Effect of Instructional Guidelines on Knowledge, Practice, and Fatigue Level among Patients with Brain Tumors

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Abstract

Fatigue is recognized as one of the most common and distressing adverse effects of cancer disease and treatment. Educational guidelines are providing general information about fatigue and introducing new concepts regarding energy conservation, self-care, and confrontation techniques**. Aim was to** evaluate the effect of instructional guidelines on knowledge, practice, and fatigue level among patients with brain tumors. **Subjects and method: Design:** A quasi-experimental research design was utilized to fulfill the aim of this study. **Setting:** the research was conducted in the neurosurgery department and neurosurgery outpatient clinic of Fayoum Oncology Center. **Subjects**: A purposive sample of 50 adult patients was included. **Four tools were used:** Tool (I) a structured interview questionnaire, Tool (II) adult patients' knowledge regarding brain tumors, Tool (III) adult patients' practice regarding brain tumors (pre/post), and Tool (IV) Fatigue assessment scale. **Results**: More than half of adult patients were having a family history of cancer. The majority of adult patients reported that the main source of information regarding their knowledge was doctors. There was a positive significant correlation (P=0.005) between adult patients' knowledge scores and their practice post-three months of instructional guidelines implementation. There were highly significant improvements in adult patients' knowledge and practice regarding brain tumors post instructional guidelines implementation (P=0.005). Statistical highly significant differences and reductions were detected between fatigue mean scores pre and post-three-months of instructional guidelines implementation**. Conclusion:** The instructional guidelines implementation had a highly significant positive effect on reducing fatigue level among adult patients with brain tumors. **Recommendations:** The instructional guidelines regarding brain tumors should be conducted, discussed, integrated into the rehabilitation programs, and taught to the adult patients using the booklet and illustrated pamphlets for each one to improve their information and reduce their fatigue level and replication of the current study with a larger sample of an adult patient with brain tumors in different settings is required for generalizing the results.

Keywords: Instructional guidelines, knowledge and practice, fatigue level, adult patients diagnosed with brain tumors.

Introduction:

Malignant brain tumors (BT) are devastating illnesses that not only carry a dismal prognosis but can profoundly affect one's function and quality of life. An estimated 23,180 primary malignant BT are expected to be diagnosed in the USA. Primary malignant BT includes all tumors of the brain, CNS, pituitary glands, and olfactory tumors of the nasal cavity. Treatment of BT often includes partial or full surgical resection, chemotherapy, and/or radiation therapy. Overall, the 5-year survival rate in the USA following diagnosis of BT is 34.2% (**Valko**. **et al., 2018).**

The central nervous system (CNS) tumors are derived from glial cells, and comprised approximately 40%-60% of all CNS primary tumors, being the most common among adults. glioblastomas may cause neurological deficits, including slow thinking, ataxia, changed behavior, dizziness, motor deficits, visual impairment (blurred vision, diplopia), epilepsy, recurrent syncope, and in more severe cases, severe sleepiness and coma. According to the literature, the survival time of patients with

glioblastoma multiforme is 10-24 months. The usual treatment is surgery, followed by radiotherapy and chemotherapy (**Lakhan & Harle, 2019).**

Although benign tumors are more prevalent and are considered more treatable than malignant tumors, intervention for any brain tumor can be invasive. Brain tumors can be treated in several ways, including surveillance, surgery, chemotherapy, and radiotherapy. The clinical approach should be considered based on several factors, including the qualities and location of the tumor along with the condition and preferences of the patients. Treatments are not without risks, however. Radiotherapy can bring about fatigue and encephalopathy, and chemotherapy regimens can have many side effects as well. Medical complications of patients with brain tumors have been well documented and include venous thromboembolic disease, syndrome of inappropriate antidiuretic hormone (SIADH), dysphagia, and seizures, among others. Psychiatric symptoms such as depression, fatigue, mood changes, and personality changes have been noted in conjunction with other symptoms such as headaches, sleep changes, and cognitive disturbances (**Berger et al., 2018)**.

