

Educational Nursing Program Implementation: It's Effect on Hepatic Encephalopathy Severity among Patients with Liver Cirrhosis

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Abstract: Hepatic encephalopathy one of the most serious complications of liver diseases which is responsible for the major cause of admission and high mortality in cirrhotic patients. So effective educational nursing intervention may be of great value in minimizing hepatic encephalopathy episode. **Purpose:** was to examine the effect of educational nursing program on hepatic encephalopathy severity among patients with liver cirrhosis. **Design:** a quasi-experimental research design was utilized. **Setting:** The current study was carried out at endemic diseases department and the outpatient clinics of Menoufia University Hospital as well as National Liver Institute at Shebin El-Kom, Menoufia Governorate, Egypt. **Subjects:** A consecutive sample of 100 adult patients with liver cirrhosis were assigned randomly and alternatively into two equal groups, 50 patients for each group. **Instruments:** Three instruments were used for data collection: Structure interview questionnaire, bio - physiological measurement instrument and West-Haven criteria scale (WHC scale). **Results:** It is revealed that 92% and 96% of study and control groups respectively had poor total knowledge pre- intervention. While 90% and 86% respectively of study group compared to 0.0% of control group had good total knowledge level immediately post intervention and after 2 months. There was highly statistically significant reductions in hepatic encephalopathy severity grade among study group compared to control group immediately post intervention and after 2 months, in which majority of study group (88%) didn't have hepatic encephalopathy abnormality compared to 48% of control group after 2 months of educational nursing intervention. **Conclusions:** Educational nursing program had a positive impact on reducing hepatic encephalopathy episodes and its severity among study group (group I) than control group (group II). **Recommendations:** Supervised health teaching should be given for all patients with liver cirrhosis to improve their knowledge and awareness about hepatic encephalopathy, its prevention and early detection especially for high risk persons. Also establishing a web site, including all information pertained to hepatic encephalopathy and all aspect of health education such as different educational materials, medias and audio-visual aids.

Key words: Educational nursing program, Hepatic encephalopathy, Liver cirrhosis.

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Introduction:

Hepatic encephalopathy (HE) is broadly defined as a neuropsychiatric syndrome that results in a reversible impairment of brain function which occurs in patients of advanced liver disorders as a result of hepatic malfunction (Saber et al., 2019). It is a complex neurological process world wide and a reversible syndrome observed in patients with advanced liver disease. HE causes significant morbidity and mortality and is responsible for considerable burden on patients and their caregivers (Kabarria et al., 2021).

The incidence and prevalence of HE can be difficult to be assessed because of the underlying causes and variable severity of the disease manifestations. Consequently, HE has been reported to occur in a wide range (20–80%) of patients with cirrhosis. The prevalence of overt HE at the time of liver cirrhosis diagnosis is approximately 10–14%. This rises to 16–21% in patients with decompensated cirrhosis. Overall, an estimated 30% to 40% of patients with cirrhosis will experience overt HE during their clinical course (Elsaid & Rustgi, 2020).

The exact cause of hepatic encephalopathy is unknown, but, it's usually triggered by renal failure, gastrointestinal bleeding (e.g., esophageal varices), constipation, infection, medication non-compliance, excessive dietary protein intake, dehydration (e.g., fluid restriction, diuretics, severe diarrhea, excessive vomiting, excessive paracentesis), electrolyte imbalance, consumption of

alcohol, certain sedatives and analgesics. In some cases, hepatic encephalopathy may occur following the creation of a transjugular intrahepatic portosystemic shunt (TIPS) (Mandiga et al., 2023).

Hepatic encephalopathy is characterized by a wide spectrum of neuropsychiatric abnormalities resulting from the accumulation of neurotoxic substances in the brain (European Association for the Study of the Liver (EASL), 2021). In many cases, patients are unaware of the symptoms. In the early stages, patients may only report subtle symptoms, such as disturbances in their sleep–wake cycles. As symptoms progress, patients may develop personality changes such as apathy, irritability, and disinhibition. If left unrecognized, symptoms worsen and patients can present with cognitive impairments such as disorientation, memory impairment, slurred speech, confusion, and eventually coma. The most widely recognized symptom of HE is asterixis. Asterixis presents as a flapping tremor that occurs because of negative myoclonus resulting in loss of postural tone (Kabarria et al., 2021).

Nurses play a key role in educating patients and families to reduce episodes of hepatic encephalopathy. A comprehensive nursing education is crucial to ensure appropriate care and patient's safety through providing structured information for the understanding of hepatic encephalopathy (HE) might be relevant to the prevention and management of

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this syndrome (Rodenbaugh et al., 2020).

Nursing education has a vital role in prevention of hepatic encephalopathy that include educating the patient and the family about the disorder, its progression and potential complications. Also, maintaining a proper nutrition which is an important consideration in the patient with cirrhosis, prevention of precipitating factors. It has vital importance in the treatment of HE, as about 90 % of patients can be cured only by adjustment of the causative precipitating factors. The clinical course of hepatic encephalopathy can be interrupted in majority of patients by controlling these precipitating factors. Hence early and accurate diagnosis and proper identification of precipitating factors will help in initiating the appropriate treatment and thereby bringing down the morbidity and mortality, compliance with treatment and follow up, patients should understand the reasoning for taking the medications (Ali et al., 2023).

Planning short and simple educational programs has a significant effect on the patient's control of his disease and its complications; and can improve quality of life, life satisfaction, and mechanisms of coping with treatment (Atya et al., 2019).

Significance of the Study:

Liver cirrhosis is chronic disease considered as an Egyptian health problem of wide prevalence. According to the latest WHO data published in 2018 Liver Disease

Deaths in Egypt reached 12.40% of total deaths. The age adjusted death rate is 116.08 per 100,000 of population ranks Egypt in the world (WHO, 2018).

Development of hepatic encephalopathy is usually associated with higher rates of mortality. The survival possibility of hepatic encephalopathy is 23 % at three years and 42 % at one year of follow-up. Moreover, about thirty percent of patients who died due to end-stage liver disease undergo prominent encephalopathy, reaching to coma (Saber et al., 2019).

There are many studies which have observed that both patients and caregivers have limited understanding of the disease and its management so it is hoped that structured nursing instructions that may lead to reduce patient's complications, hospital stay, nurse's workload and cost burden on the patients and society that are associated with complications management.

It is hoped that hepatic patients will be protected from occurrence of hepatic encephalopathy by following the structured nursing instructions that may lead to reduce patient's complications, hospital stay, nurse's workload and cost burden on the patients and society that are associated with complications management.

Purpose of the study:

The purpose of the current study was to examine the effect of educational nursing program on hepatic encephalopathy severity among patients with liver cirrhosis.

