https://menj.journals.ekb.eg
Print ISSN: 2735-3974
Online ISSN: 2735-3982
DOI: ----------

MNJ
Menoufia Nursing Journal
Faculty of Nursing
Menoufia University

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

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Abstract: Hepatic encephalopathy (HE) is a severe liver diseases complication that primarily leads to patient admissions and a significant mortality rate among those with cirrhosis. So effective educational nursing intervention may be of great value in minimizing HE episode. **Purpose:** was to examine the educational nursing program effect on HE severity among patients with liver cirrhosis (LC). 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 LC were assigned alternatively and randomly into two equal groups, 50 patients for each group. **Instruments:** Three instruments were utilized for data collection: Structure interview questionnaire, bio - physiological measurement instrument and West-Haven criteria scale (WHC scale). **Results:** It is detected 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. High statistically significant reductions were observed in HE severity grade among study group contrast to control group immediately post intervention and after 2 months, in which majority of study group (88%) didn't have HE abnormality compared to 48% of control group after 2 months of educational nursing intervention. **Conclusions:** Educational nursing program had a positive impact on reducing HE episodes and its severity among study group (group I) than control group (group II). **Recommendations:** All LC patients should receive supervised health education to increase their HE knowledge and awareness, its prevention, and early detection, with a particular emphasis on high-risk individuals. Additionally, developing a website that encompasses comprehensive information regarding higher education (HE) and all facets of health education, including media, various educational resources, and audio-visual aids.

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

Introduction:

Hepatic encephalopathy (HE), which occurs in advanced liver disorders patients due to hepatic dysfunction, is broadly defined as a neuropsychiatric syndrome characterized by reversible brain function impairment.

HE, which occurs in advanced liver disorders patients due to hepatic dysfunction, is broadly defined as a neuropsychiatric syndrome characterized by reversible brain function impairment (Saber et al., 2019). It is a complex neurological process worldwide and a reversible syndrome observed in advanced liver disease patients. Significant mortality and morbidity are attributed to HE, which also imposes a substantial burden on patients and their caregivers (Kabaria et al., 2021).

Assessing the HE prevalence and incidence can present challenges due to the complex etiology and varying the disease's symptoms severity. Thus, it has been documented that HE manifests in a broad spectrum of cirrhosis patients, ranging from 20% to 80%. Now of liver cirrhosis (LC) diagnosis, the prevalence of over HE ranges between 10 and 14%. In decompensated cirrhosis patients, this percentage increases to 16–21%. During their clinical course, 30% to 40% of cirrhosis patients are estimated to develop overt HE (Elsaid & Rustgi, 2020).

Although the exact HE causes remains unknown, factors such as constipation, infection, renal failure, gastrointestinal bleeding (e.g., esophageal varices), non-compliance with medication, excessive protein intake in the diet, dehydration (e.g., excessive paracentesis, severe diarrhea, excessive vomiting), electrolyte imbalance, alcohol consumption, specific sedatives, and analgesics have been associated with the condition. HE can develop in specific cases after a transjugular intrahepatic portosystemic shunt establishment (Mandiga et al., 2023).

Wide-ranging neuropsychiatric abnormalities characterize HE, which is caused by the neurotoxic substances' accumulation in the brain. (European Association for the Study of the Liver (EASL), 2021). Patients frequently remain oblivious to the symptom's presence. During the initial phases, individuals may present with only mild symptoms, such as disruptions to their sleep cycle. Patients may experience personality changes including irritability, apathy, and disinhibition, as the symptoms advance. Failure to diagnose this condition may result in the symptoms progression to include cognitive impairments such as slurred speech, memory loss, confusion, disorientation, and ultimately coma. Asterixis is the most widely recognized HE symptom. Asterixis manifests as a flapping tremor, which is caused by postural tone loss due to negative myoclonus (Kabaria et al., 2021).

Nurses assume an essential role in imparting knowledge to patients and their families regarding the HE prevention episodes. Providing structured information that could be utilized in the HE management and prevention is a critical component of a comprehensive nursing education, which is necessary to ensure appropriate patient safety and care (Rodenbaugh et al., 2020).

