Effect of Nursing Teaching Protocol on Patient-Reported Outcomes among Hepatocellular Carcinoma Patients Undergoing Transarterial Chemoembolization

Attyiat Hassan Hussein, Kawther Badry Mobed, Sayed Hassan Ahmed, Manal Sayed Atya
1: Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Assiut University, Egypt.
2,4: Lecturer of Medical Surgical Nursing, Faculty of Nursing, Assiut University, Egypt.
3: Lecturer of diagnostic and interventional radiology, Faculty of Medicine, Assiut University, Egypt.

Abstract:

Background: Transarterial chemoembolization is an effective therapy for liver malignancies that cannot be cured. **Aim:** Evaluate effect of nursing teaching protocol on patient-reported outcomes among hepatocellular carcinoma patients undergoing transarterial chemoembolization. **Research design:** A quasi-experimental research design (study/ control). **Sample:** A purposeful sample of 60 patients of both sexes with hepatocellular carcinoma undergoing transarterial chemoembolization, Patients were divided into two equal groups at random, 30 patients for each group. **Setting:** Interventional Radiology department, tropical Medicine& Gastroenterology department, and outpatient clinic at El - Rajhi liver Hospital, Assiut University. **Tools:** Demographic and Health related data Questionnaire, Occurrence and degree of common symptoms assessment sheet, The Karnofsky Performance Scale, Patient Satisfaction with Nursing Care Quality Questionnaire and Functional Assessment of Cancer Therapy- for Hepatobiliary cancer patients (FACT-Hep Questionnaire). **Results:** Patients who received the nursing teaching protocol reported a reduction in symptoms of nausea, vomiting, anxiety, fatigue, and insomnia (p-value <0.001) when compared to the control group. Following the implementation of the nursing teaching protocol, the study group's Karnofsky Performance Scale (KPS), satisfaction with nursing care, and quality of life scores significantly increased compared to the control group (p-value <0.001). **Conclusion:** Nursing teaching protocol effectively minimizes symptoms, improves functional status, and raises satisfaction with the nursing care quality and quality of life in patients with hepatocellular carcinoma undergoing trans-arterial chemoembolization. **Recommendations:** Incorporate nursing teaching protocol about TACE in interventional radiology unit to improve patients reported outcomes.

Key words: Hepatocellular carcinoma, Nursing teaching protocol, Patient-reported outcomes, Transarterial chemoembolization

Introduction

Hepatocellular carcinoma (HCC) is one of the deadliest cancers that affect humans. This form of primary liver cancer is the most prevalent and aggressive **(Verma et al., 2023).** Primary liver cancer, the sixth most prevalent and fourth most deadly cancer, continues to pose a serious worldwide threat to human health. WHO estimations state that by 2030, liver cancer will be a contributing cause in over a million deaths and by 2040, there could be a >55% increase in the number of liver cancer cases and deaths **(Rumgay et al., 2022).** Ninety

percent of primary hepatic malignancies have been attributed to hepatocellular carcinoma (HCC), which is also one of the leading causes of death from cancer **(Campani et al., 2023).**

About 80% of instances of HCC occur in the context of a severely damaged cirrhotic liver that has already begun to gather molecular alterations. Furthermore, several environmental (aflatoxin, aristolochic acid, and tobacco) and etiological (hepatitis C virus (HCV), hepatitis B virus (HBV), alcohol use disorder, and non-alcoholic steatohepatitis (NASH)) factors have been linked to separate pathways in the development of cancer **(Llovet et al., 2022).**

The initial non-surgical treatment option for HCC is interventional therapy. Treatment regimens involving image-guided locoregional therapies, such as ablation (e.g., microwave ablation, cryoablation, radiofrequency ablation), trans arterial embolization (TAE), chemoembolization (TACE), or radioembolization (TARE), can be used as palliative, neo-adjunctive, or curative depending on the stage of the patient's disease **(Criss and Makary., 2023).**

Transarterial chemoembolization is the best treatment for people with intermediate-stage hepatocellular carcinoma **(Reig et al., 2022).** The transarterial chemoembolization method works by injecting chemotherapeutic medicines together with the radiopaque contrast agent into tumor-feeding arterie, the goal of the procedure is to restrict the tumor's access to oxygen and nutrients, therefore leading to its necrosis and subsequent shrinking **(Criss and Makary., 2023).**

TACE procedure: A, axial CT showing arterial hyperenhacning HCC , B , 3 D CT reconstruction showing feeding hepatic arterial branches to HCC , C selective catheter angiogram showing pathological vessels of HCC, D control post-TACE angiogram showing embolization of pathological vessels with lipiodol accumulation within HCCC

Comparable to systemic chemotherapy, TACE can result in severe side effects and discomforts including pain, nausea, vomiting, fever, exhaustion, poor appetite, fullness in the abdomen, depression, anxiety, and difficulty sleeping **(Chen et al., 2022).**

A patient-reported outcome (PRO) consists of "any report of the status of the patient's health condition that comes directly from the patient, without interpretation of the patient's response by a clinician or anyone else.". They are employed to gather data regarding the symptoms experienced by patients and how they affect their quality of life, allowing for both individual and group level monitoring and the identification of

individuals who require intervention **(Serper et al., 2022).**

Before the procedure, the nursing staff should explain the TACE to the patients, remind them of the precautions, assist them in making preoperative preparation, monitor their vital signs promptly after the procedure, assist the patients in taking their medication as directed by the doctor, notify the attending physician as soon as they experience any adverse post-procedural symptoms, and provide intervention. The management of symptoms is important to QOL in this patient population **(Gu & Liang, 2022).** During procedural intervention, oncology nurses play a crucial role in educating patients, delivery and monitoring of care and managing their expectations **(Kelly et al., 2021).**

After the procedure, which takes about one to two hours, patients are usually monitored overnight before being released the next day. Along with patient assessment, education, vital sign monitoring, patient positioning, and medication administration—including the use of moderate sedation—radiology nurses are accountable for ensuring patients' health, comfort, and safety throughout imaging operations. Considering that nurses interact with patients more than any other healthcare professional; they have the ability to significantly influence patient outcomes in radiology **(Werthman, 2019).**

Significance of the study:

HCC is the third most common cause of cancer-related mortality and the sixth most common kind of cancer worldwide. HCC contributes to about 85% of all liver cancer occurrences globally, making it the most frequent type **(Sung et al., 2021)**. In Egypt, HCC ranks second among male cancers and sixth among female cancers. **Rashed et al., 2020).** TACE is the initial line of treatment for uncomforted side effects of HCC. Therefore, when it is used in conjunction with interventional therapy, high-quality nursing can lower the incidence of undesirable reactions associated to the health issues, reduce patients' anxiety and symptoms, and enhance quality of life. Therefore, Researchers suggests this study to evaluate the effect of nursing teaching protocol on patient-reported outcomes among hepatocellular carcinoma patients undergoing transarterial chemoembolization.