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Research Hypotheses:

The following research hypotheses were formulated to achieve the aim of the study:

- Patients who receive educational nursing program (study group) will have higher level of knowledge score than patients who don't (control group).
- Patients who receive educational nursing program (study group) will have lower hepatic encephalopathy grades than patients who don't (control group).

Methods:

Research design:

A quasi-experimental research design (study and control) was utilized for this study.

Research Setting:

The current study was carried out at endemic diseases department and the outpatient clinics of Menoufia University Hospital as well as Liver Institute at Shebin El-Kom, Menoufia Governorate, Egypt.

Sampling:

A consecutive sample of 100 adult patients with liver cirrhosis were assigned randomly and alternatively into two equal groups, 50 patients for each group. Group one was the study group. Patients received the structured educational nursing program along with routine hospital care. Group two was the control group. patients was exposed to routine hospital care only.

Sample size was determined based on the following equation:

$$n_0 = Z^2 p q / e^2$$

Z = is the desired confidence level which is 95% (1.96) (The value for Z is found in statistical tables which contain the area under the normal curve)

e = is the desired level of precision 0.05 (±5%),

p = is the estimated proportion of an attribute that is present in the population, and q is 1-p.

As the sample included liver cirrhosis patients with certain inclusion criteria, the sample size (n₀) can be adjusted as:

$$n = n_0 / [1 + \{(n_0 - 1) / N\}]$$

Where (n) is the sample size according to the included criteria and N is the population size (Singh & Masuku, 2014).

Inclusion criteria:

- Patients didn't receive any educational intervention regarding hepatic encephalopathy before.
- Free from hepatic encephalopathy at the time of data collection.
- Free from renal failure, diabetes mellitus and cancer to avoid any deterioration in patients' status especially intellectual and not to interfere with specific nursing education.
- Patients who aren't critically ill who able to communicate.

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Instruments of the study:

Instrument one: Structure interview questionnaire:

It was developed by the researcher based on Atya et al., (2019) to assess baseline bio- sociodemographic data and patients' knowledge. It included three parts:

- **Part one:- Sociodemographic data:**-It comprised of thirteen questions and included information about patient's age, sex, marital status, level of education and occupation.....etc.
- **Part two:- Medical data:** It comprised of twenty- eight questions related to past and present medical history such as such as etiology of liver cirrhosis, duration of illness, history of other chronic diseases, history of bleeding, esophageal varices and ascites, dietary regimens and prescribed medications....etc.
- **Part three: - Patients' knowledge:** It comprised of four questions about liver cirrhosis: definition, causes, clinical manifestations and complications. Also it included nine questions about hepatic encephalopathy: definition, causes, signs & symptoms, stages, complications, diagnostic studies, its treatment and prevention. Moreover it contained four questions to assess patient's knowledge about allowed and prevented food, salt substitutes and food cause distention. The total questions were seventeen.

Scoring system:-

Each answer was given two marks if the patient reported completely correct answer, one mark if he /she reported incompletely correct answer and zero if the answer was incorrect or I don't know. All answers were summed to give a score ranged from zero to thirty-four. The higher score, the higher knowledge level. The total score was converted into percentage score and was categorized as follow:

- ◆ A score less than 50% denoted poor knowledge (from zero to sixteen marks).
- ◆ A score from 50 % to less than 70% denoted fair knowledge (from seventeen to twenty- three marks).
- ◆ A score of 70% or more denoted good knowledge (from twenty- four to thirty- four marks).

These were standardized categories as mentioned by Al-Khaled et al., (2011).

Instrument two: Bio - physiological measurement instrument:-

It was developed by the researcher based on Saber et al, (2019) to assess the common problems that the patients may have such as fatigue, itching, dry mouth, muscular cramps and also common problems related to dietary regimen that the patients may complain such as flatulence, nausea, vomiting, constipation, diarrhea, dehydration and dietary irregularity. Also included some lab investigation which evaluated: hemoglobin, albumin and liver function tests.

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Each patient was asked to respond to the questions as "yes" or "no". While results of blood investigations were compared to normal range.

Instrument three: West-Haven criteria scale (WHC scale):

It was developed by Ferenci et al, (2002) to assess hepatic encephalopathy severity. This is based on the level of impairment of autonomy, changes in consciousness, intellectual function and behavior. Its score is ranged from zero to four in which:

- **Grade 0:** indicate no abnormality.
- **Grade 1:** indicate trivial lack of awareness, euphoria or anxiety, shortened attention span and impaired performance of addition.
- **Grade 2:** indicate lethargy or apathy, minimal disorientation of time or place, subtle personality changes, inappropriate behavior and impaired performance of subtraction.
- **Grade 3:** indicate somnolence to semi stupor, but responsive to verbal stimuli, confusion and gross disorientation.
- **Grade 4:** indicate coma unresponsive to verbal or painful stimuli.

The validity of West-Haven criteria scale (WHC scale) was shown to be good construct validity 0.80, reliability was also demonstrated with strong test-retest agreement test-retest methods to ascertain consistency and Cronbach's Alpha was $\alpha = 0.732$ (Vilstrup et al., 2014).

Procedure:-

Written approval:

Permission to carry out the study was taken from responsible authorities after explanation of the purpose of the study.

Instruments development:

First and second instruments were developed by the researcher but instrument III was developed by by Ferenci et al., (2002). All instruments were tested for face and content validity by five academic experts in the field of Medical Surgical Nursing. The experts revised the instruments for clarity, relevancy, comprehensiveness, simplicity and applicability. Minor modifications were done accordingly to ascertain relevance and completeness.

Reliability:

The first and the second instruments were tested for reliability using Cronbach Alpha reliability analysis. Its value was 0.801 for the first instrument and 0.834 for the second one, while third instrument was proved to be valid and reliable instrument (Vilstrup et al., 2014).

Pilot study:

A pilot study was conducted prior to data collection on 10% of the study sample (10 patients) to test the feasibility, clarity and applicability of the instruments and determine the needed time to fill it, and then necessary modifications were done so

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these patients were excluded from the actual study.

Ethical Consideration:

A written approval from ethical and research committee of Faculty of Nursing, Menoufia University was obtained. Also written agreement was obtained from the authorities of endemic diseases department, outpatient clinic of Menoufia University Hospital and Liver Institute. Each patient was asked for their informed consent to participate in the study after being informed of its purpose. Concerning collected data, secrecy was taken into account. The researchers accentuated that data would be confidentially preserved. Furthermore, respondents' anonymity was certain by coding data. Patients were also informed that they can withdraw from the study at any time without penalty and refusal to participate wouldn't affect their care.