Fatigue is recognized as one of the most common and distressing adverse effects of cancer disease and treatment. The clinical symptom of fatigue may include generalized weakness, decreased mental concentration, insomnia or hypersomnia, and emotional change that cause significant impairment to the global quality of life of cancer patients during and after treatment. The pathogenesis of the relationship between cancer and fatigue has not been elucidated, but physiological, biochemical, and psychological disturbances seem to be involved. Due to its multifactorial nature, several interventions in the management of cancer-related fatigue have been investigated **(Armstrong & Gilbert, 2018).**

Some of the physiopathological factors of fatigue, including inflammatory cytokine dysregulation, changes in hypothalamic regulator circuits and serotonergic system in the central nervous system (CNS) **(Horneber et al., 2017).** Also, disturbances in circadian and sleep-wake rhythm, gene polymorphisms of regulatory proteins involved in oxidative phosphorylation, B-cell signal transduction, proinflammatory cytokine expression and catecholamine metabolism **(Raaf et al., 2018).**

There is no gold standard for fatigue treatment, possibly due to its multifactorial etiology and lack of knowledge of underlying mechanisms. However, some of the pharmacological or non-pharmacological approaches have been found to contribute to reducing cancer-related fatigue. The most frequently used non-pharmacological approaches are physical activity (exercise), psychosocial interventions, including educational interventions, management of work and rest times, and relaxation and attention techniques (**Bower, 2014**).

Among the psychosocial interventions, which include education, counseling, and support groups, educational therapy and cognitive-behavioral therapy have shown significant benefits to patients. Educational guidelines are providing general information about fatigue and introducing new concepts regarding energy conservation, self-care, and confrontation techniques. Energy conservation is defined as individualized, planning aimed at preventing to prevent a decrease in patient's energy level required to complete a task for improving his ability to manage fatifue throughout the entire day **(Pachman et al., 2018)**.

Cancer-related fatigue (CRF) is defined as "a distressing, persistent, subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning". The CRF differs substantially from so-called 'healthy' or 'normal' fatigue as it tends to be more severe, more distressing, and less likely to be relieved by rest. Researchers have reported that greater than 80% of patients with BT experience fatigue during therapy. The incidence of CRF may approach 89–94% among patients with recurrent malignant gliomas when measured using validated and reliable instruments for this population. Among patients with low-grade glioma, 39% reported fatigue up to 8 years after completion of therapy. Fatigue has even been rated as being more troublesome than other symptoms, such as pain or nausea, and vomiting, which can generally be managed by medications. The CRF can also have profound psychosocial

and economic impacts (**NCCN Clinical Practice Guidelines in Oncology, 2019**).

The evidence is limited to support complementary therapies such as qigong, hypnosis, music therapy, Reiki/therapeutic touch, and massage as treatments for general CRF. Several recent randomized trials have demonstrated that yoga was effective in reducing CRF, although most of these trials were conducted in women with breast cancer. A recent meta-analysis of seven acupuncture studies concluded that while acupuncture may show promise, only two out of seven had significant reductions in fatigue **(Bower et al., 2017**).

Exercise and physical activity continue to demonstrate the strongest evidence on the reduction of CRF among all nonpharmacological interventions. Although the largest meta-analysis to date included a few studies involving patients with solid brain tumors, limited research continues to exist on the correlation between exercise and CRF for patients with brain tumors. Multiple evidence-based exercise and activity guidelines have been established and continue to emerge for specific cancer populations; however only two case studies exploring the effects of exercise and potential guidelines for this patient population have been recently published **(Chandwani et al., 2018).**

Several pharmacologic interventions may be effective in the treatment of fatigue in the cancer setting. Neurostimulants, in particular methylphenidate, has also been studied in multiple placebo-controlled trials in general cancer patients with mixed results. In the brain tumor population, there have been several uncontrolled studies of neurostimulators with encouraging results on fatigue **(Yennurajalingam & Bruera, 2019)**.

A study of armodafinil in primary brain tumor patients undergoing radiation therapy found no overall significant effect on CRF. However, when the subgroup of patients who had higher levels of fatigue at baseline was analyzed, significant improvements were found. However, this study was not powered to detect differences in subgroups, which was a limitation. A study of modafinil found no significant differences in fatigue of primary brain tumor patients. Another study of methylphenidate and modafinil found improvements in fatigue; however, those improvements were not statistically significant (**Page et al., 2015).**

Nurses act as vital members of the health care team and are considered as a vital component in the overall patient outcome based on the expert neurological assessment, they are involved to care for adult patients with brain tumors at various levels of intervention and health education. The nurse must have a thorough understanding of patients` needs to provide optimal nursing intervention and education and thus improve their health (**White et al., 2017**).