Operational definition:

Patient-reported outcomes: are outcomes the patient has revealed directly. This data collection technique is typical for assessing subjective indicators such symptoms, functional status, patients' satisfaction, and quality of life.

The aim of the study was to evaluate the effect of nursing teaching protocol on patient-reported outcomes among hepatocellular carcinoma patients undergoing transarterial chemoembolization.

Objectives

1. Assessment of severity of symptoms, functional status, and quality of life for patients with hepatocellular carcinoma undergoing trans arterial chemoembolization
2. Implanting of nursing teaching protocol about TACE for HCC.
3. Evaluate the effect of nursing teaching protocol about TACE on

severity of symptoms, functional status, and quality of life for HCC.
4. Assess HCC satisfaction with nursing teaching protocol.

Hypotheses: The subsequent research hypotheses were integrated:

H1: A reduction in the study group's post-procedural symptom severity as compared to patients in the control group.

H2: Functional status for patients with hepatocellular carcinoma undergoing interventional therapy would be improved in the study group compared to control group patients.

H3: Study group patients' satisfaction with nursing care would be higher compared to control group patients.

H4: Quality of life for patients with hepatocellular carcinoma undergoing transarterial chemoembolization would be improved in the study group compared to control group patients.

Patients and methods:

Research design: -

Quasi experimental research design (Study - control) was used in this empirical intervention study for determining the causal effect of an intervention on the target population and to compare groups using random assignment (study and control) **(Silverman, 2016)**. The dependent variable in this study was the implementation of nursing teaching protocol, and the independent variable was the patient reported outcomes.

Setting: -

The study was carried out in the Interventional Radiology department, tropical Medicine, Gastroenterology department and outpatient clinic at El - Rajhi liver Hospital, Assiut University, which, in southern Egypt, is a hospital devoted to hepatobiliary and gastroenterological illnesses as well as liver transplantation, Therefore, we chose this location because the hospital specializes more in treating hepatological diseases and admits patients with HCC. Interventional Radiology department located on the second floor and Gastroenterology department located in the third floor for female patients and fourth floor for male patients. The Interventional Radiology departments received HCC patients on Saturday, Tuesday, and Thursday each week from the outpatient clinics for TACE.

Sample

The study recruited purposeful sample of sixty adult patients with HCC, both male and female undergoing transarterial chemoembolization. The sample divided randomly and alternatively into two equal groups, control group (n =30 patients) received the conventional hospital instructions, and study group (n =30 patients) received nursing teaching protocol. Study and control groups' sample homogeneity was maintained.

Inclusion Criteria

The patient groups that would constitute the sample of this study (study and control) including patients with HCC undergoing transarterial chemoembolization, patients who, after being told of the study's purpose, give their agreement to participate, who were between 18-65 years of age, could understand the information given and who have not any problem preventing verbal communication.

Exclusion criteria

Potential participants were excluded who had advanced liver disease, with

other malignancies; multiple chronic diseases; active gastrointestinal bleeding, encephalopathy, refractory ascites, and the existence of portal vein occlusion or vascular invasion as a result of a liver tumor, extra hepatic metastases, proto-systemic shunt, end-stage tumor illness, auditory impairments, psychological issues, and involvement in additional clinical trials.

Sample size: With the use of (G power software), 60 patients were calculated. computed the sample size to test differences between two independent means two tailed. used "error 0.05", "effect size 0.8", and "power 95%.".

Tools: Five data collection tools were employed to fulfill the study's objectives.

Tool (I): the Demographic and Health related data Questionnaire

It was developed by the researchers to assess demographic and medical data of patients: It included three parts.

Part (one): **demographic data for the patient:** It included (6) items related to patients (age, gender, occupation, marital status, residence, level of education).

Part (two): Child Pugh score: It is a universal scoring system of the degree of liver failure in patients with cirrhosis. It was modified by **Pugh et al. in 1973**. It was adopted by researchers to assess the severity of the disease. This score includes three biochemical markers (serum albumin, total bilirubin, and prothrombin time, INR) and clinical features as the presence of ascites and hepatic encephalopathy.

The Child score ranges from 5-15 with individual scoring; 5-6 being class A, 7-9 are being class B and 10-15 class C.

Part (three): Medical data such as Body Mass Index (BMI) and length of hospital stay.

Tool II: Occurrence and degree of common symptoms assessment sheet: it was developed by researchers based on literature review (**El-Sayed, & Fekry., 2023), Shaaban., 2021),** to assess the incidence and severity of symptoms during hospitalization. Symptoms such as fever, pain, nausea, vomiting, fatigue, constipation, anxiety, and insomnia.

The symptoms were assessed during period of hospitalization after performance of transarterial chemoembolization.

Scoring system

Fever was categorized as low (less than 37.9°C), medium (between 37.9 and 38.9°C), or high (above 38.9°C).

A 6-point Likert scale was used to grade additional symptoms; 0 meant not present, 1 meant mild, 2 to 4 meant moderate, and 5 to 6 meant severe.

Tool III: The Karnofsky Performance Scale (KPS): It was developed by (**Karnofsky & Burchenal, 1949)** and adopted by researchers to assess the functional status of patients. The general state of a patient was graded on this scale from 0 to 100, with each increment of 10 points denoting a grade: 100 indicated the patient's best performance level (healthy), while 0 (nil) indicated the patient's death.

On the day of admission and one month later, the KPS scores were

assessed (i.e., before and after nurse teaching protocol, respectively).

Scoring system

The scoring outcomes were separated into three categories: poor (10–40 points), medium (50–70 points), and good (80–100 points).

Tool IV: Patient Satisfaction with Nursing Care Quality Questionnaire (PSNCQQ)

It was developed by **(Laschinger et al., 2005)** and adopted by researchers to assess satisfaction of patients with nursing Care. The PSNCQQ consists of 19 items and 4 extra questions to gauge how satisfied patients are with the overall quality of care and services obtained while a patient in the hospital, overall quality of nursing care, and intention to recommend the hospital to family and friends. Every PSNCQQ item consists of a sentence that serves as a "signpost" indicating the question's substance, followed by a longer question that serves as a "descriptor" providing further information.

The PSNCQQ was assessed **during the period of hospitalization.**

Scoring system

Every PSNCQQ item is rated on a 5-point Likert scale from poor to excellent. The total number of questions was 23 questions. The scores ranged from 23-115 degree.

Scale	percent	Description
5	85 – 100	Excellent
4	70 – 84	Very Good
3	55 – 69	Good
2	40 – 54	Fair
1	39 and below	Poor

Tool V: Functional Assessment of Cancer Therapy- for Hepatobiliary cancer patients (FACT-HepQuestionnaire) Version4.