Data collection:

- ◆ Data collection was extended over a period of 10 months from June 2022 to March 2023.
- ◆ Patients who agreed to participate in the study and fulfilled the inclusion criteria were divided randomly into two equal groups: study group (I) and control group (II) (50 patients for each group).
- ◆ Each patient of both groups was interviewed individually by the researcher in Endemic Diseases Department at Menoufia University and National Liver Institute, while the follow up was performed after the patients were discharged at outpatient clinics in both setting.

- ◆ The researcher start with the control group (II) firstly then the study group (I) to avoid the contamination of results.
- ◆ The study was conducted on four consecutive phases: Assessment, planning, implementation and evaluation phases as following:

i. Assessment phase:-

This phase took about 20-30 minutes for each patient of both groups. During this phase the researcher interviewed each patient of both groups individually to collect base line data as follow:

- The researcher assessed bio - demographic characteristics using part one and two of instrument I. It took about 5-10 minutes.
- All patients of both groups were assessed for their knowledge about liver cirrhosis, hepatic encephalopathy and their diet using part three of instrument I. It took about 10-15 minutes
- Each patient of both groups was assessed for the common problems that they might have and some lab investigations results were collected from patients' charts using instrument II. It took about 5 minutes
- The researcher took the patients' telephone's number at the first contact (during hospitalization) to determine the time of appointments in order to complete data collection process.

ii. Planning phase:

The researcher prepared an instructional booklet about educational nursing program based on baseline

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subject's data and their needs assessment as well as extensive literature review (Sayed et al., 2014, Atya et al., 2019 & Saber et al., 2019). This booklet was supported by colored illustrative pictures. The booklet contained the following information:

- Brief overview about anatomy and functions of the liver.
- Brief overview about liver cirrhosis (definition, causes, manifestations and complications).
- Information about hepatic encephalopathy (definition, causes, signs & symptoms, stages, diagnostic studies and how to manage it).
- Nursing teaching guidelines to minimize hepatic encephalopathy as maintaining proper nutrition (balanced diet, importance of vegetables and fruits, sodium restriction and amount of liquids / day). Moreover the booklet contain information about prevention of encephalopathy as avoid alcohol and immune suppressed medication, maintaining a proper nutrition and adherence to medical treatment..etc. Also importance of compliance to therapeutic regimen was included such as taking medication on time and avoid over dose of medications as well as follow doctor's instructions.

iii. Implementation phase:

- The researcher interviewed each patient of the study group individually in his/her room at the previously mentioned settings for four teaching sessions for four days in which each day contains one session, twice per week. Each

session took about 30-45 minutes according to patient's level of understanding. The previously prepared booklet was distributed by the researcher at the beginning of first session. Lectures, group discussion, video, demonstration and return demonstration were used for illustration.

- The prepared protocol of care conducted through the following sessions:-

❖ **During the first session**, At the beginning of the session, the researcher provided each patient of study group knowledge about anatomy and functions of liver and liver cirrhosis (definition, causes, manifestation and complications). At the end of this session the researcher allowed each patient to ask questions and provided them with question's answers. This session took about 30 minutes.

❖ **At the beginning of the second session**, the researcher refreshed the previous learnt knowledge and then gave information about hepatic encephalopathy disease (definition, causes, manifestations, stages, diagnostic studies and medical management). This session took about 45 minutes.

❖ **At the beginning of the third session**, the researcher reinforced the received learning knowledge and answered any question or solved any problem that might arise, then the researcher gave information about teaching guidelines for

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patients with liver cirrhosis as maintaining proper nutrition, methods of preventing encephalopathy and importance of compliance to therapeutic regimen. This session took about 45 minutes.

❖ **At the beginning of the fourth session,** the researcher summarized the received instructions and allowed all patients asking questions then provided them with question's answers. This session took about 45 minutes.

❖ **During follow up period,** the researcher reinforced the patients by phone to be sure that patients followed the instructions or not and incidence of hepatic encephalopathy.

IV. Evaluation phase:

- All patients of both groups were evaluated twice (immediately after the fourth session of educational nursing program and after two months) for their knowledge, biophysiological measurements (problems and lab investigations) and severity of HE using all instruments (part three of instrument I, instrument II and instrument III).
- A comparison was done between both groups (study and control groups) immediately after fourth session of educational nursing program and after two months to assess the effect of educational nursing program on occurrence of hepatic encephalopathy.

Limitation of the study:

- There was insufficient number of patients at Endemic department in Menoufia University Hospital for data collection so the researcher added another setting (National Liver Institute) and the data was collected from both settings.

Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 26, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, comparison between two groups was done using Chi-square test (χ^2). For comparison between more than two means of non-parametric data, Kruskal-Wallis (χ^2) was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r).

Results:

Table (1):- this table shows that, about two thirds of both studied groups (study & control) had 50 to 60 years (70% & 62% respectively) and male (72% and 60% respectively). Concerning marital status, the majority of them were married (82% and 88% respectively). As regard level of education, about one third of both

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study and control groups (40% and 32% respectively) had secondary education. In relation to occupation, 28% of study group had an administrative work while 34% of the control group didn't work. The highest percentage of them (76% and 82% respectively) were from rural area, in relation to work status, 70.4% of study group as compared to 85% of control group had partial work time after disease. The majority of both study and control groups reported that their income was insufficient (82% and 86% respectively). About two thirds of both groups were nonsmokers (64% and 66% respectively). About half of smokers of both groups smoked one to two package of cigarettes /day (50% and 52.9% respectively).

There were no statistically significant differences between both groups regarding all sociodemographic characteristics.

Table (2):- This table shows that, more than two thirds of study and control groups detected liver cirrhosis by presence of some symptoms (74% and 70% respectively). The major appeared manifestation among study group was ascites (27%), while among control group were ascites and bleeding (20%). The known cause for liver cirrhosis was chronic viral hepatitis among more than one half of both study and control groups (56% and 52% respectively). The major chronic health problems among study and control group was thyroid disease (70% and 58. 8% respectively). Minority of them was previously hospitalized due to liver cirrhosis (36% and 22% respectively). The highest frequency reason for

hospital admission among both groups was fatigue (50% and 36.4% respectively). In relation to frequency of hepatic encephalopathy, about two thirds of both groups didn't have previous history of HE (70% and 66% respectively). The major cause of hepatic encephalopathy among more than two thirds of study and control group was liver cirrhosis (66.7% and 70.6% respectively). Also the majority of them didn't have history of esophageal varices (92% and 88% respectively). Moreover the majority of study group (92%) and more than three fourths of control group (78%) didn't have past history of bleeding and didn't have pervious history of blood transfusion (88% and 82% respectively). As regarding frequency of ascites, the majority of subjects in both groups didn't have pervious history of ascites (88% and 94% respectively). Less than one third of both groups (32% and 28% respectively) took antiviral drugs for treating cirrhosis.