Patient education is defined as any educational activities designed to improve patients' health behaviors and health status. Its main purpose is to maintain or to improve patient health or, in some cases, to slow deterioration. An informed and educated 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. The medical component of health education involves medical information and preventive measures concerning health and well-being. Research has demonstrated that effective health education begins with the identification of various important needs for the patients (**Pachman et al., 2018**).

Aim of the study

Evaluate the effect of instructional guidelines on knowledge, practice, and fatigue level among patients with brain tumors through:

- Assessing adult patients' knowledge regarding brain tumors.
- Assessing adult patients' practice regarding brain tumors.
- Assessing fatigue level among adult patients diagnosed with brain tumors.
- Designing and implementing instructional guidelines based on the patients' needs.
- Evaluating adult patients' knowledge, practice, and fatigue level among patients with brain tumors after implementing instructional guidelines.

Research hypothesis:

H1: Adult patients' knowledge regarding brain tumors would be improved after implementing the instructional guideline.

H2: Adult patients' practice regarding brain tumors would be improved after implementing the instructional guideline.

H3: Instructional guidelines regarding brain tumors would have a positive effect on reducing fatigue levels among adult patients.

Subjects and Method:

Research design:

A quasi-experimental research design was utilized to fulfill the aim of this study. Quasi-experimental research is a prospective or retrospective study in which patients self-select or are selected into one of some different treatment groups to compare the real effectiveness and safety of non-randomized treatments **(Maciejewski, 2020).**

Setting:

The study was conducted at Neurosurgery Department and Neurosurgery Outpatient Clinic affiliated at Fayoum Oncology Center, Egypt, this setting was selected due to the high prevalence of patients in the selected setting, and also it serves the biggest region of the population.

Subjects:

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, 0.001 was used as the high significance.

A purposive sample of fifty adult patients was included from a population who have met the inclusion criteria within six months and received care from the previously mentioned setting. The inclusion criteria were adult patients their ages ranged from18-60 years old and who visited the previously mentioned setting, were fully oriented, and agreed to participate in this study. Those patients were followed up before discharge in the neurosurgery department and 3 months. Exclusion criteria included: Disoriented adult patient, Uncooperative adult patient, and adult patients on mechanical ventilation.

Data collection tools:

Three tools were used to collect the data of the study as the following:

The tool I: A structured interview questionnaire was developed by the researchers after reviewing the related literature and research studies **(Pachman et al., 2018; Zeng, et al., 2018, and Yennurajalingam & Bruera, 2019);** it included two parts:

Part (1): It included demographic data of adult patients such as age, educational level, occupation, and residence.

Part (2): It included past and medical data related items such as previous neurological problems (More than one), presence of chronic illness, previous neurosurgery treatment received, type of tumor, and family history

Tool (II) adult patients' knowledge regarding brain tumors (pre/post) (Yennurajalingam & Bruera, 2019): It was developed by the researchers and included 18 questions (multiple choose questions). It was designed to assess adult patients' knowledge regarding brain tumors such as Brief anatomy of the brain, various diagnostic procedures and how to be prepared for it, benefits of surgical management, systemic and neurosurgical postoperative complications after brain tumors surgery, Information about how to reduce or prevent postoperative complications through medical therapy after surgery, how to deal with seizures, and sources of information regarding their knowledge.

Scoring system:

The adult patient was given 1 when the answer was correct and if the answer was incorrect the score was given 0. A patient who scored from 1 to 8 was considered to have unsatisfactory knowledge (< 50%), and those who scored between 9 to18 were considered to have satisfactory knowledge (≥50%).

Tool (III) adult patients' practice regarding brain tumors (pre/post): (Chandwani et al., 2018): It included six questions (multiple choose questions) were developed by the researchers. It was designed to assess adult patient's practice regarding brain

tumors 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 "not done answer", and one for "done answer". The total score was categorized into adequate and inadequate practices" as follows: inadequate less than 50% and adequate for more than 50%.