A HE vital part prevention is nursing education, which includes informing the patient and family about the

condition, its possible complications, and progression. Also, it is essential to prevent precipitating factors and maintain proper nutrition, both of which are vital considerations for cirrhosis patients. The adjustment of the causative precipitating factors is crucial in the HE treatment, as it enables the cure of approximately 90% of patients. In most patients, the HE clinical progression can be halted through the management of these precipitating factors. Therefore, rapid, and accurate detection and identification of precipitating factors are crucial for starting the suitable treatment and consequently reducing morbidity and mortality, compliance with treatment and follow up, patients should understand the reasoning for taking the medications (Ali et al., 2023).

The implementation of short and simple educational programs greatly impacts the patient's ability to manage their illness and its complications; and may enhance coping mechanisms, quality of life, and life satisfaction during treatment (Atya et al., 2019).

Significance of the Study:

LC is a prevalent chronic disease that is regarded as a significant public health concern in Egypt. The most recent WHO data, which was released in 2018, indicates that liver disease accounted for 12.40% of all deaths in Egypt. Egypt ranks 116.08 per 100,000 of its population in terms of age-adjusted mortality, the highest in the world (WHO, 2018).

The HE is frequently accompanied by increased mortality rates. HE is associated with a 23% survival rate after three years and a 42% survival rate after one year of follow-up. Furthermore, approximately 30% of patients who died to end-stage liver disease exhibited severe encephalopathy, which progressed to coma (Saber et al., 2019).

There are many studies which have observed that both patients and caregivers have limited disease understanding 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 HE occurrence 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 study purpose was to examine the educational nursing program impact an on the HE severity in individuals diagnosed with LC.

Research Hypotheses:

In order to accomplish the study purpose, the following research hypotheses were formulated:

- Patients who enroll in an educational nursing program (study group) will exhibit a higher knowledge score in comparison to patients who remain inactive (control group).
- Patients who enroll in an educational nursing program (study group) will have lower HE 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 investigation was conducted. 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:

An alternating sample of 100 adult patients diagnosed with LC was divided into two equal groups, with each group consisting of 50 patients. Group one was the study group. Patients received the structured educational nursing program along with routine hospital care. Group two was the control group. Only routine hospital care was administered to the patients.

Sample size equation:

$$n0 = Z2\ p\ q\ /\ e2$$

Z2 = 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 LC patients with certain inclusion criteria, the sample size (n0) can be adjusted as:

$$n = n0\ /\ [1 + \{(n0 - 1)\ /\ N\}]$$

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 HE before.
  - Free from HE 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.

Instruments of the study:

Instrument (1) Structure interview questionnaire:

Based on Atya et al. (2019), it was developed by the researcher to evaluate patients' knowledge and bio-sociodemographic information at the outset. It included three parts:

- **Part one:- Sociodemographic data**

It consisted of thirteen questions and included information about patient's sex, age, occupation, education level and marital status…..etc.

- **Part two:- Medical data**

It consisted of twenty-eight questions about the individual's present and past medical history such as such as LC etiology, illness duration, other chronic diseases history, bleeding history, esophageal varices and ascites, dietary regimens and prescribed medications….etc.

- **Part three: - Patients' knowledge:**

It comprised of four questions about LC: definition, causes, clinical manifestations and complications. Also, it included nine questions about HE: 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: -

Two marks were awarded to each answer provided by the patient if it was completely accurate, one mark if he /she reported incompletely correct answer and zero if the answer was incorrect or I don't know. The sum of every response produced a score between zero and thirty-four. The higher score, the higher knowledge level. After converting the total score to a percentage, it was classified as follows:

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

According to Al-Khaled et al. (2011), these were standardized categories.

Instrument (2) Bio - physiological measurement instrument:-

According to Saber et al. (2019), the researcher established it to assess the common problems that the patients may have such as muscular cramps, itching, fatigue, dry mouth, in addition to frequent problems associated with 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.

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

Instrument (3) West-Haven criteria scale (WHC scale):

It was created by Ferenci et al. (2002) to evaluate the HE severity. This depends on the autonomy impairment degree, intellectual function, behavior and changes in consciousness. The range of its score is from zero to four, including:

- **Grade 0**: Indicate that there is no abnormality.
- **Grade 1**: denote a trivial lack of awareness, anxiety or euphoria, a shortened attention span, and difficulty performing addition.
- **Grade 2**: indicate lethargy or apathy, slight confusion regarding time or location, subtle alterations in personality, inappropriate conduct, and compromised subtraction skills.
- **Grade 3**: indicate somnolence to semi-stupor, but remain verbally responsive, confusion and gross disorientation.
- **Grade 4**: distinguish coma by the response absence to painful or verbal 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:

- The responsible authorities allowed permission for the study to be conducted after an explanation of the study's objectives.