Table (3):- This table reveals that, about half of both groups (study and control) had liver cirrhosis from more than five years (46% and 54% respectively). In relation to family history of liver cirrhosis, majority of both groups (84% and 88% respectively) didn't have family history of liver cirrhosis. More than one third of study and control groups (34%) followed low protein diet. There were no statistical significant differences between both groups regarding all items of present medical history.

Figure (1):- This figure reveals that, the majority of study and control

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groups (92.0% and 96.0% respectively) had poor total knowledge level pre-intervention that was highly significantly decreased to 0.0% and 0.0% compared to 94% and 96% of control group post intervention and at follow up respectively.

Table (4):- This table shows that, about half of study group (62%, 52%, 46% and 68%) and control group (68%, 48%, 58% and 72%) had extreme fatigue, itchy skin, mouth dehydration and muscular cramps pre- intervention that were highly significantly decreased 2 months post intervention among study group (18%, 6.0%, 12% and 18% respectively) versus control group (68%, 48%, 60% and 72% respectively).

Regarding dietary symptoms, the majority of both study group (82%, 86% and 88%) and control group (84%, 80% and 92%) complained of distension, constipation and dietary irregularity respectively pre-intervention that were highly significantly decreased among study group (16%, 6.0% and 10%) versus control group (86%, 88% and 92%) 2 months post intervention

Table (5) This table shows that, pre-intervention, the majority of both groups (study and control) had abnormal hemoglobin (90.0% and 92.0% respectively) that was highly significantly decreased post intervention and follow up period to 84.0% and 68.0% respectively for study group versus 96.0% and 94.0% respectively for control group. Regarding AST pre - intervention, one half of study group (50.0%) and majority of control group (94%) had abnormal AST. While post intervention and follow up period, abnormality of AST was highly significantly improved for study group (42.0% and 28.0% respectively) versus 90.0% and 64.0% for control group respectively.

Figure (2) This figure shows that majority of study group (94% and 88%) was normal compared to (86% and 48%) of control group post intervention and during follow up period. There was highly significant difference among both groups regarding hepatic encephalopathy severity grade.

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Table (1): Distribution of both studied groups according to their socio demographic data (n=100) .

Socio demographic data	Study group (n=50)		Control group (n=50)		Test of significance	
	No.	%	No.	%	X ²	P-Value
Age						
30-<40 years	3	6.0	5	10.0	0.896	0.639
40-< 50 years	12	24.0	14	28.0		
50-60 years	35	70.0	31	62.0		
Mean ± S.D	54.66±7.91		53.74±8.56		t = 0.575	0.568
Gender						
Male	36	72.0	30	60.0	1.604	0.205
Female	14	28.0	20	40.0		
Marital status						
Single	1	2.0	1	2.0	2.039	0.564
Married	41	82.0	44	88.0		
Widowed	7	14.0	3	6.0		
Divorced	1	2.0	2	4.0		
Education level						
Illiterate	13	26.0	12	24.0	3.210	0.523
Read and write	1	2.0	5	10.0		
Basic education	8	16.0	8	16.0		
Secondary education	20	40.0	16	32.0		
University education and post graduate studies	8	16.0	9	18.0		
Occupation						
Manual work	13	26.0	8	16.0	2.269	0.518
Administrative work	14	28.0	12	24.0		
Don't work	13	26.0	17	34.0		
Housewife	10	20.0	13	26.0		
Place of residence						
Urban	12	24.0	9	18.0	0.542	0.461
Rural	38	76.0	41	82.0		
Work status after disease						
	(n=27)		(n=20)		3.999	0.131
Total work time	8	29.6	3	15.0		
Partial work time	19	70.4	17	85.0		
Joined a new job	0	0.0	0	0.0		
Perceived monthly income						
Sufficient	9	18.0	7	14.0	0.298	0.585
Insufficient	41	82.0	43	86.0		
Smoking						
Yes (Cigarettes)	18	36.0	17	34.0	0.044	0.834
No	32	64.0	33	66.0		
Numbers of cigarettes per day						
	(n=18)		(n=17)		0.172	0.918
< less than one package	6	33.3	6	35.3		
from one to two packages	9	50.0	9	52.9		
> more than 2 packages	3	16.7	2	11.8		

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Table (2): Distribution of both studied groups regarding past medical history (n = 100)

Past medical history	Study group (n=50)		Control group (n=50)		Test of significance	
	No.	%	No.	%	X ²	P-Value
Detecting cirrhosis by						
chance	13	26.0	15	30.0	0.198	0.656
Presence of some symptoms	37	74.0	35	70.0		
Appeared manifestation	(n=37)		(n=35)		5.883	0.502
Fatigue	5	13.5	5	14.3		
Abdominal pain	5	13.5	6	17.1		
Jaundice	7	19.0	5	14.3		
Itchy skin	6	16.2	3	8.6		
Stool color change	0	0.0	2	5.7		
Bleeding	4	10.8	7	20.0		
Ascites	10	27.0	7	20.0		
Knowing the cause of liver cirrhosis?					0.161	0.688
Yes (Chronic viral hepatitis)	28	56.0	26	52.0		
No	22	44.0	24	48.0		
Presence of other chronic health problems					0.386	0.534
Yes	20	40.0	17	34.0		
No	30	60.0	33	66.0		
Type of chronic health problems	(n=20)		(n=17)		0.358	0.549
Thyroid disease	14	70.0	10	58.8		
Cardiovascular diseases	6	30.0	7	41.2		
Previous hospitalization due to liver cirrhosis					2.380	0.123
Yes	18	36.0	11	22.0		
No	32	64.0	39	78.0		
Frequency of previous hospitalization	(n=18)		(n=11)		1.473	0.479
Once	9	50.0	3	27.3		
Twice	7	38.9	6	54.5		
3 times or more	2	11.1	2	18.2		
Reason for hospitalization all times	(n=18)		(n=11)		5.486	0.241
Fatigue	9	50.0	4	36.4		
Ascites	7	38.9	3	27.3		
Jaundice	2	11.1	1	9.1		
Melena	0	0.0	2	18.2		
Hematemesis	0	0.0	1	9.1		
Surgical history					1.000	0.500
Yes	5	10.0	4	8.0		
No	45	90.0	46	92.0		
Type of surgery	(n=5)		(n=4)		0.225	0.894
Hemorrhoid	2	40.0	2	50.0		
Cesarean section	1	10.0	1	25.0		
Appendectomy	2	40.0	1	25.0		

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**Continued Table (2): Distribution of both studied groups regarding past medical history
(n = 100)**