Tool (IV): Fatigue assessment scale:

This tool was adopted from **Kleijn et al., (2011)**, it was a self-developed rating scale consisting of 10 items (which assess fatigue level of individuals during various activities in a week in terms of physical, social, psychological, and spiritual domains and its relationship with time of the day). Scores ranged from 0 (no fatigue) to 10 (worst possible) with a total score range of 0 to 100. No fatigue, very little, mild, moderate, severe, worst denotes 0, 1-9, 10-30, 31- 60, 61-80, 81-100 respectively. The reliability of the scale is considered good with Cronbach's alpha of 0.81 for the total score.

Validity of the tools:

The content validity of the tools and the instructional guideline, its clarity, comprehensiveness, appropriateness, and relevance were reviewed by five experts' professor; two experts in medical-surgical nursing, one expert in oncology, and two experts in community health nursing field. Modifications were made according to the panel judgment to ensure sentence clarity and content appropriateness.

Reliability of the tools:

The Cronbach's α test was used to assess the reliability of the questions relating to knowledge, which was 0. 89, and the reliability of the questions relating to reported practice was 0.87.

Methods of data collection:

Fieldwork:

The study included 50 adult patients. The researchers collected data from the adult patients attended previously selected settings three days / a week from 9 am to 1 pm at morning shift (Sunday and Monday). Data were collected within 6 months from May 2019 until the end of October 2019. Approximately, 50-60 minutes were taken to complete each interview questionnaire.

The researchers met adult patients individually at waiting area present at previously selected settings and explain the aim of the study after introducing themself to patients. The researchers used face- to -face interview and they read the questions and possible answers to the patients to help them filled their response in the tools.

A pilot study

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

After selecting the adult patients, who met the inclusion criteria, the aim and importance of the research study were explained.

The data collection tools were distributed to the studied adult patients twice; (1) pre-test to assess their knowledge, practices, and fatigue level before implementing instructional guidelines. (2) Post-test to assess adult patients' knowledge, practices, and fatigue level after implementing instructional guidelines.

The simplified booklet was used as a supportive material and given to adult patients in the Arabic language to cover all items regarding the knowledge and practice regarding brain tumors after reviewing the related literature based on the assessment of the actual needs of the studied adult patients. Different teaching methods such as lectures, discussion, pictures, and posters were used.

The researchers designed and implemented the educational guidelines regarding brain tumors in the form of a theoretical part and practical part. The theoretical part was included adult patients' knowledge regarding brain tumors. It was implemented through lectures, posters, educational films, scenarios, and role-plays. An educational booklet written in simple Arabic language and illustrative pictures were prepared by the researchers was given to the patients regarding brain tumors.

The subject contents have been sequenced through 4 sessions (2 sessions for theoretical part and 2 sessions for practical part), and each session took about 20-30 minutes. The total time was 2 hours for each one. At the beginning of the first session, an introduction about the educational

guidelines regarding brain tumors was given and each session started with a summary feedback about the previous session.

The instructional guidelines included knowledge regarding brain tumors as follow:

- Brief anatomy of the brain
- Various diagnostic procedures and how to be prepared for it
- Benefits of surgical management, systemic and neurosurgical postoperative complications after brain tumors surgery
- Information about how to reduce or prevent postoperative complications through medical therapy after surgery
- How to deal with seizures

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

The instructional guidelines included practices regarding brain tumors as follow:

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

Evaluation: Occurred after three months, each adult patient was re-interviewed to assess their knowledge, practices, and fatigue level. Re-assessment of adult patient was done using the same tool (II, III, and IV).

Ethical considerations:

Before the research started, Approval of the Ethical Research Committee of the Faculty of Nursing was obtained before conducting the study. The researchers met both medical and nursing directors of the selected settings to clarify the purpose of the study and take their approval. Written consent was obtained from adult patients to gain their cooperation. The aim of the study was explained and the expected outcomes from the implementation of the study were included in this letter to obtain permission for data collection. The objective of the study was explained to adult patients. The researchers informed the adult patients that, the study was voluntary; they were allowed to refuse to participate in the study. Adult patients had the right to withdraw from the study at any time, without giving any reason. Adult patients were assured that their information would be confidential and used for research purposes only.