It was developed by **(Heffernan et al., 2002).** It is a self-reported questionnaire designed especially to address the health-related quality of life (HRQoL) of patients with hepatobiliary carcinoma. Researchers started using it to assess patients' health-related quality of life.

It comprises of the FACT-G, which has four dimensions: emotional (six items), social/family (seven items), physical (seven items), and functional (seven items) well-being; additionally, it includes an 18-item hepatobiliary cancer subscale (HCS) which evaluates gastrointestinal symptoms such as anorexia, weight loss, and jaundice, as well as back and stomach pain.

The patient's quality of life was assessed both on the day of admission and one month later (i.e., before to and after the nursing teaching protocol).

Scoring system

It is a five-point Likert scale ranging from

Not at all	0
A little bit	1
Some-what	2
Quite bit	3
Very much	4

Physical well-being (PWB)
Range of scores: 0–28
Social/family well-being (SWB)
Range of scores: 0–28
Emotional well-being (EWB)
Functional well-being (FWB)
Range of scores: 0–28
Hepatobiliary caner subscale (HCS)
Range of scores: **0-72**

The tool's total scores range from 0 to 180, where higher numbers indicate a higher quality of life**.**

Content validity and reliability:

Content validity:

A group of five experts from Assiut University, faculty of nursing's medical surgical nursing department made the conclusion. A few changes were made in accordance with the experts' assessments about sentence structure, and item order.

Reliability:

Cronbach's Alpha, a model of internal consistency with a normal range of 0 to 1 (value more than 0.5 acceptable reliability), was used to statistically test the reliability of the instruments, Tool III: The Karnofsky Performance Scale (KPS) was reliable at 0.97, Tool IV: Patient Satisfaction with Nursing Care Quality Questionnaire was reliable at 0.97, Tool V: Functional Assessment of Cancer Therapy- for Hepatobiliary cancer patients (FACT-Hep Questionnaire) was reliable at 0.94.

Procedure

The following stages were used to carry out the current study:

Preparatory phase

Administrative approval:

Authorized approval and administration permission was received from the head of the Interventional Radiology department, tropical Medicine and Gastroenterology department at El - Rajhi liver Hospital, Assiut University to gather the needed data after study aim explanation.

Ethical Consideration:

The faculty of nursing's ethics committee authorized the research proposal in January 2023 with ethical code (1120240547). Prior to the conduct of the pilot study and the actual study, after outlining the nature and purpose of the research, official permission and consent were obtained from the dean of the Faculty of Nursing, as well as the departments of interventional radiology, tropical medicine, gastroenterology, and outpatient clinic at El- Rajhi liver Hospital, Assiut University. Patients under study had the right to decline participation or to leave the trial at any moment for any reason. Participants received guarantees that all of their data would be kept extremely private. Before beginning data collection, the patients were informed of the study's purpose. Patients who agreed to participate gave their oral agreement after being reassured that the information would be kept private and used only for the intended research. When the study was being applied, there was no risk to the study subjects.

Pilot study

To test the viability and clarity of the study tools, it was conducted on 10% (6 patients) of the sample. It also calculates how long it will take to complete the study materials. Patients from the pilot research sample contributed to the total sample because there was no need for modification.

Fieldwork description

The research was conducted during a ten-month period, from February to November, with the researcher's availability for morning and afternoon shifts.

Nursing teaching protocol

After reviewing the nationally and internationally related literature, tools

was developed, and the researcher developed nursing teaching protocol **(Bischoff et al., 2020, Finn et al., 2019, and Deng et al., 2021)** to improve patients reported outcomes post TACE. The nursing teaching protocol comprised both a theoretical and an applied component. To accomplish the goal of the study, the researcher created an illustrated guideline booklet in basic Arabic that patients may refer to and review the material supplied.

Assessment phase: The sample was first recruited by the researcher in accordance with eligibility requirements. Individual interviews were conducted with those who provided their consent, utilizing the data collecting form. The data collected helped the researcher as they prepared the nursing teaching protocol and served as baseline data or pretest. Before presenting to the multidisciplinary committee at the outpatient clinics of the Interventional Radiology Unit, affiliated to the El-Rajhi Liver Hospital, the researchers met with each patient for the first time. During this meeting, they introduced themselves and gave a brief explanation of the nature and goal of the study. The researchers used **Tool I** (Demographic and Health related data Questionnaire) to gather demographic, medical data and severity of the disease of each participant. Also, assessment was conceded to every patient using **tool III** (The Karnofsky Performance Scale (KPS) to measure the functional status of patients, **Tool IV** (PSNCQQ - Patient Satisfaction with Nursing Care Quality Questionnaire) to assess patient's satisfaction with the overall quality of care and **Tool V (**Functional Assessment of Cancer Therapy- for Hepatobiliary cancer patients (FACT-Hep Questionnaire) to assess quality of life.

Depending on the patients' responses, the research tool filling process took an average of 40 to 50 minutes.

Implementation phase

The researcher met with the patients individually and administered the nursing teaching protocol plan in the presence of their relative for including them in the care, to remind and motivate the patient to adhere to the instructions in three sessions. The researcher utilized simple terms appropriate for the patient's educational background. Each patient was given a copy of the nursing teaching protocol and educational multimedia video clips to keep on hand for future reference.

To improve adherence and follow the instructions, nursing teaching protocols were delivered with the use of reinforcement and motivation. The patients had the time to ask questions, express their feelings and anxiety. Instruct the patients to adhere to medications and follow up visit schedule.

The first session: focused on the theoretical aspects of TACE, including its definition, indications, contraindications, risk factors, benefits, and disadvantages, preoperative examinations and preparation and preoperative fasting, health education about complications, education regarding diet, other measures to reduce adverse events and advice on how to handle post-embolization