Instruments development:

- Instruments I and II were created by the researcher, whereas instrument III was established by Ferenci et al. (2002). The content and face validity of each instrument were evaluated by 5 academic experts specializing in the medical surgical nursing field. The experts revised the instruments for comprehensiveness, simplicity, applicability clarity, and relevancy. Minor adjustments were made as necessary to ensure the content's completeness and relevance.

Reliability:

- The first and the second instruments were tested for reliability utilizing 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 carried out on 10% of the study sample (10 patients) before data collection to assess the instruments' feasibility, clarity, and applicability, as well as evaluate the time required to complete it, following that, the requisite adjustments were made to ensure that these patients were excluded from the main study.

Ethical Consideration:

- Written approval from the research and ethics committee of the 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. Additionally, patients were informed that they could withdraw from the study at any time without incurring any penalties, and that their care would not be affected by their decision to not participate.

Data collection:

- Data collection lasted for a period of 10 months from June 2022 to March 2023.
- The study participants, who met the inclusion criteria and accepted to take part, were allocated at random into two equal groups: study group (I) and control group (II), with 50 patients in 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.
- To prevent result contamination, the researcher start the investigation with the control group (II) prior to proceeding to the study group (I).
- The research was conducted. in four consecutive phases: Assessment, planning, implementation, and evaluation phases as following:

I. Assessment phase:-

20 to 30 minutes were required for this phase for every patient in both groups. The researcher conducted individual interviews with each patient in both groups during this phase to collect basic data as follows:

- The researcher assessed bio - demographic characteristics utilizing part one and two of

instrument I. It took about 5-10 minutes.

- The knowledge of each patient in both groups regarding hepatic cirrhosis, HE, and their diet was evaluated through the utilization of 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 utilizing instrument II. It took about 5 minutes
- The researcher obtained the patients' telephone numbers during the first meeting (which occurred while they were hospitalized) to ascertain the scheduled appointment times and thereby finalize the data collection procedure.

II. Planning phase:

The researcher prepared an instructional booklet about educational nursing program based on baseline 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 the liver functions and anatomy.
- Brief overview about LC (manifestations, definition, causes, and complications).
- Information about HE (stages, causes, definition, symptoms & signs, diagnostic studies and how to manage it).
- Nursing teaching guidelines to minimize HE as maintaining proper nutrition (balanced diet, fruits and vegetables importance, 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 medications overdose as well as follow doctor's instructions.

III. Implementation phase:

- The researcher conducted individual interviews with each patient in the study group within their respective rooms at the previously mentioned settings for four teaching sessions for four days in which each day contains one session, twice per week. Each session lasted between 30 and 45 minutes, contingent upon the patient's understanding level. The researcher distributed the booklet that had been prepared in advance at the beginning of the initial session. Illustrative elements included lectures, group discussions, videos, demonstrations, and return demonstrations.
- The prepared protocol of care conducted through the following sessions: -
  - **During the first session**, At the session beginning, the researcher provided each patient of study group knowledge about anatomy and functions of liver and LC (definition, causes, manifestation, and complications). At the conclusion of this session, the researcher provides patients with answers to all their questions and granted them the opportunity to pose any further questions. The duration of this session was approximately 30 minutes.
  - **At the second session beginning**, the researcher refreshed the previous learnt knowledge and then

gave information about HE disease (definition, causes, manifestations, stages, diagnostic studies, and medical management). The duration of this session was approximately 45 minutes.

- **At the third session beginning**, 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 LC patients as maintaining proper nutrition, methods of preventing encephalopathy and importance of compliance to therapeutic regimen. This session took about 45 minutes.
- **At the fourth session beginning**, 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.
- The researcher reinforced the patients via phone during the follow-up period to be sure that patients followed the instructions or not and HE incidence.

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 HE severity utilizing 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 educational nursing program effect on HE occurrence.