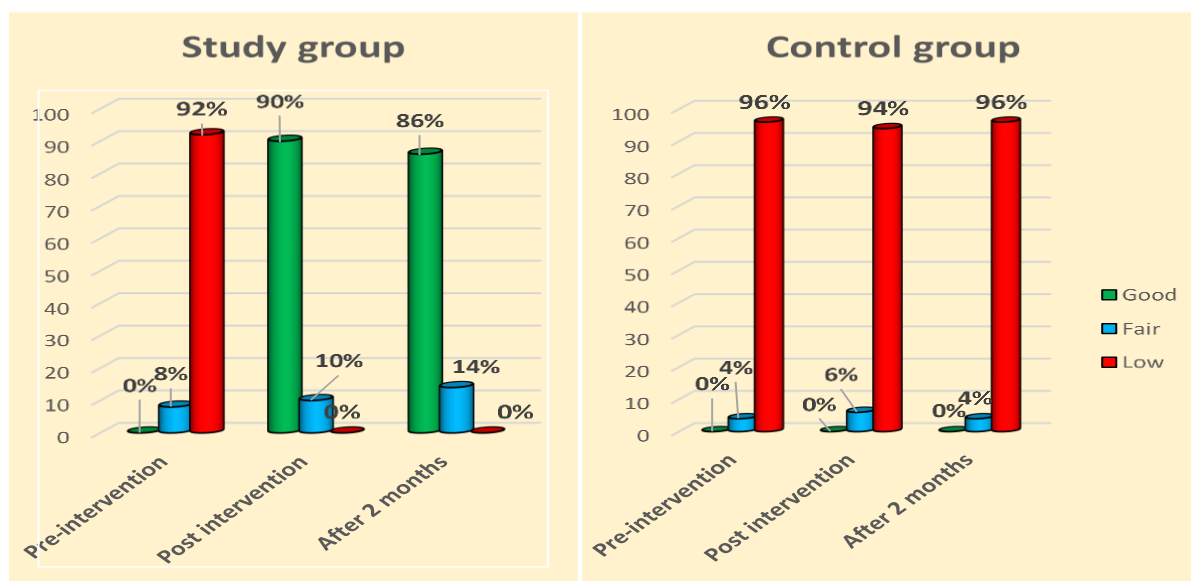
Past medical history	Study group (n=50)		Control group (n=50)		Test of significance		
	No.	%	No.	%	X ²	P-Value	
Frequency of hepatic encephalopathy					0.129	0.931	
No	35	70.0	33	66.0			
Once	10	20.0	12	24.0			
Twice	5	10.0	5	10.0			
Causes					0.569	0.436	
		(n=15)					(n=17)
Gastric bleeding	2	13.3	3	17.6			
Liver cirrhosis	10	66.7	12	70.6			
Immunosuppression drugs	2	13.3	1	5.9			
Diuretics drugs	1	6.7	1	5.9			
History of esophageal varices					0.741	0.505	
Yes	4	8.0	6	12.0			
No	46	92.0	44	88.0			
Duration from:					0.278	0.870	
		(n=4)					(n=6)
One year	1	25.0	1	16.7			
2-3 years	2	50.0	4	66.7			
More than 3 years	1	25.0	1	16.7			
History of bleeding					3.843	0.050	
Yes	4	8.0	11	22.0			
No	46	92.0	39	78.0			
Site of bleeding					2.727	0.256	
		(n=4)					(n=11)
Oral	0	0.0	1	9.1			
Rectal	0	0.0	4	36.4			
Both	4	100.0	6	54.5			
History of Blood transfusion					0.706	0.401	
Yes (Twice)	6	12.0	9	18.0			
No	44	88.0	41	82.0			
Frequency of ascites					0.301	0.793	
No	44	88.0	47	94.0			
Once	4	8.0	2	4.0			
Twice	2	4.0	1	2.0			
Prescribed drugs for cirrhosis					2.722	0.743	
Antivirals	16	32.0	14	28.0			
Immunity stimulants	13	26.0	12	24.0			
Medicines to treat metal poisoning	0	0.0	1	2.0			
All of the above	11	22.0	14	28.0			
Don't know	10	20.0	9	18.0			

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Table (3): Distribution of study and control groups regarding present medical history (n = 100)

Present medical history	Study group (n=50)		Control group (n=50)		Test of significance	
	No.	%	No.	%	X ²	P-Value
Duration of liver cirrhosis / years						
< less than 3 years	6	12.0	8	16.0	1.606	0.448
3- 5 years	21	42.0	15	30.0		
> more than 5 years	23	46.0	27	54.0		
Family history of liver cirrhosis						
Yes	8	16.0	6	12.0	0.332	0.564
No	42	84.0	44	88.0		
Degree of kinship						
	(n=8)		(n=6)		1.000	0.657
First-degree relative	5	62.5	4	66.7		
Second-degree relative	3	37.5	2	33.3		
Following a special diet						
Low protein	17	34.0	17	34.0	1.530	0.821
Low carbohydrate	3	6.0	3	6.0		
Low fat	16	32.0	11	22.0		
Low salt	6	12.0	10	20.0		
A diet to lose weight	8	16.0	9	18.0		

Figure (1): Percentage distribution of the study group regarding total knowledge level throughout study period (n=100).



Pre- intervention (p1)
Post intervention (p2)
Follow up after 2 months (p3)

X²=0.709
X²=92.50
X²=93.77

P= 0.400
P=0.000**
P=0.000**

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Table (4): Comparison between study and control groups regarding health problems throughout the study periods