Administrative design:

Administrative permission was obtained through an issued letter from the Dean of Faculty of Nursing, Fayoum University to the Directors of the Neurosurgery Department and Neurosurgery Outpatient Clinic affiliated with Fayoum Oncology Center to achieve this study.

Statistical analysis:

Data entry and statistical analysis were performed using SPSS for Windows, version 20. Frequencies and percentages for qualitative variables and mean and SDs for quantitative variables were represented descriptive statistics. Differences between the two means tests (t-test) were used. Chi-square (x2) test was used to compare qualitative parameters. Pearson's correlation coefficient (r) test was used. Statistical significance was considered at P-value <0.05.

Results:

Table (1): Reflected that 60% of the studied adult patients were between 40 < 60 years. Male was constituted 67% of the total sample, (55%) of them had secondary education, 67% were working and (62%) of them were living in urban residences.

Table (2): Showed that (92%) of the studied adult patients had previous neurological problems, (53%) of the studied adult patients were having a chronic disease, regarding types of treatment of cancer (55%) of them were received chemotherapy as a treatment, all patients (100%) received anticonvulsants medication, analgesics, and antibiotics. Most of them (93%) received steroids**.** Finally, 77% of the studied adult patients had benign brain tumors.

Figure (1): Showed that less than two-thirds (63%) of adult patients were not having a family history of cancer.

Figure (2): Portrayed that 73% of the studied adult patient**s** reported that their main source of information about knowledge regarding brain tumors was doctors.

Table (3) illustrated the effect of instructional guidelines' implementation on adult patients' knowledge regarding brain tumors. It

was observed that the highest percentage of the adult patient had satisfactory knowledge regarding brain tumors in all items post guidelines implementation than pre and there was a highly statistically significant difference between adult patients' knowledge regarding brain tumors pre and post-implementation of the instructional guidelines ($P<0.001$).

Table (4): Showed that there was an improvement in the studied adult patients' satisfactory knowledge post implementing instructional guidelines as compared to pre-implementing guidelines. There was a highly statistically significant difference between total satisfactory knowledge pre/post three months of instructional guidelines implementation (P-value <0.000).

Figure (3) demonstrated the adult patients' total practice score pre and three-months post-instructional guidelines implementation. It observed that majority of the studied adult patients (93%) had inadequate practice regarding brain tumors pre- instructional guidelines implementation and decreased to become 13% three-months post- instructional guidelines implementation. On the other hand, 7% of the studied adult patients had adequate practice pre-instructional guidelines implementation compared to 87 % post-three-months post- instructional guidelines implementation with statistical significant difference.

Table (5): Illustrated frequency and percentage distribution of fatigue level of the studied adults patients pre and post-instructional guidelines implementation, it was observed that there was a significant difference and improvement in fatigue level among patients with decreased in the fatigue level scores.

From **table 6,** highly a statistically significant (P-0.001) decrease in fatigue mean score was observed among the studied adult patients post-three-months of instructional guidelines implementation.

From **table 6, highly** statistically significant (P-0.001) decrease in fatigue score with statistical significant difference was observed among the studied adult patients' post-three-months of instructional guidelines implementation.

Table (7): Showed that there was a significant positive correlation (P=0.002) between adult patients' knowledge scores and their practice post-three-months instructional guidelines implementation.

Table (1): Frequency and percentage distribution of the studied adult patients regarding their demographic characteristics (n=60)

Items	No.	%
Adult patients ' age in years		
21< 30 years	6	10
30< 40 years	18	30
40 - 60 years	36	60
Gender		
Male	40	67
Female	20	33
Education level		
Illiterate	0	0
Read and write	3	5
Secondary education	33	55
Higher education	24	40
Occupation		
Working	40	67
Not working	20	33
Residence		
- Rural	23	38
- Urban	37	62

Table (2): Frequency and percentage distribution of the studied adult patients regarding their past and medical data (n=60)

Item	No.	%
Previous neurological problems:		
- Yes	55	92
- No	5	8
Presence of chronic illness		
- Yes	32	53
- No	28	47
Previous neurosurgery		
- Yes	0	0
- No	60	100
Treatment received		
Radiotherapy	27	45
Chemotherapy	33	55
Anticonvulsants medication	60	100
Analgesics medication	60	100
Antibiotics	60	100
Steroids	55	92
Type of tumor		
- Benign	46	77
- Malignant	14	23