Limitation:

- 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:

Utilizing SPSS (Statistical Package for the Social Sciences, version 26, SPSS Inc. Chicago, IL, USA), the gathered data were systematically arranged, computed, and analyzed statistically. The range, mean, and standard deviation were computed for the quantitative data included in the set. The Chi-square test (2) was utilized to compare two groups based on qualitative data that characterized a categorical set of information by frequency, percentage, or proportion of each category. KRUSSkal-Wallis (2) was computed to facilitate the comparison of means of non-parametric data exceeding two. Utilizing Pearson's correlation coefficient (r), the correlation between variables was assessed.

Results:

Table (1) 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). Regarding their marital status, most of them were married (82% and 88% respectively). As regard educational level, approximately one third of both 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. Most 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).

Regarding all sociodemographic characteristics, the two groups did not differ in a statistically significant way.

Table (2) indicates that, more than two thirds of study and control groups detected LC by presence of some symptoms (74% and 70% respectively). The main appeared manifestation among study group was ascites (27%), while among control group were ascites and bleeding (20%). The known cause for LC 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 LC (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 HE, about two thirds of both groups didn't have previous history of HE (70% and 66% respectively). The main cause of HE among more than two thirds of study and control group was LC (66.7% and 70.6% respectively). Also, most 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 history of bleeding and didn't have pervious history of blood transfusion (88% and 82% respectively). As regarding frequency of ascites, most 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) shows that, about half of both groups (study and control) had LC from more than five years (46% and 54% respectively). In relation to family history of LC, most of both groups (84% and 88% respectively) didn't have family history of LC. A low protein diet was followed by over one-third (34%) of both the study and control groups. Regarding any aspect of the present medical history, there were no differences that were considered statistically significant between the two groups.

Figure (1) reveals that, most of the study and control 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) 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, most 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) shows that, pre- intervention, most 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) 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 HE severity grade.

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					0.896	0.639
30-<40 years	3	6.0	5	10.0		
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					1.604	0.205
Male	36	72.0	30	60.0		
Female	14	28.0	20	40.0		
Marital status					2.039	0.564
Single	1	2.0	1	2.0		
Married	41	82.0	44	88.0		
Widowed	7	14.0	3	6.0		
Divorced	1	2.0	2	4.0		
Education level					3.210	0.523
Illiterate	13	26.0	12	24.0		
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					2.269	0.518
Manual work	13	26.0	8	16.0		
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					0.542	0.461
Urban	12	24.0	9	18.0		
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					0.298	0.585

Socio demographic data	Study group (n=50)		Control group (n=50)		Test of significance	
	No.	%	No.	%	X^2	P-Value
Sufficient	9	18.0	7	14.0		
Insufficient	41	82.0	43	86.0		
Smoking					0.044	0.834
Yes (Cigarettes)	18	36.0	17	34.0		
No	32	64.0	33	66.0		
Numbers of cigarettes per day	**(n=18)**		**(n=17)**			
< less than one package	6	33.3	6	35.3	0.172	0.918
from one to two packages	9	50.0	9	52.9		
> more than 2 packages	3	16.7	2	11.8		

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)**			
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	5.883	0.502
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?						
Yes (Chronic viral hepatitis)	28	56.0	26	52.0	0.161	0.688
No	22	44.0	24	48.0		
Presence of other chronic health problems						
Yes	20	40.0	17	34.0	0.386	0.534
No	30	60.0	33	66.0		
Type of chronic health problems	**(n=20)**		**(n=17)**			
Thyroid disease	14	70.0	10	58.8	0.358	0.549
Cardiovascular diseases	6	30.0	7	41.2		
Previous hospitalization due to liver cirrhosis						
Yes	18	36.0	11	22.0	2.380	0.123
No	32	64.0	39	78.0		
Frequency of previous hospitalization	**(n=18)**		**(n=11)**			
Once	9	50.0	3	27.3		
Twice	7	38.9	6	54.5	1.473	0.479
3 times or more	2	11.1	2	18.2		
Reason for hospitalization all times	**(n=18)**		**(n=11)**			
Fatigue	9	50.0	4	36.4		
Ascites	7	38.9	3	27.3		
Jaundice	2	11.1	1	9.1	5.486	0.241
Melena	0	0.0	2	18.2		
Hematemesis	0	0.0	1	9.1		
Surgical history						
Yes	5	10.0	4	8.0	1.000	0.500
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		