syndrome and other complications, and the follow-up method, as well as the discharge plan.
This session lasted 30-40 minutes.
The second session: Postoperative protocols were educated as care guidelines for the insertion site, symptomatic treatment, medication delivered by the nurses. Postoperative instructions were given to the patients, which included 12 hours of bed rest and 6 hours of additional immobilization on the puncture side. After surgery, patients were told to stay hydrated for four hours and then gradually resume their regular diet as soon as they felt no pain. Stepwise exercise therapy included ascending stairs and walking quickly. The patient's comfort level determined the exercise's intensity, and if the patient became too uncomfortable, it was promptly discontinued.
This session lasted 35-45 minutes.
Third session: This session covered addressed the practical portion and used applied training to reduce adverse events and improve patient reported outcomes among patients. After TACE (deep breathing exercises, assessment of body temperature, application of cold compress, application of hot compress, use of incentive spirometer, measurements to symptoms), progressive muscle relaxation was the final.
This session lasted 30-40 minutes.
Evaluation phase:
During hospitalization period both groups (study and control group) were evaluated for Occurrence and degree of common symptoms using (tool II) and satisfaction with nursing care using (tool IV).
After one month both groups (study and control group) were evaluated for functional status and quality of life using (tool III&IV). This evaluation was carried out at outpatient clinic El - Rajhi liver Hospital, Assiut University. Patients were evaluated for the effect of nursing teaching protocol on reported outcomes among (study group) in comparison to the control group.
Statistical analysis:
The acquired data were examined, coded, tabulated, and ready for computer entry. Using computer intervention SPSS version 22, Excel 2016, descriptive statistics (frequencies, percentages, means, and standard deviations) and analysis of variance (chi-square test P-Value <0.05) were performed. A two-tailed $p < 0.05$ was deemed statistically significant. The T-test was used to compare between categorical variables, while the Correlation Coefficient test was used to compare between continuous variables and reveal the association between scores. IBM SPSS 20.0 was used to conduct all of the analyses.
Results:
Table (1): demonstrates that the study's and the control groups' greatest patient percentages were between the ages of 60 and 65, with mean ages of 50.53±9.17&52.33±10.4 respectively. Majority of the study group patients (86.7%) and the control group patients (73.3%) were males. As regarding marital status most of the study and control group patients were married (80.0% & 86.7% respectively). Relating to residence, more than half of the study group patients (53.3 %)

and two third of the control group patients (66.7 %) were from rural areas. According to education, less than half of the study and control group patients were read and write (46.7% &43.3 % respectively). Relating to Occupational status, less than half of the study group patients (43.3 %) were retired while an equal percent of one third of the control group patients (33.3 %) were employer and retired. Relating to smoking, more than half of the study group patients (53.3%) and three fifths of the control group patients (60.0%), were smokers, with no statistically significant difference between the two groups regarding demographic and health related data.

Figure (1): Identifies that more than half of the study group patients (53.3%) and two thirds of the control group patients (66.7%) were in class A, with no statistically significant difference between the two groups related to Child Pugh score.

Table (2): Displays that; majority of the study group patients (80.0%) and more than half of the control group patients (53.3%) stayed at hospital for about one day with statistically significant difference between the two groups with p-value < 0.05. As regard BMI, more than one half of the study group patients (53.3%) and of the control group patients (56.7%) had normal weight, with no statistically significant difference.

Table (3): Demonstrates that there was statistically significant difference between the study and control group patients related to nausea, vomiting, anxiety, fatigue and insomnia with p-value <0.001, and for constipation with p-value < 0.05. While there was no statistically significant difference between the two groups of patients related to fever and pain.

Table (4): Clears functional status on admission with no statistically significant difference between the study and control group patients. While after one month of nursing teaching protocol there was statistically significant difference between two groups as the majority of study group patients had good functional status (86.7%) while (46.7%) of control group patients had medium performance.

Table (5): Reveals that nearly two thirds of the study group patients (60.0%) had very good score of satisfaction with nursing care quality, while; the same percentage of the control group patients had fair score with a highly statistically significant difference with p-value <0.001.

Table (6): Illustrates that on admission there was no statistically significant difference between the study and control group patients related to quality of life Fact-Hep domains (physical, social, emotional, functional, and Hepatobiliary caner subscale) and total FACT-HEP score while after one month of nursing teaching protocol there was a statistically significance difference between the two groups with p-value <0.001.

Table (7): Reveals that there is a positive correlation between patient satisfaction with nursing care quality and functional status and quality of life with a statistically significant difference on admission and after one month of nursing teaching protocol with p-value <0.001.

Figure (2): Denotes that there is a positive correlation with statistically significant difference on admission between FACT-Hep Total score and KPS, as regard the study and control group patients.

Figure (3): Denotes that there is a positive correlation with statistically significant difference after one month between FACT-Hep Total score and KPS, as regard the study and control group patients.

Table (1): Frequency & percentage distribution of demographic and health related data for studied patients (n=60).

Demographic and health related data	Study (n=30)		Control (n=30)		X2	P.value
	No	%	No	%		
Age						
30>40	2	6.7	6	20.0	3.00	0.392
40>50	10	33.3	6	20.0		
50>60	8	26.7	8	26.7		
60-65	10	33.3	10	33.3		
Gender						
Male	26	86.7	22	73.3	1.67	0.197
Female	4	13.3	8	26.7		
Marital Status						
Single	2	6.7	2	6.7	2.08	0.556
Married	24	80.0	26	86.7		
Divorced	2	6.7	0	0.0		
Widow	2	6.7	2	6.7		
Residence						
Urban	14	46.7	10	33.3	1.11	0.430
Rural	16	53.3	20	66.7		
Level of education						
Preparatory school	2	6.7	0	0.0	6.08	0.193
Secondary school	2	6.7	0	0.0		
University	10	33.3	11	36.7		
Illiterate	2	6.7	6	20.0		
Read and write	14	46.7	13	43.3		
Occupational status						
Employer	7	23.3	10	33.3	5.97	0.113
House wife	2	6.7	7	23.3		
Not work	8	26.7	3	10.0		
Retired	13	43.3	10	33.3		
Smoking						
Yes	16	53.3	18	60.0	0.27	0.602
No	14	46.7	12	40.0		

Chi square test for qualitative data between the two groups
****Significant level at P value < 0.05, **Significant level at P value < 0.01***