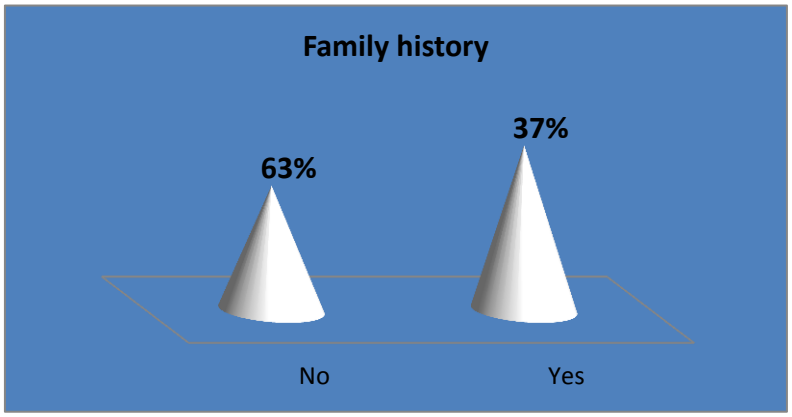


Figure (1): Percentage distribution of the studied adult patients regarding their family history (n=60)

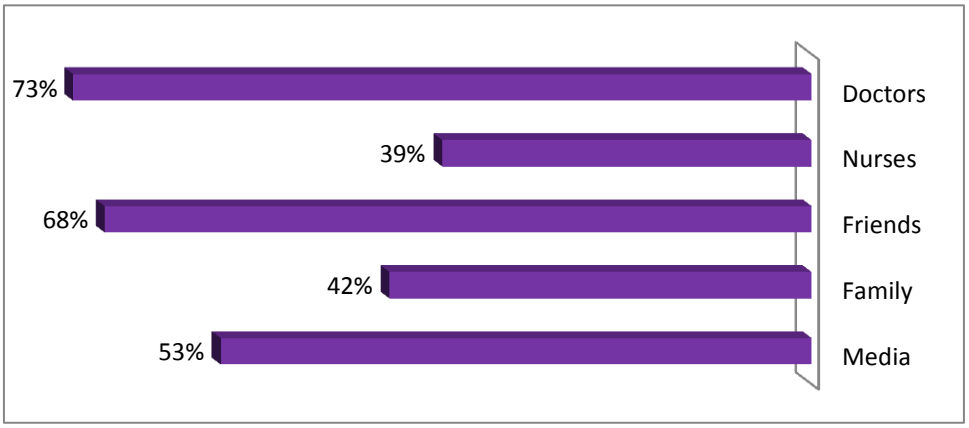


Figure (2): Percentage distribution of the studied adult patients about their source of knowledge regarding brain tumor

Table (3): Frequency and percentage distribution of adult patients' satisfactory knowledge regarding brain tumors pre and post instructional guidelines' implementation

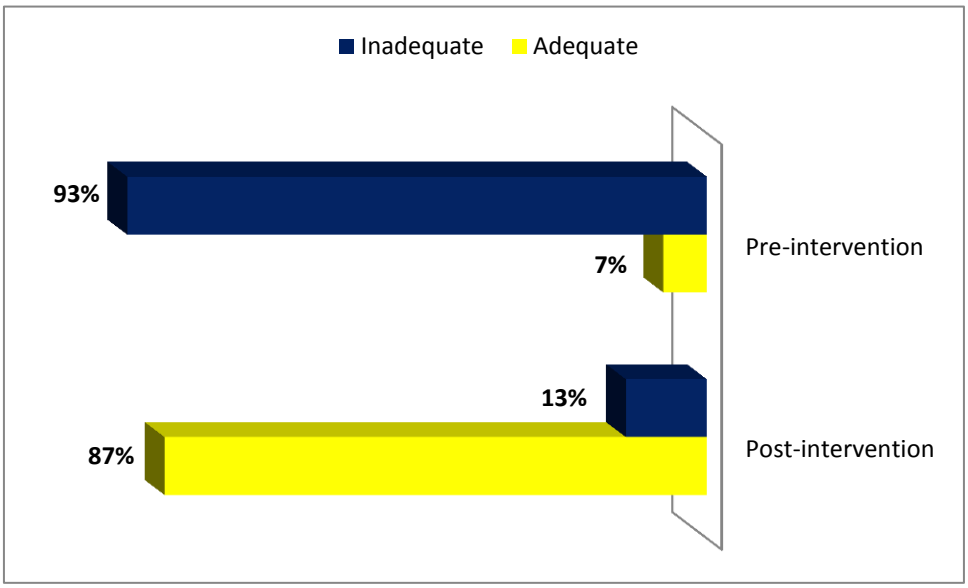
Adult patients' knowledge	No =(60)		p-value
	Pre (No/%)	Post (No/%)	
Anatomy of the brain	0 (0)	44 (74)	<0.001*
Diagnostic procedures	14 (24)	54 (90)	<0.001*
Benefits of surgical management	16 (27)	51 (85)	<0.001*
Postoperative complications	20 (34)	44 (74)	<0.001*
Postoperative complications prevention	9(15)	41(69)	<0.001*
How to deal with seizures	14 (23)	48(80)	<0.001*