Continued Table (2): Distribution of both studied groups regarding past medical history

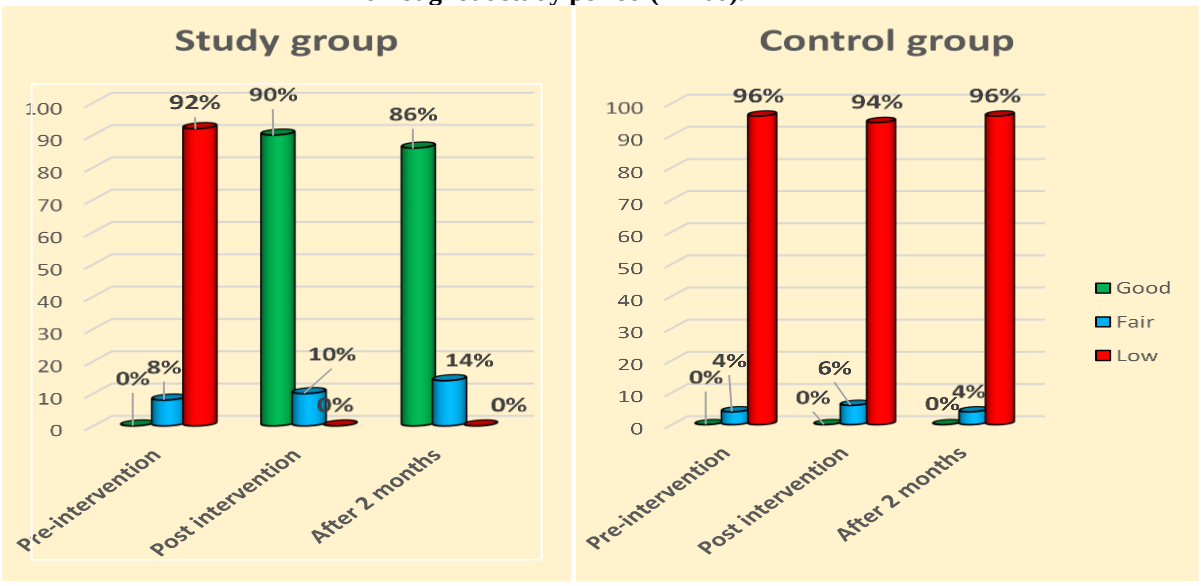
(n = 100)

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	(n=15)		(n=17)		0.569	0.436
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:	(n=4)		(n=6)		0.278	0.870
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	(n=4)		(n=11)		2.727	0.256
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		

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		
3- 5 years	21	42.0	15	30.0	1.606	0.448
> 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)			
First-degree relative	5	62.5	4	66.7	1.000	0.657
Second-degree relative	3	37.5	2	33.3		
Following a special diet						
Low protein	17	34.0	17	34.0		
Low carbohydrate	3	6.0	3	6.0		
Low fat	16	32.0	11	22.0	1.530	0.821
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 (p_1)	X^2=0.709	P= 0.400
Post intervention (p_2)	X^2=92.50	P=0.000**
Follow up after 2 months (p_3)	X^2=93.77	P=0.000**

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	X2=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**

X^2: Chi-square test. * Significant at p ‹ 0.05. **Highly significant at p ‹ 0.001.