Health problems	Study group (n=50)						Control group (n=50)						(p ₁)	(p ₂)	(p ₃)
	Pre-intervention		Post intervention		Follow-up 2 Months		Pre-intervention		Post intervention		Follow-up 2 Months				
	Yes		Yes		Yes		Yes		Yes		Yes				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
Extreme fatigue	31	62.0	8	16.0	9	18.0	34	68.0	34	68.0	34	68.0	X ² =0.396 p=0.529	X ² =27.75 P=0.000**	X ² =25.50 p=0.000**
Itchy skin	26	52.0	3	6.0	3	6.0	24	48.0	24	48.0	24	48.0	X ² =0.160 p=0.689	X ² =22.37 P=0.000**	X ² =22.37 p=0.000**
Mouth dehydration	23	46.0	5	10.0	6	12.0	29	58.0	29	58.0	30	60.0	X ² =1.442 p=0.132	X ² =25.66 P=0.000**	X ² =25.00 p=0.000**
Muscular cramps	34	68.0	8	16.0	9	18.0	36	72.0	36	72.0	36	72.0	X ² =0.190 p=0.663	X ² =31.81 P=0.000**	X ² =29.45 p=0.000**
Dietary symptoms															
Distention	41	82.0	7	14.0	8	16.0	42	84.0	42	84.0	43	86.0	X ² =0.071 p=0.790	X ² =49.02 P=0.000**	X ² =49.02 p=0.000**
Nausea	29	58.0	4	8.0	4	8.0	29	58.0	29	58.0	30	60.0	X ² =0.00 p=1.000	X ² =28.26 P=0.000**	X ² =30.12 p=0.000**
Vomiting	28	56.0	4	8.0	4	8.0	25	50.0	25	50.0	27	54.0	X ² =0.361 p=0.584	X ² =21.41 P=0.000**	X ² =24.73 p=0.000**
Constipation	43	86.0	3	6.0	3	6.0	40	80.0	40	80.0	44	88.0	X ² =0.638 p=0.424	X ² =55.85 P=0.000**	X ² =67.48 p=0.000**
Diarrhea	6	12.0	2	4.0	2	4.0	6	12.0	6	12.0	6	12.0	X ² =0.00 p=1.000	X ² =2.174 P=0.140	X ² =2.174 P=0.140
Dehydration	8	16.0	1	2.0	2	4.0	7	14.0	7	14.0	10	20.0	X ² =0.078 p=0.779	X ² =4.891 P=0.027*	X ² =6.061 p=0.014*
Dietary irregularity	44	88.0	5	10.0	5	10.0	46	92.0	46	92.0	46	92.0	X ² =0.444 p=0.505	X ² =67.26 P=0.000**	X ² =67.26 p=0.000**

X²: Chi-square test.

* Significant at p < 0.05.

**Highly significant at p < 0.001.

P₁: p value for comparing between the studied groups at pre intervention.

P₂: p value for comparing between the studied groups at post intervention.

P₃: p value for comparing between the studied groups after 2 months.

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Table (5): Distribution of selective laboratory investigation values for study and control groups throughout the study periods (n =100)

Selective laboratory investigation values		Pre-intervention				Post intervention				Follow-up 2 Months				Test of significance		
		Study group		Control group		Study group		Control group		Study group		Control group		(p ₁)	(p ₂)	(p ₃)
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
Hemoglobin	Normal	5	10.0	4	8.0	8	16.0	2	4.0	16	32.0	3	6.0	X ² =1.000 p=0.500	X ² =4.000 p=0.046*	X ² =10.98 p=0.001**
	Abnormal	45	90.0	46	92.0	42	84.0	48	96.0	34	68.0	47	94.0			
Albumin	Normal	34	68.0	31	62.0	36	72.0	33	66.0	34	68.0	31	62.0	X ² =0.675 p=0.338	X ² =0.830 p=0.415	X ² =0.675 p=0.338
	Abnormal	16	32.0	19	38.0	14	28.0	17	34.0	16	32.0	19	38.0			
Aspartate aminotransferase (AST)	Normal	25	50.0	3	6.0	29	58.0	5	10.0	36	72.0	18	36.0	X ² =24.00 p=0.000**	X ² =25.66 p=0.000**	X ² =13.04 p=0.000**
	Abnormal	25	50.0	47	94.0	21	42.0	45	90.0	14	28.0	32	64.0			
Alanine transaminase (ALT)	Normal	38	76.0	35	70.0	48	96.0	37	74.0	49	98.0	45	90.0	X ² =0.653 p=0.326	X ² =9.490 p=0.002**	X ² =2.837 p=0.092
	Abnormal	12	24.0	15	30.0	2	4.0	13	26.0	1	2.0	5	10.0			

X²: Chi-square test.

P₁: p value for comparing between two groups at **pre-intervention**.

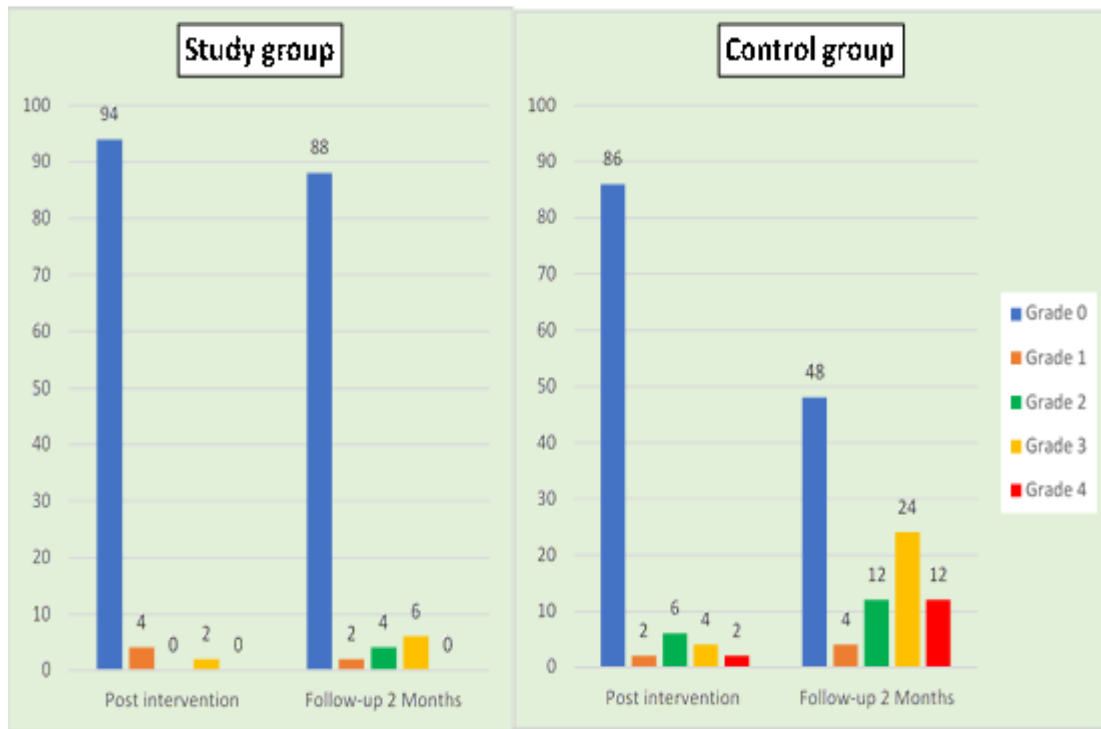
P₃: p value for comparing between two groups **after 2 Months**.

**Highly significant at p < 0.001.

P₂: p value for comparing between two groups at **post intervention**.

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Figure (2): Percentage distribution of hepatic encephalopathy severity grade among study and control groups immediately post intervention and after 2 months (n=100)



Discussion

Hepatic encephalopathy is the major and serious complication of liver cirrhosis which continues to be a major clinical problem with signifies a serious prognosis. So educational nursing intervention for patient with liver cirrhosis is particularly important in prevention of HE because good patient education has proven to be a key tool in disease management, providing significant benefit in clinical outcomes. It has been shown that the wide variation in patients' knowledge may affect patients' willingness to accept and adhere to medical interventions (Garrido et al., 2017).