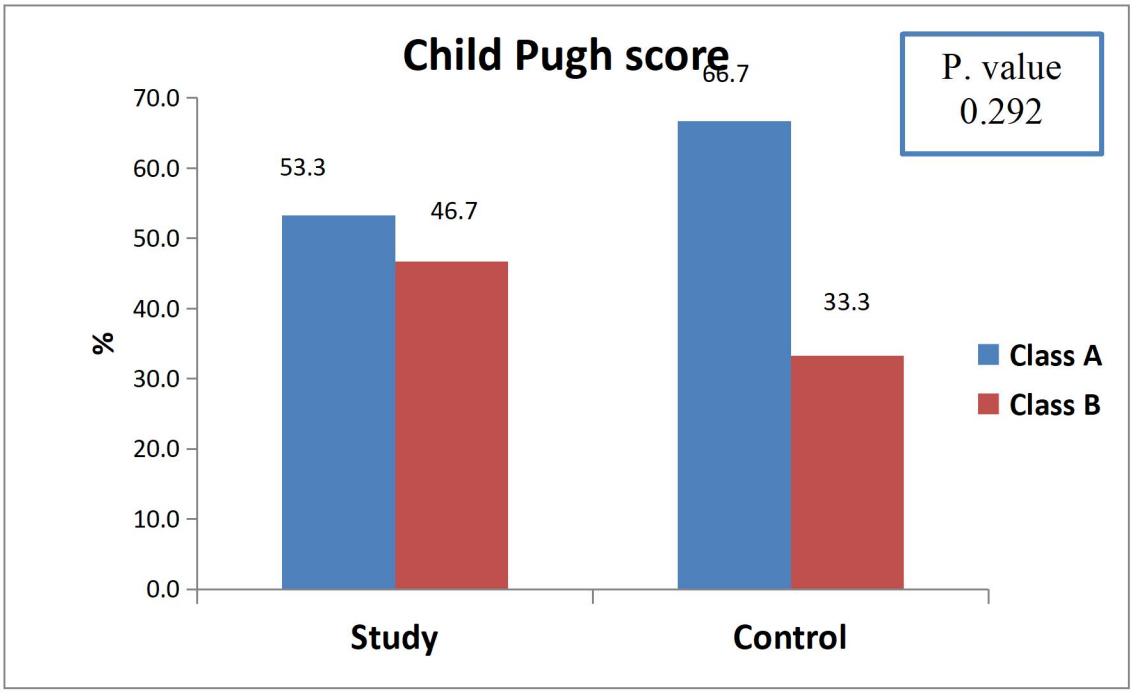

Figure (1) Percentage distribution of study and control group patients related to Child Pugh score.

Chi square test for qualitative data between the two groups

****Significant level at P value < 0.05, **Significant level at P value < 0.01***

Table (2):- Frequency & percentage distribution of the studied patients in relation to their medical data (n=60).

Medical data	Study (n=30)		Control (n=30)		X2	P.value
	No	%	No	%		
Length of hospital stay						
1 day	24	80.0	16	53.3	7.89	0.019*
From 2-3 day	6	20.0	8	26.7		
More than 3 days	0	0.0	6	20.0		
BMI						
Underweight	7	23.3	8	26.7	1.18	0.756
Normal Weight	16	53.3	17	56.7		
Overweight	6	20.0	5	16.7		
Obese	1	3.3	0	0.0		

Chi square test for qualitative data between the two groups

****Significant level at P value < 0.05, **Significant level at P value < 0.01***

Table (3): - Comparison between study and control group related to occurrence and degree of common symptoms (n=60).

Symptoms	Study (n=30)		Control (n=30)		X2	P.value
	No	%	No	%		
Fever						
Non	28	93.3	24	80.0	4.30	0.230
Low	2	6.7	2	6.7		
Moderate	0	0.0	2	6.7		
High	0	0.0	2	6.7		
Pain						
Non	4	13.3	0	0.0	6.60	0.086
Mild	12	40.0	8	26.7		
Moderate	8	26.7	12	40.0		
Sever	6	20.0	10	33.3		
Nausea						
Non	2	6.7	0	0.0	17.14	0.001**
Mild	20	66.7	8	26.7		
Moderate	8	26.7	12	40.0		
Sever	0	0.0	10	33.3		
Vomiting						
Non	16	53.3	2	6.7	29.56	0.000**
Mild	14	46.7	10	33.3		
Moderate	0	0.0	6	20.0		
Sever	0	0.0	12	40.0		
Anxiety						
Non	12	40.0	4	13.3	25.85	0.000**
Mild	18	60.0	8	26.7		
Moderate	0	0.0	6	20.0		
Sever	0	0.0	12	40.0		
Constipation						
Non	30	100.0	24	80.0	6.67	0.036*
Mild	0	0.0	4	13.3		
Sever	0	0.0	2	6.7		
Fatigue						
Non	20	66.7	4	13.3	28.89	0.000**
Mild	10	33.3	8	26.7		
Moderate	0	0.0	6	20.0		
Sever	0	0.0	12	40.0		
Insomnia						
Non	30	100.0	14	46.7	21.82	0.000**
Mild	0	0.0	4	13.3		
Moderate	0	0.0	8	26.7		
Sever	0	0.0	4	13.3		

Chi square test for qualitative data between the two groups
Significant level at P value < 0.05, **Significant level at P value < 0.01

Table (4): - Comparison between study and control group related to functional status based on Karnofsky Performance Scale (KPS) on admission and after one month post nursing teaching protocol (n=60)

Functional status	Study (n=30)		Control (n=30)		X2	P. value
	No	%	No	%		
On admission						
Poor	0	0.0	2	6.7	3.77	0.155
Medium	10	33.3	14	46.7		
Good	20	66.7	14	46.7		
Mean ±SD	**76.67±4.79**		**71.33±16.13**		**T=1.74**	**0.088**
After one month						
Poor	0	0.0	10	33.3	23.52	<0.001**
Medium	4	13.3	12	40.0		
Good	26	86.7	8	26.7		
Mean ±SD	**92.00±11.86**		**58.33±16.83**		**T=8.95**	**<0.001****

Chi square test for qualitative data between the two groups

–Independent T-test quantitative data between the two groups

****Significant level at P value < 0.05, **Significant level at P value < 0.01***

Table (5):- Comparison between study and control group related to satisfaction with nursing care quality (n=60)

Patient Satisfaction with Nursing Care Quality	Max Score	Study (n=30)		Control (n=30)		X2	P. value
		No	%	No	%		
Poor	<39%	0	0.0	0	0.0	52.8	<0.001**
Fair	40 – 54%	0	0.0	18	60.0		
Good	55 – 69%	0	0.0	10	33.3		
Very Good	70 – 84%	18	60.0	2	6.7		
Excellent	85 – 100%	12	40.0	0	0.0		
Mean±SD(range)	**115**	**97.73±7.44**		**61.00±11.18**		**14.98**	**<0.001****

Chi square test for qualitative data between the two groups

–Independent T-test quantitative data between the two groups

****Significant level at P value < 0.05, **Significant level at P value < 0.01***

Table (6) : Comparison between study and control group patients quality of life on admission and after one month post nursing teaching protocol based on FACT-Hep score (n=60)

Quality of life	On admission				After one month			
	Study (n=30) Mean±SD	Control (n=30) Mean±SD	T	P.value	Study (n=30) Mean±SD	Control (n=30) Mean±SD	T	P.value
Physical well-being	8.8±2.58	6.8±4.85	2.00	0.051	22.33±2.4	9.67±6.14	10.52	0.000**
Social/family well-being	14.67±3.46	13.8±5.04	0.78	0.441	26.33±2.4	16.93±5.87	8.12	0.000**
Emotional well-being	2.47±1.38	2.6±2.03	-0.30	0.767	19.53±3.46	3.6±2.62	20.10	0.000**
Functional well-being	6.73±3.41	5.67±3.69	1.16	0.250	22.47±4.85	6.87±3.67	14.03	0.000**
Hepatobiliary caner subscale (HCS)	37.47±3.79	39±5.71	-1.23	0.225	61±6.11	43.2±7.29	10.25	0.000**
Trial outcome index (TOI)	53±8.03	51.47±8.97	0.698	0.488	105.8±12.97	59.73±12.81	13.83	0.000**
FACT-G Total score	32.67±8.36	28.87±10.48	1.55	0.126	90.67±12.38	37.07±13.2	16.22	0.000**
FACT-Hep Total score	70.13±11.09	67.87±12.61	0.74	0.463	151.67±18.39	80.27±16.57	15.80	0.000**

− Independent T-test quantitative data between the two groups*

**Significant level at P value < 0.05, **Significant level at P value < 0.01*

Table (7): Correlation between patient satisfaction with nursing care quality, functional status, and quality of life for study and control group patients.