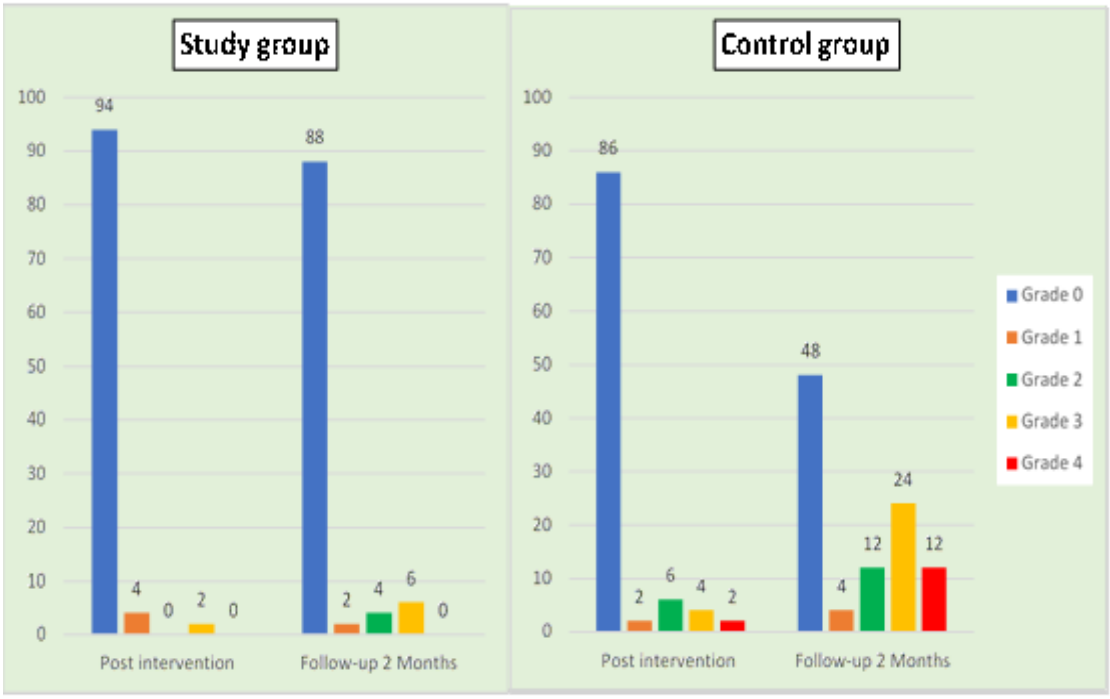
P_1: p value for comparing between the studied groups at pre intervention. **P_2:** p value for comparing between the studied groups at post intervention.
P_3: p value for comparing between the studied groups after 2 months.

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			

X^2: Chi-square test.
P_1: p value for comparing between two groups at **pre-intervention**.
P_3: p value for comparing between two groups **after 2 Months**.
**Highly significant at p ‹ 0.001.
P_2: p value for comparing between two groups at **post intervention**.

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



Discussion:

The HE is a significant and crucial complication of LC, representing a dire prognosis and an ongoing major clinical concern. So educational nursing intervention for LC patients 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. The willingness of patients to accept and adhere to medical interventions may be influenced by the considerable variation in their knowledge, according to research (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 HE severity among studied groups.

Sociodemographic data of the studied group:

The current study did not identify any statistically significant difference among the examined groups with respect to 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. Atya et al. (2019) provided support for this discovery by demonstrating that the mean age of patients in the study group was 59.16±6.04 years, whereas in the control group it was 59.23±6.27 years.

Concerning gender, this study found that about two thirds of both groups were males. These results agreed with many studies and review of literature 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, most of both groups were married. Atya et al. (2019), who found that most of the sample were married, support this result. Consistent with the results of Mahmoud et al. (2021), most patients analyzed in

this study were married. This could potentially be accounted for by the fact that most individuals in this age group are married, according to the researcher.

Regarding educational level, about one third of study and control groups had secondary education. This result was consistent with the results of Thuy (2019), who discovered that over one-third of the groups analyzed held a secondary education. In contrast, Taha et al. (2020) found that a significant proportion of patients in both the study and control groups lacked literacy skills. Also disagrees with Mahmoud et al., (2021) that indicated more than one third of both groups were illiterate. This may be related to Menoufia government had high percentage of educated personals.

Concerning place of residence, the current investigation detected that over two-thirds of both groups originated from rural regions 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.

Concerning an occupation, approximately one-third of the study and control groups did not work according to the results of the present investigation. On the same line, Mahmoud et al., (2021) detected that more than one third of studied groups didn't work. On the other hand, this finding didn't agree with Abdel Rehaim and Mohamed, (2017) who found that most of male patients were worked as employers and farmers (workers).

Concerning monthly income, the current study discovered that majority of both study groups determined that the income is insufficient. This result aligns with the study of 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 most of both study groups had sufficient income. 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 agrees with Ali et al., (2023) who observed that more than half of both groups were nonsmokers. 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 LC, the current investigation detected that, more than half patients of both groups observed that chronic viral hepatitis was the cause for LC. This result is consistent with the results of Peng et al. (2021), who detected that a minority of patients with HE carried the hepatitis B virus while hepatitis C virus was present in over 50% of the patients. This study is further supported by Atya et al., (2019) & Kamal et al., (2018) they found that the prevailing etiology of hepatic cirrhosis among the participants in their research was chronic hepatitis C infection. Viral hepatitis causes hepatocyte damage, which disrupts hepatic function and has the potential to result in HE.