This discussion covered the following parts: Bio- sociodemographic characteristics of the studied sample, patient's total knowledge, bio-physiological measurement and hepatic

encephalopathy severity among studied groups.

Sociodemographic characteristics of the studied group:

The results of the present study revealed that, there was no statistical significant difference between studied groups regarding their sociodemographic characteristics.

Regarding to age, the current study revealed that; the mean age of both study and control groups was 54.66 ± 7.91 and 53.74 ± 8.56 . This finding was supported by Atya et al., (2019) showed that the mean age of the patients in study group was 59.16 ± 6.04 years and in control group was 59.23 ± 6.27 years.

Concerning sex, the present study found that about two thirds of both groups were males. These results agreed with many studies and review of literature

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which found that more than half of patients were male as Al Ghamdi & Shah, (2018) & EL-Shafei et al., (2017) they stated that slightly more than two thirds of patients were male.

Concerning marital status, the majority of both groups were married. This finding is supported by Atya et al., (2019) who reported that the majority of sample were married. Also the result on the same line with Mahmoud et al., (2021) who found that the majority of studied patients were married. From the researcher point of view, this may explained by the majority of the age group is usually be married.

Regarding educational level, about one third of study and control groups had secondary education. This finding was consistent with the study done by Thuy, (2019) who stated that more than one third of studied groups had secondary education. But this result is contradicted with Taha et al., (2020) who revealed that the majority of both study and control group patients were illiterate. Also disagrees with Mahmoud et al., (2021) that reported more than one third of both groups were illiterate. From the researcher point of view, this may be related to Menoufia government had high percentage of educated personals.

Concerning place of residence, the present study found that more than two thirds of both groups were from rural areas which come in line with Mahmoud et al., (2021) who found that more than half of their studied patients were rural. Also this finding is supported by Ali et al., (2023) who found that there was more than half of the study group were from rural areas.

In relation to occupation, findings of present study revealed that about one third of the study and control groups didn't work. On the same line, Mahmoud et al., (2021) reported that more than one third of studied groups didn't work. On the other hand, this finding didn't agree with Abdel Reham and Mohamed, (2017) who found that the majority of male patients were worked as employers and farmers (workers).

Concerning monthly income, the present study found that majority of both study groups reported that the income is insufficient. This finding is consistent with Alfauomy et al., (2020), who found that more than half of study groups didn't have enough income. But this result is contradicted with Sabola et al., (2022) who found that the majority of both study groups had sufficient income. From the researcher point of view, this may be related to about one third of study groups didn't work and medications costs.

As regard to smoking, about two third of both groups were nonsmokers. This is in agreement with Ali et al., (2023) who reported that more than half of both groups were nonsmokers. From the researcher point of view, this may be related to less than the half of subjects of both groups were female who are traditionally nonsmoker in our society.

Past medical history for studied group:

Regarding the known cause of liver cirrhosis, the results of the present study revealed that, more than half patients of both groups reported that chronic viral hepatitis was the cause for liver cirrhosis. This finding agrees with Peng

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et al., (2021) who stated that more than half of hepatic encephalopathy patients had hepatitis C virus and little number of patients had hepatitis B virus. Also this result is supported by Atya et al., (2019) & Kamal et al., (2018) they found that the most common cause of hepatic cirrhosis in their study population was chronic infection with hepatitis C. From the researcher point of view, this because that viral hepatitis damage liver cells which alter liver function and can lead to hepatic encephalopathy.

In relation to presence of other chronic diseases, the present study documented that the minority of study and control groups had cardiovascular diseases. This finding was in agreement with results of Kuo et al., (2017) who revealed that hypertension and coronary artery disease were reported in minority of patients. On the other hand, this result disagrees with Ali et al., (2023) who reported that more than half of studied patients among both study and control groups had hypertension, From the researcher point of view, this may be as a result of all studied groups followed special diet.

Concerning causes of previous hospital admission, the current study reported that the main cause was fatigue followed by ascites then jaundice. These results disagree with Sabola et al., (2022) who reported that the majority of patients admitted due to stomach bleeding, followed by increase serum bile, then hypertension, and finally diabetes mellitus. Also contract with Abd Elkader et al., (2019) who reported that nearly half of patients presented with hematemesis. From the researcher point of view, this may be as a result of liver

diseases increase the risk for developing esophageal varices.

As regard history of hepatic encephalopathy, this study revealed that about two thirds of both groups didn't have pervious history of hepatic encephalopathy. The result is in line with Ali et al., (2023) who concluded that more than one third of the studied patients in both groups didn't have previous hospitalization due to hepatic encephalopathy.

This finding disagrees with Hafez et al., (2020) who found that about three quarters of studied patients had three or more of previous attack of hepatic encephalopathy. From the researcher point of view, this may be as a result of exclusion of old age patients (>60 years) and patients with multiple system failure which can increase occurrence of hepatic encephalopathy.

Regarding history of esophageal varices, majority of both groups didn't have history of esophageal varices. This result disagrees with Atya et al., (2019) who found that slightly more than half of patients had esophageal varices and two thirds of them had performed endoscopic band ligation. Also Garcia-Tsao et al., (2017) who stated that gastro esophageal varices are present in approximately 50% of patients with cirrhosis. From the researcher point of view, this may be because that the majority of study groups were in early stages of liver cirrhosis.

In relation to history of bleeding, the majority of study and control groups didn't experience gastrointestinal bleeding. This finding is in contract with Sethuraman & Balasubramanian, (2019) who noted that about two thirds of studied patients had developed hepatic

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encephalopathy due to gastrointestinal bleeding. Also this finding disagrees with Ali et al., (2023) who found that about half of the studied patients in both groups had gastrointestinal bleeding. From the researcher point of view this could be as a result of the majority of study groups were in early stages of liver cirrhosis.

Concerning history of ascites, the majority of both groups didn't have ascites before, This finding disagrees with Abdel Reham & Mohamed, (2017) who revealed that the majority of the study group had moderate degree of ascites, also Ali et al ., (2023) who revealed that more than half of the studied patients had ascites. From the researcher point of view this may be as a result of the majority of study groups were in early stages of liver cirrhosis.

Present medical history:

Regarding duration of liver cirrhosis, the present study finding presents that about half of study groups had liver cirrhosis from three to more than 5 years. This finding is supported by Sabola et al., (2022) who reported that half of study subjects had liver cirrhosis from three to more than 5 years. Also in the same line Alfauomy et al., (2020) found that more than half of the studied patients suffering from liver cirrhosis since one to less than five years. From the researcher point of view, this result can be justified as liver cirrhosis can be asymptomatic condition until the occurrence of decompensation and complication which lead to delayed discovery and diagnosis of disease.