*highly significance at 0.0001 levels

Table (4): Frequency and percentage distribution of the total satisfactory knowledge of the studied adults patients pre and post-instructional guidelines implementation

Total knowledge	Pre instructional guidelines implementation		Post instructional guidelines implementation		T	P-value
	No	%	No	%		
Satisfactory	13	21	56	93	4.054	<0.001*
Unsatisfactory	57	79	4	7		

*Statistically significant level at P < .05



*highly Significance at 0.0001 levels

Figure (3): Differences between adult patients' total practice pre and post-three-month instructional guidelines implementation regarding brain tumors (n=60)

Table (5): Frequency and percentage distribution of fatigue level of the studied adults patients pre and post-instructional guidelines implementation (n=60)

Fatigue level	Pre instructional guidelines implementation		Post instructional guidelines implementation		T	P-value
	No	%	No	%		
No fatigue (0)	0	0.0	6	9.8	14.023	<0.001*
Very little (1-9)	0	0.0	13	22		
Mild (10-30)	0	0.0	23	38.2		
Moderate (3- 60)	26	43	18	30		
Severe (61-80)	18	30	0	0.0		
Worst (81-100)	16	27	0	0.0		

Table (6): Differences between adult patients' fatigue mean scores pre and post-three-months instructional guidelines implementation regarding brain tumors (n=60)

Items	Pre instructional guidelines implementation	After three-month instructional guidelines implementation	P- value
Fatigue score	26.89+ 4.07	14.01+ 1.23	0.125 (0.0001*)

*highly Significance at 0.0001 levels

Table (7): Correlation coefficient between total studied adult patients' knowledge and practice mean scores pre and post-three-month of instructional guidelines implementation

Knowledge	Practice			
	Pre instructional guidelines implementation		After three-month instructional guidelines implementation	
	R	P	R	P
- **Total knowledge pre-test**	0.048	0.802 (N.S)	---	---
- **Total knowledge post-test**	---	---	0.405	0.002*

*highly Significance at 0.0001 levels

Discussion:

Fatigue is considered the most common symptom experienced by patients during the brain cancer disease from diagnosis to the end of life and is defined as a distressing, persistent and subjective sense associated with physical, emotional, and/or cognitive tiredness that interferes with usual functioning **(Bower, 2014)**

The finding of the present study indicated that less than two-thirds of the studied adult patients were between 40 < 60 years and males were constituted more than two-thirds of the total sample. These findings are similar to the result in a study conducted by **Bin-Madhi, (2017**) entitled "Brain tumors excision guided by neuronavigation: Practical application and results" which showed that brain tumors were more common in males than females with a mean age of 47 years old.

The results of the current study revealed that most of the studied adult patients had previous neurological problems. **Urden et al., (2016**) and **Krucik, (2018**) reported that the more common clinical manifestations of brain tumors are headache, drowsiness, visual disturbances, change consciousness level, seizures, and motor deficit.