In relation to presence of other chronic diseases, this investigation determined that cardiovascular diseases were present in a minority of both the study and control groups. This result was consistent with the investigation of Kuo et al. (2017), who found that only a small percentage of patients were presented with hypertension (HTN) and coronary artery disease. However, Ali et al. (2023), who documented that HTN was present in over 50% of the patients in both the study and control groups.

This may be because of all studied groups followed special diet.

Concerning causes of previous hospital admission, the present study documented that fatigue was the primary etiology, with ascites and jaundice following suit. These results disagree with Sabola et al., (2022) who showed that most patients admitted due to stomach bleeding, followed by increase serum bile, then HTN, and finally diabetes mellitus. Also contract with Abd Elkader et al., (2019) who reported that nearly half of patients presented with hematemesis. This may be because of liver diseases increase the risk for developing esophageal varices.

As regards history of HE, this study showed that about two thirds of both groups didn't have pervious history of HE. The findings are consistent with those of Ali et al. (2023), who determined that over one third of the patients analyzed in both cohorts had no prior history of hospitalization resulting from HE.

This result contradicts the findings of Hafez et al. (2020), who discovered that approximately 75% of the patients under study had experienced three or more episodes of HE in the past. ***From the perspective of the researcher,*** this may be because of exclusion of old age patients (>60 years) and patients with multiple system failure which can increase occurrence of HE.

Regarding history of esophageal varices, in both groups, esophageal varices were not a documented condition in the majority. In contrast to this result, Atya et al. (2019) discovered that marginally more than half of the patients exhibited esophageal varices, with two-thirds of them having undergone endoscopic band ligation. Additionally, according to Garcia-Tsao et al. (2017), gastroesophageal varices are observed in around 50% of individuals diagnosed with cirrhosis. This may be because that most study groups were in early stages of LC.

Concerning a previous history of bleeding, in most study and control groups, gastrointestinal bleeding was non-existent. This finding is in contract with Sethuraman & Balasubramanian, (2019) who noted that about two thirds of studied patients had developed HE 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. This could be because of most of study groups were in early stages of LC.

Concerning history of ascites, most of both groups didn't have ascites before, this finding disagrees with Abdel Rehaim & Mohamed, (2017) who determined that ascites affected most of the study participants to a moderate degree. Additionally, Ali et al. (2023) found that over 50% of the patients under investigation exhibited ascites. This may be because of most study groups were in early stages of LC.

Present medical history:

Regarding duration of LC, the present study finding presents that about half of study groups had LC from three to more than 5 years. This finding is supported by Sabola et al., (2022) who detected that half of study subjects had LC from three to more than 5 years. In the same direction, Alfauomy et al. (2020) discovered that over 50% of the patients under investigation had been afflicted with LC for a duration of one to five years or less. **From the perspective of the researcher**, this result is justifiable due to the fact that LC may manifest asymptomatically until complications and decompensation occur, which can cause a delay in the disease's detection and diagnosis.

In relation to family history of LC, there was no familial history of LC in

most of both groups. The result is consistent with Sethuraman & Balasubramanian, (2019) who noted that most of the studied subjects didn't have family history of LC. Also, the finding agrees with Alfauomy et al., (2020) who observed that majority of the study groups didn't have family history of LC. 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 LC.

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 indicated that the majority of study groups didn't follow special diet. This result can be because of the majority of study groups were in early stages of LC.

Knowledge assessment for studied groups:

Regarding patients' total knowledge level pre and post educational nursing intervention, the results of the current study indicated that prior to the intervention, most of both groups had inadequate overall knowledge regarding LC and HE. However, this significantly improved among the study group compared to the control group both immediately following the intervention and two months later. These findings are consistent with the study done by Ali et al., (2023) who mentioned that in regard to the level of knowledge possessed by the majority of the control and study groups prior to the implementation of designated nursing guidelines, no statistically significant difference could be found between the two groups. Moreover, the findings are supported by Saad et al. (2021), which indicate that over 75% of the patients analyzed possessed an inadequate level of overall knowledge prior to the program's implementation. Also, these findings align with the research conducted by Atya et al. (2019), which observed a clear enhancement in the overall mean knowledge scores of the patients under investigation both immediately following and three months after the implementation of nursing teaching guidelines.