Functional status	Patient Satisfaction with Nursing Care Quality			
	Study		Control	
	R	P	R	P
KPS On Admission	0.554	0.001	0.497	0.005
KPS after one month	0.538	0.002	0.238	0.205
Quality of life				
FACT-Hep Total score on admission	0.781	0.000	0.023	0.904
FACT-Hep Total score After one month	0.881	0.000	-0.040	0.834

** Statistically Significant correlation at P. value <0.05*

*** Statistically Significant correlation at P. value <0.01*

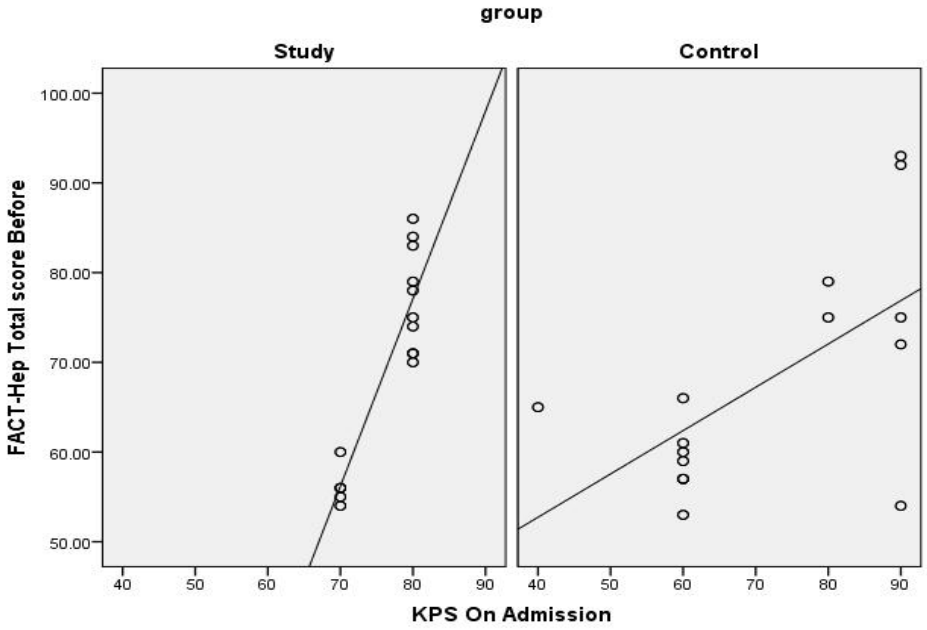

Figure (2): Relation between the FACT-Hep Total score and KPS on admission pre nursing teaching protocol For Study and Control group (n=60)

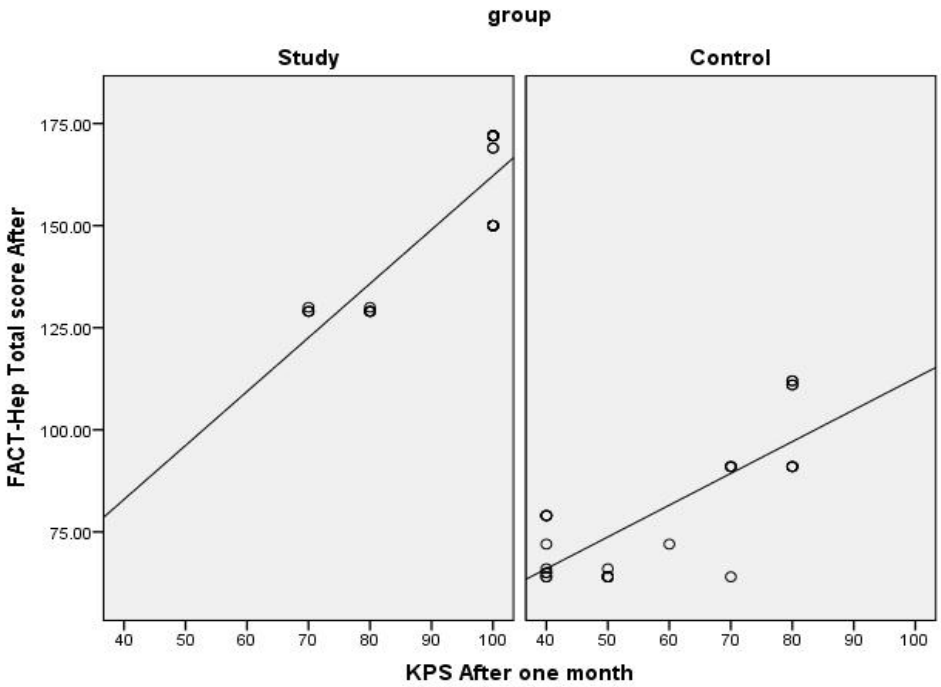

Figure (3): Relation between the FACT-Hep Total score and KPS on admission after one month of nursing teaching protocol For Study and Control group.

Discussion:

The main treatment option for individuals with liver cancer who are unable to undergo surgical resection is transhepatic arterial chemoembolization (TACE); patients with liver cancer may also use TACE as an adjuvant therapy following surgery. TACE has been documented as a successful treatment for both advanced and localized liver cancer. **(Chang et al., 2020)**

The current study was carried out aiming to evaluate the effect of nursing teaching protocol on patient-reported outcomes among hepatocellular carcinoma patients undergoing trans arterial chemoembolization. Discussion of the findings of this study would cover the main parts of the results.

Regarding demographic and health related data for studied patients: Related to demographic characteristics; The results of this study showed that the study's and the control groups' greatest patient percentages were between the ages of sixty to sixty-five with mean age 50.53±9.17&52.33±10.41. This could be attributed to the higher prevalence of liver disease in middle-aged and elderly individuals compared to younger age groups. This is similar to study by **Elkenawy et al., (2022)** who illustrated that that incidence of HCC was increased in patients more than 50 years. The results of this finding also showed accordance with finding of **Yuli et al., (2019)** who reported that mean age of patients in the observation group was 51.32±6.14 years old and control groups was 52.14±8.25 years old. Also, in the same line **Gu and Liang. (2022)** added that mean age of patients in the clinical nursing pathway group was 52.4 ± 3.5 years old and 52.2 ± 2.9 years old for control group) with no obvious difference.