In relation to family history of liver cirrhosis, majority of both groups didn't have family history of liver cirrhosis. This finding is in line with Sethuraman

& Balasubramanian, (2019) who noted that the majority of the studied subjects didn't have family history of liver cirrhosis. Also the finding agrees with Alfauomy et al., (2020) who observed that majority of the study groups didn't have family history of liver cirrhosis. Also this finding agrees with Sabola et al., (2022) who found that more than two third of study groups didn't have family history of liver cirrhosis.

Regarding following a special diet, all study and control groups followed special diet. This result contradicted with Sabola et al., (2022) who reveals that more than half of study groups followed normal diet. Also this result disagrees with Alfauomy et al., (2020) who reported that the majority of study groups didn't follow special diet. From the researcher point of view, this result can be because of the majority of study groups were in early stages of liver cirrhosis.

Knowledge assessment for studied groups:

Regarding patients' total knowledge level pre and post educational nursing intervention, the findings of the present study revealed that, the majority of both studied groups had poor subtotal knowledge level pre intervention regarding liver cirrhosis and hepatic encephalopathy that were highly significantly improved among study group than control group immediately post intervention and after 2 months. These findings are consistent with the study done by Ali et al., (2023) who mentioned that there was no statistical significant difference between control and study groups regarding knowledge level before the implementation of

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designated nursing guidelines as the majority of them had unsatisfactory knowledge. Moreover these findings are supported by Saad et al., (2021) who revealed that more than three quarters of the studied patients have unsatisfactory level of total knowledge on pre implementation of the designed program. Also these findings are consistent with the study done by Atya et al., (2019) who found that there was an obvious improvement of total mean knowledge scores of the studied patients immediately post and after three months from application of nursing teaching guidelines.

Moreover results of the current study showed that there was highly significant improvement of total knowledge level of the study group immediately post and after two months from application of educational nursing intervention. This result agrees with Sabola et al., (2022) who stated that there was lack of patient's knowledge that was appeared pre intervention while it improved after implementation of the nursing teaching guidelines.

Additionally, study done by Mohammed et al., (2021) who stated that there was a statistical significant improvement in total patients' knowledge after application of intervention program. Also Taha et al., (2015) who stated that there was a statistical significant improvement in total patients' knowledge after application of intervention program.

From the researcher's point of view, the improvement of knowledge level among study group than control group stress the importance of the educational nursing intervention that was given by the

researcher to the study group which supported by the illustrative colored booklet, while the low knowledge level before the intervention demonstrates the patient's need for educational intervention.

These findings generally led to acceptance of first study hypothesis that showed improvement of study group's knowledge level than control group knowledge level after implementing the educational nursing intervention.

Bio physiological measurements for studied groups:

Concerning health problems, a great percentage of study and control groups had worst health problems and worst dietary symptoms pre intervention. While post intervention and follow up period almost all health problems were highly significantly improved for study group than control group. These results are consistent with study conducted by Mahmoud et al., (2018) who found that, the majority of patients in the study sample felt abdominal distension, pain and discomfort most of time during the time of data collection, more than one third of them felt abdominal pain and discomfort all time, while the minority of them felt it little of time.

On the same line these findings are supported by Abraides & Bosch, (2017) who stated that the majority of patients had felt full, anorexia, nausea and vomiting. They also had activity intolerance related to anemia from poor nutrition and muscle wasting pre-intervention while there were significant improvements in health problems post intervention.

Moreover these results agree with Alfauomy et al., (2020) who revealed

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that there was significant improvement in dietary management occurred post nursing interventions in comparison to the beginning of study. Additionally the present study finding is in accordance with other studies done in China by Ban et al., (2017) as well as Dong et al., (2018). They found that nutritional dysfunction exists in patients with liver cirrhosis and also reported a significant difference between the study and control groups after implementation of health education regarding nutrition.

From the researcher's point of view, this may be as a result of the majority of the studied patients had unsatisfactory knowledge level before applying the nursing interventions, but compliance with therapeutic diet needs knowledge about different elements of food, how to deal with food problems that was given to study group by the researcher.

In relation to lab investigations, there were highly significant improvements in almost all laboratory investigation values post intervention and follow up. These findings are supported by Sabola et al., (2022) who found that there were an improvement in all of mean score of patients' laboratory data. Also these results are consistent with Malky et al., (2016) who found highly significant reduction of liver enzymes post intervention than pre-intervention.

Hepatic encephalopathy severity grade among studied groups:

Regarding hepatic encephalopathy severity grade pre and post educational nursing intervention, the current study results showed that there was highly significantly decrease of hepatic encephalopathy severity grade among study group than control group 2 months

post educational intervention. This result agrees with Atya et al., (2019) who revealed that post three months there was nearly one fourth of patients in both groups had hepatic encephalopathy but confirmed that there was a highly statistically significant difference between study and control groups of patients who exposed to hepatic encephalopathy through three months.

On the same line this result is consistent with Ali et al., (2023) who reported that there was a statistical significant difference between control and study groups as regards recurrence admission to hospital during 4 weeks post discharge as a result of hepatic encephalopathy.

From the researcher's point of view, this could be as result of the lack of knowledge for the control group regarding hepatic encephalopathy prevention and self-care and stress the importance of educational intervention that was given to the study group by the researcher.

Also this finding is supported by Neff et al., (2018) who noted that about one third of patients readmitted due to liver diseases within 1 month and about half was readmitted for HE. Also this finding agrees with Saab, (2019) who noted that hospital readmissions after discharge for decompensated cirrhosis, and for HE in particular, are common in patients with cirrhosis.

Moreover this finding is in line with Alfauomy et al., (2020) who found that the mean scores of illness- monitoring management of the study group were affected significantly by the implemented nursing interventions. These results supported the second study

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hypothesis of implementing educational nursing intervention that lead to a positive impact on reducing hepatic encephalopathy episodes and its severity grade among study group than control group.

Conclusions:

Based on the findings of the current study, it can be concluded that:

- Educational nursing intervention had significant effect on improving the total knowledge level among study group (group I) than control group (group II).
- Educational nursing intervention had a positive impact on reducing hepatic encephalopathy episodes and its severity grade among study group (group I) than control group (group II).

Recommendations:

- Supervised continuous educational programs about prevention of hepatic encephalopathy should be implemented to improve patient's knowledge and awareness about hepatic encephalopathy, its prevention and early detection especially for high risk persons.
- Strategies to improve and sustain adherence levels are required including counseling offered to patients who are deteriorating or experience periodic exacerbation of symptoms.

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