Moreover, the findings of the present investigation showed a statistically significant enhancement in the overall knowledge level of the participants both immediately following and two months after the implementation of the educational nursing intervention. The findings of this study are consistent with those of Sabola et al. (2022), who assessed that patients exhibited a deficiency in knowledge prior to the intervention, which was observed to have diminished subsequent to the implementation of the nursing teaching guidelines.

Additionally, a study done by Mohammed et al. (2021) showed that the implementation of an intervention program resulted in a statistically significant enhancement in the overall knowledge of the patients. Furthermore, Taha et al. (2015) assessed that the implementation of the intervention program resulted in a statistically significant enhancement in the overall knowledge of the patients.

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.

The results generally supported the initial study hypothesis, which suggested that the study group's level of knowledge

would be greater in comparison to the control group as a result of 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 align with the research conducted by Mahmoud et al. (2018), which found that throughout the data collection period, a significant proportion of the patients in the study sample experienced abdominal distension, pain, and discomfort on a regular basis. Specifically, over one-third of the participants reported always experiencing abdominal pain and discomfort, whereas a minority reported experiencing it infrequently.

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. In addition, they had activity intolerance due to anemia caused by inadequate 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 indicated that a significant enhancement in dietary management was observed after the implementation of nursing interventions, when compared to the initial stages of the study. Additionally, the results of the current study align with those of Dog et al. (2018) and Ban et al. (2017), both of which were conducted in China. Nutritional dysfunction has been found in patients diagnosed with LC and a significant difference was observed between the study and control groups following the implementation of nutrition-related health education.

This may be because most of the patients under study possessed an inadequate level of knowledge prior to receiving nursing interventions. However, adherence to a therapeutic diet requires knowledge regarding the various components of food and strategies for managing food-related issues, which the researcher provided to the study group.

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 was an improvement in all mean score of patients' laboratory data. Also, these results are consistent with Malky et al., (2016) who indicated highly significant reduction of liver enzymes post intervention than pre-intervention.

HE severity grade among studied groups:

Regarding HE severity grade pre and post educational nursing intervention, the findings of the present study showed that two months after the educational intervention, the severity grade of HE decreased significantly more in the study group than in the control group. This result is consistent with that of Atya et al. (2019), who found that nearly one-fourth of patients in both groups developed HE after three months. However, they also confirmed that there was a highly statistically significant difference between the groups of patients exposed to HE through three months in the study and control groups.

On the same line this finding is consistent with Ali et al., (2023) who reported that a statistically significant difference was observed between the control and study groups in terms of recurrence admission to the hospital

within four weeks of discharge because HE.

This may have occurred due to the control group's limited understanding of self-care and HE prevention; therefore, promote the significance of the educational intervention that the researcher provided to the study group.

Also, this result is corroborated by Neff et al. (2018), who observed that approximately one-third of patients required readmission within a month for liver diseases, with roughly half requiring readmission for HE. Also, this result is consistent with Saab's (2019) observation that hospital readmissions following discharge are prevalent among cirrhosis patients who have decompensated cirrhosis, and specifically for HE.

Moreover, this result is consistent with the findings of Alfauomy et al. (2020), who observed that the nursing interventions implemented had a significant impact on the mean scores of illness monitoring and management in the study group. The second study hypothesis that implementing an educational nursing intervention would have a positive effect on reducing HE episodes and their severity grade among the study group as compared to the control group was supported by these results.

Conclusions:

- The educational nursing intervention effect on the overall knowledge level of the study group (group I) was significantly greater than that of the control group (group II).
- Educational nursing intervention had a positive impact on reducing HE episodes and its severity grade among study group (group I) than control group (group II).

Recommendations:

- Supervised continuous educational programs about prevention of HE should be implemented to progress patient's knowledge and awareness about HE, its prevention and early detection especially for high-risk persons.
- It is necessary to implement strategies that increase and maintain adherence levels, such as providing counseling to patients whose condition is deteriorating or who experience periodic exacerbations of symptoms.

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