The present investigation represented that majority of the study, and the control group patients were males and married. That finding may be attributed to the higher prevalence of liver disease among males than females in rural communities. Explanation for higher percentage of marital status may be attributed to cultural factors within the studied sample community. This finding aligns with the results of **Shaaban, (2021)** who studied the effect of supportive nursing care on symptom intensity and quality of life of hepatocellular carcinoma patients undergoing transarterial chemoembolization and clarified that, males were more prevalent and highest percentage of the studied participants of both groups were married. This also agrees with the results of **Mahgoub et al.,**

(2020) who reported that there was a male predominance in both groups.

Another study by **Lampimukhi et al., (2023)** explained that there were gender differences that were seen, with men having greater rates of HCC than women. These differences could be caused by a variety of biological and environmental factors, such as levels of androgen hormone, smoking, and alcohol consumption. Also, **Yenjai et al., (2022)** was in line with same finding as They stated that the majority of participants were married and that there were more male patients than female patients in both groups.

This observation supports the work of **Abdullah et al. (2021),** who conducted a study at Al-Rajhy Liver Hospital, Assiut University, to assess the quality of life among elderly with chronic liver diseases," they also found that most of their study sample were male and married.

Relating to residence, two thirds of the patients in the control group and more than half of the subjects in the study were from rural areas. These results corroborated those of **Fekry et al., (2023)**, who discovered that almost two thirds of the patients were rural residents. This observation may be attributed to the geographic location of Al Rajhi liver hospital in Assuit, which serves numerous rural counties within the governorate.

The outcomes of the present research showed that nearly half of patients were able to read and write. This outcome may be attributed to the predominantly rural background of the studied patients. This observation aligns with the finding of **Sheta & Abo El-Fadl., (2023)** who study effect of self-care strategies on health outcomes of patients with hepatocellular carcinoma and reported that slightly fewer than fifty percent of the studied patients possess basic literacy skills (reading and writing).

Relating to Occupational status, less than half of the study group patients were retired while an equal percent of one third of the control group patients were employer and retired. This finding was in accordance with **Chen et al., (2022)** who stated that highest percentage of patients were retired.

Relating to smoking, more than half of the study group patients and three fifths of the control group patients were smokers. This could be explained that tobacco components are typically metabolized in the liver, and their carcinogenic effects are known. This was in accordance with **Sheta and Abo El-Fadl., (2023)**

who indicated that around half of the patients under study were cigarette smokers, and most of them had been smoked for more than three years. Additionally, over half of them smoked a full pack of cigarettes daily.

A comprehensive review of eighty-one epidemiological research by **McGlynn et al., (2021)** reported that cigarette users had an elevated risk of HCC and death. In agreement with the same finding **Yu et al., (2020)** in their study reported that most patients were smokers.

The results of the current study indicated that group-related demographic variables did not differ statistically. This indicates that the two groups were similar, which supported the idea that the patients under study were similar. This was consistent with the finding of a study done by **Elkosier et al., (2022)** who stated that there were no statistically significant differences were detected between the study and control groups.

Additionally, **Wang et al., (2022)** who studied "The Effect of Nursing Management of Patients Undergoing Interventional Therapy for Liver Cancer Compared with Standard Care on Patient-Reported Outcomes" showed no statistically significant difference between the intervention and control groups the two groups of patients were comparable.

In respect to Child Pugh score the current study identified that more than half of the study group patients and two thirds of the control group patients were in class A, with no statistically significant difference between the two groups related to Child Pugh score. This outcome is agreed with **Elkenawy et al., (2022)** who found that more than half of the patients were Child A. This also was in agreement with **Mahmoud et al., (2022)** who illustrated that highest percentage of patients were in in class A.

According to medical data of the studied patients it was found that majority of the study group and more than half of the control group patients stayed at hospital for about one day with statistically significant difference between the two groups with p-value < 0.05. This coincides with **Min Hu et al., (2022)** who stated that the observation group's hospital stays were significantly ($P < 0.05$) shorter than the control groups.

Also in this respect, **Gardini et al., (2018)** Considering the duration of hospital stays of the patients under investigation, the findings indicated that most patients in the study group had less than two days of hospital stay after the

nursing protocol was implemented, whereas patients in the control group had longer hospital stays than two days.

Jing and Guoyun (2020) conducted a study on patients with liver cancer who underwent interventional surgery. The study's authors found a correlation between higher nursing care and a shorter length of stay in the hospital following surgery.

Concerning occurrence of common symptoms; the present study represented that the majority of study group had mild pain level while control group had moderate to severe pain level. This is due to the close monitoring of patients by nurses' post-procedure to manage pain and avoid complications. In addition, **Wang et al., (2022)** documented that, the post embolization pain score in the health education group was significantly lower than in the control group ($P<0.05$) and concluded that, health education among HCC patients before TACE is beneficial for the pain relief during interventional procedure.

Furthermore, the current study demonstrated that there was statistically significant difference between the study and control group patients related to nausea, vomiting, anxiety, fatigue and insomnia with p-value <0.001, and for constipation with p-value < 0.05. This improvement in symptoms is likely attributable to effect of nursing instructions taught in teaching protocol. This finding supports the first research hypothesis.

This result is consistent with the findings of **Wang et al., (2022)**, who reported that the intervention group's rate of moderate and severe symptoms was significantly reduced, as well as the severity of pain, nausea, anxiety, and fatigue, when compared to the control. Even though the intervention group experienced less severe constipation and vomiting than the control group, as well as a reduced proportion of moderate to severe symptoms, the difference was not statistically significant.

These findings concur with those of **Elkosier et al., (2022)**, who found that following the implementation of early palliative care, there were significant differences between the study group and the control group, including all items of the Edmonton symptoms score with ($P<0.001$) except pain and anxiety. The same previous findings are consistent with **Mahgoub et al., (2020)** who came to the conclusion that, when compared to patients in the control group, the study group's length of

hospital stay, and the number and consequences of post-procedure complications were reduced by putting the nursing protocol on trans-hepatic arterial chemoembolization into practice.

Similarly, the study's results agree with those of **Shaaban, (2021)** who documented significant difference between the study group and control group during follow-up and after supportive nursing care was implemented, with the exception of nausea and dyspnea. This indicates that the degree of symptoms experienced by individuals with hepatocellular carcinoma was positively impacted by supportive nursing care.

The same previous finding agrees with **Sheta and Abo El-Fadl., (2023**) who highlighted significant reduction in the experience of symptoms and discomfort following the implementation of self-care strategies compared to the period before their implementation.