The results of the present study illustrated that more than half of the studied adult patients were having a chronic disease. This result is similar to the study of **Edlinger et al., (2016)** who studied "Blood pressure and other metabolic syndrome factors and risk of brain tumor" and reported that thirty percent of patients in the study sample were having

hypertension. So, brain tumor risk may be higher in people with high blood pressure. Such results are also reported in the study done by **Tong et al., (2018**) who studied "Diabetes mellitus and risk of brain tumors" and reported that brain tumor risk was 24% higher in females with diabetes

The results of the current study revealed that more than half of the studied patients were received chemotherapy as a treatment, and all of them received anticonvulsants medication, analgesics, and antibiotics. Majority of them received steroids. **White et al. (2017)** stated that patients with brain tumors require a variety of medical treatments. Anticonvulsant medication is frequently given to suppress the possibility of seizures. Antibiotic is usually given to prevent infection. Analgesic is usually given to reduce pain and steroid is given to reduce cerebral edema after intracranial surgery.

The results of the current study revealed that approximately three-quarters of the studied adult patients reported that their main source of information about knowledge regarding brain tumors was doctors. This reflects that patients are directed correctly in seeking services and help in such chronic diseases.

The results of the present study indicated that there was an improvement in the studied adult patients' knowledge post implementing instructional guidelines as compared to pre-implementing guidelines. There was a highly statistically significant difference (P-value <0.000). From the researchers' point of view, this result reflects the positive effect of instructional guideline implementations, which meet the adult patients' needs and provide them with sufficient knowledge to maintain health and reduce their fatigue.

This could be explained the reasons why the patients didn't receive enough information from the health care team. Some patients were having lack of the interest to know any information while others were interested to know but they didn't find the person who had enough time to provide them with enough information. This improvement is the emphasis on the fact that most patients have a strong desire to learn more knowledge about their conditions and show the effect of the program.

The present study results revealed an improvement in patients' practice and the majority of them had adequate practice post-three-months instructional guidelines implementation. From the researchers' point of view, it reflected the good impact of the instructional guidelines on improving practices**.** These are confirmed the significant modifications in the adult patents practice that reflected the main goals of the implementation of the instructional guidelines. This result agreed with **Fan et al**., (**2020)** who reported that, a health behavior change 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 person's health**.** A study by **Ricardo et al., (2018)** supported that; knowledge deficit is associated with poor health and maladaptive disease preventive behavior**.**

The results of the present study showed that a statistically significant decrease in fatigue mean score was observed among the studied adult patients post-three-months of instructional guidelines implementation regarding brain tumors. These results were supported with the aim and hypotheses of the present study. These results are in the same line with **Parth et al., (2020)** who studied "Rehabilitation of Adult Patients with Primary Brain Tumors" who reported that fatigue levels decreased after the rehabilitation program. From the researchers' point of view, reflected the success of implementing the instructional guidelines regarding brain tumors.

The present study revealed that there was significant correlation (P=0.002) between adult patients' knowledge scores and their practice post-three-months instructional guidelines implementation. From the researchers' point of view, this reflected the importance of improving adult patients' knowledge and practice to help them learn and acquire good knowledge and apply it. This association is explained that when the studied adult patients had sufficient knowledge they can practice well.

These results were supported by **Piper and Stewart, (2009**) who revealed that an

effective health education program will result in changes that demonstrate increased knowledge about specific medical and health-related issues for a prolonged period. Effective health education will yield both short-term and long-term changes in behavior that reduce risky behavior and reduce or prevent many postoperative complications. These changes in behavior can be recorded through evaluator observations and learner feedback

Conclusions:

Based on the results and hypotheses of the present study, the study findings concluded that the results support the research hypothesis in which implementing instructional guidelines regarding brain tumors had a significant positive effect on improving adult patients' knowledge, practice, and reducing their fatigue level. There was a significant positive correlation (P=0.002) between adult patients' knowledge scores and their practice post-three-months of instructional guidelines implementation. Also, there were highly significant changes and improvements in adult patients' knowledge and practice regarding brain tumors post instructional guidelines implementation (P=0.001).

Recommendations:

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

The developed instructional guidelines regarding brain tumors should be conducted, discussed, integrated into the rehabilitation programs, and taught to adult patients using the booklet and illustrated pamphlets for each one to improve their information and reduce their fatigue level and replication of the current study with a larger sample of adult patients with brain tumors in different settings is required for generalizing the results.

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