehabilitation program related to brain surgery to enhance their knowledge and promote self-care behaviors and psychological status including anxiety, stress and depression.
- All patients having brain surgery should have access to the prepared booklet and illustrated pamphlets for each patient to improve their information and reduce their anxiety, stress, and depression levels regarding brain surgery.
- Emotional support should be provided to patients undergoing brain surgery**.**
- Further research on a larger sample is recommended to achieve generalization.
- Further study is recommended to evaluate physical and psychological assessment before and after the surgery.

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