The present study documented that there was no statistically significant difference between the two groups of patients related to fever and pain. This finding aligns with a study conducted by **Ma et al., (2021)** who investigated the effect of a solution-focused approach on the complications, pain, sleep, and quality of life in hepatocellular carcinoma patients receiving TACE and reported no statistically significant change in pain perception scores between the two groups ($P > 0.05$). **Wang et al., (2022)** stated that the frequency of fever and sleeplessness in the two groups was comparable.

Concerning functional status of studied patients: Regarding functional status the present study cleared that most of the study group patients had good performance after one month, while control group had an equal percentage of good and medium performance with no statistically significant difference. While after one months of nursing teaching protocol there was a statistically significant difference between two groups (study and control) as most study group patients had good functional status while nearly half of control group patients had medium performance with p-value <0.00.

According to the study, this improvement resulted from giving patients a colorful booklet with various facts and self-care techniques to assist them remember and to make it easier for them to access information when needed. This finding supports the second research hypothesis.

This was in line with **Yenjai et al., (2022)** They discovered that a thorough discharge program improved the functional condition of patients who obtained trans arterial chemoembolization for hepatocellular cancer. In patients with hepatocellular carcinoma receiving trans arterial chemoembolization, there was a statistically significant difference ($p = 0.020$) in the mean rank of functional status between the experimental and control groups.

Furthermore **Wang et al., (2022)** it was determined that the intervention group's KPS and care satisfaction scores were both considerably higher than those of the control group ($p <.05$). Patients' physical function improved, which improved their social and familial functioning and, ultimately, their general functional status.

Concerned with patient satisfaction with nursing care quality: The current study denotes that near two third of the study group patients had very good score of satisfaction with nursing care quality, while the same number of the control group patients had fair score with a highly statistically significant difference between two group with p-value <0.001. This finding supports the third research hypothesis.

These in the same context with **Wang et al., (2022)** in their study who was found that the scores for patient satisfaction with nursing care of the intervention group were significantly higher than that of the control group.

In agreement with current study result **Gu and Liang. (2022)** reported that the satisfaction scores of study group patients were higher than those in the control group ($P < 0.05$). **Yuan et al., (2022)** agreed with current study result as they stated that the total satisfaction of patients in the majority of comprehensive group was significantly higher than that of patients in the conventional group.

Yu et al., (2020) had demonstrated that there was a significant difference ($P < 0.05$) in the nursing satisfaction score between the research and control groups.

Concerning quality of life: The present research discloses that there was statistically significant improvement in quality-of-life Fact-Hep domains (physical, social, emotional, functional, and Hepatobiliary caner subscale) after one month of nursing teaching protocol compared to pre intervention phase. There was a statistically significance difference between the two groups with p-value <0.001. This

observation may be attributed to patient's compliance with the nursing teaching protocol and continuous follow up by the researcher. This finding supports the fourth research hypothesis.

This observation aligns with the findings of **Fekry et al., (2023)** who found that the total FACT-HEP score of the patients under study in the post-intervention phase compared to the pre-intervention phase had a P. value of 0.001 and that there had been statistically significant improvement in all dimensions of the FACT hep domains (physical, social, emotional, functional, and Hep-concern well-being).

In a similar way **Elkosier et al., (2022)** study results showed, before the intervention, there were no statistically significant changes between the two groups under study in terms of FACT-Hep. Upon completion of the recent study, it was observed that, with the exception of emotional wellbeing, there were highly significant differences between the study and control groups with respect to the FACT-Hep score at two weeks following the implementation of early palliative care. Additionally, there were remarkably significant differences between the research and control groups at the one-month follow-up, encompassing every item on the FACT-Hep score.

Additionally, the study's findings are consistent with those of **Shaaban (2021)**, who found that there was a significant change in the FACT-Hep domains and total FACT-Hep score between the study and control groups two weeks post-intervention and at follow-up.

Similarly, **Min Hu, et al., (2022)** found that the observation group's quality of life scores was significantly ($P < 0.05$) higher than those of the control group. In a similar vein, **Krakauer, (2019)** noted that giving patients palliative care enhances their quality of life.

Concerning relations: The current study findings displayed that there is a positive correlation between patient satisfaction with nursing care quality, functional status and quality of life on admission and after one month of nursing teaching protocol with p-value <0.001. From the standpoint of researchers this finding may be attributed to nursing teaching protocol which successfully increased participants' understanding of the transarterial chemoembolization procedure, this allowed patients to take an active role in their care and adhere to their instructions', thereby improved their satisfaction which

leaded to improving the overall quality of life and functional status of patients.

These in the same line with **Min Hu, et al., (2022)** concluded that the perioperative use of comprehensive nursing intervention in TACE for PHC patients raises nursing quality and patient satisfaction while also improving QoL for patients. This conclusion, which is corroborated by a study by **Li & Li, (2018)** on "comprehensive nursing of hepatocellular carcinoma patients after TACE," emphasized that comprehensive nursing enhances QoL and satisfaction while successfully reducing pain associated with TACE in HCC patients.

Also, there is a positive correlation with statistically significant difference on admission and after one month between FACT-Hep Total score and KPS, as regard the study and control group patients. Higher FACT scores indicated better performance and higher KPS scores suggested greater functioning in patients, the positive correlation between these two tools can validate that nursing teaching protocol improver patients' outcomes. These findings are consistent with the study by **Laube et al., (2021)** who described that high-quality nursing care has been notified to adequately improve the QoL in HCC patients.

These findings concur with those of **Fekry et al. (2023),** who reported a highly statistically significant positive association (p.value = 0.001) between QoL and the favorable outcome of the patients under study throughout both the pre- and post-intervention phases. According to the same findings as **Elkosier et al., (2022)**, there was a statistically significant positive association between practice and the favorable outcomes of the patients under study. Also, **Wang et al., (2022)** found that patients' symptoms, functional status, and satisfaction with nursing care can all be markedly improved by receiving high-quality nursing care through a symptom management program.

Conclusion:

On the light of the present study, it can be concluded that, nursing teaching protocol had a positive effect on minimize patient's symptoms, satisfaction with nursing care quality, functional status, and quality of life for patients with hepatocellular carcinoma undergoing trans arterial chemoembolization. There was positive correlation between total scores of satisfactions with nursing care quality, functional status, and quality of life of study

group patients after implementing the nursing teaching protocol.

Recommendations:

- Patients with hepatocellular carcinoma having transarterial chemoembolization should have access to the instructional illustrated booklet, handouts, films, and posters.
- All HCC patients receiving TACE should have routine follow-up to enhance their quality of life, functional status, and ability to take care of themselves.
- A repeat of the study with a bigger probability sample drawn from various regions to allow for the results to be more broadly applied.

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