Effect of an Educational Program on Health Related Quality of Life among Patients with Metabolic Associated Fatty Liver Disease

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Abstract:

Background: Metabolic associated fatty liver disease (MAFLD) is a multisystem condition that affects both physical and psychological well-being, leading to impaired health-related quality of life (HRQOL). **Aim of the study:** This study aimed to evaluate the effect of an educational program on health related quality of life among patients with Metabolic associated fatty liver disease. **Research design:** A quasi-experimental (pre-post-test) design was used. **Subjects:** The study included 81 adult patients with MAFLD. **Setting:** The internal medicine department and hepatology and gastroenterology outpatient clinics at Benha University Hospital. **Tools of data collection: Tool I:** Structured Interview Questionnaire and **Tool II:** The chronic liver disease questionnaire for Nonalcoholic fatty liver disease. **Results:** Before the educational program, 86.4% of the studied patients had poor knowledge about MAFLD. This improved to 84% immediately after the program and 75.3% three months later. Regarding HRQOL, 64.2% had poor levels pre-program, whereas 61.7% and 74.1% showed high HRQOL one month and three months post-program respectively. **Conclusion:** A significant statistical improvement in knowledge about MAFLD was found post program implementation. There was a significant statistical improvement in health related quality of life post program implementation. There was a highly significant correlation between knowledge levels and HRQOL domains one month and three months post program implementation. **Recommendations:** Continuous educational and training programs are recommended for patients with MAFLD to enhance knowledge, support informed decision-making, and improve health outcomes and quality of life.

Keywords: Educational program, Health Related Quality of Life and Metabolic Associated Fatty Liver Disease.

Introduction

Metabolic associated fatty liver disease (MAFLD) is a novel terminology introduced in 2020 to provide a more accurate description of fatty liver disease associated with metabolic dysfunction. It replaces the outdated term nonalcoholic fatty liver disease (NAFLD) and aims to improve diagnostic criteria and tailored treatment strategies for the disease **(Habibullah et al., 2024)**.

It is one of the most common causes of chronic liver disease and is defined as the presence of ≥5% hepatic steatosis (HS), detected either by imaging or histology when secondary causes for hepatic fat accumulation are excluded **(Habibullah et al., 2024; Kaya & Yilmaz, 2022)**. MAFLD is a multisystem condition that has significant consequences, because it enhances the risk of hepatic cirrhosis, hepatic failure as well as hepatocellular carcinoma **(Eslam et al., 2020a; Eslam et al., 2020b)**.

Metabolic associated fatty liver disease is recognized as the liver disease component of

metabolic syndrome (MS), which is mainly related to insulin resistance and genetic susceptibility **(Li et al., 2020)**. Typically, MAFLD is called the silent disease due to the lack of symptoms in the early stages. Most individuals with MAFLD are asymptomatic. Occasionally, MASH patients may present fatigue, unjustified weight loss, and discomfort in the right upper side of the abdomen **(Al-Dayyat et al., 2018; Li et al., 2020)**.

Besides fatigue, MAFLD patients may also experience other symptoms such as anxiety, depression, cognitive impairment, and loss of self-esteem. These symptoms significantly impact patients' well-being **(Said et al., 2024).** In Recent studies about HRQoL of MAFLD patients, it was proven that patients with MAFLD experienced significant impairment in HRQOL and performance of physical activities **(Glass et al., 2022).**

Metabolic associated fatty liver patients are at higher risk of not only liver-related complications but also cardiovascular and all-cause mortality. Indeed, cardiovascular disorders are the leading cause of mortality in patients with MAFLD, followed by extrahepatic malignancies and liver-related complications, indicating the multisystemic involvement in the disease **(Mantovani et al., 2020).** MAFLD is also associated with other extrahepatic diseases, such as MS, obesity, T2DM, chronic kidney disease (CKD), poly-cystic ovarian syndrome (PCOS), obstructive sleep apnea (OSA), extrahepatic malignancies, osteoporosis, and cognitive disorders **(Colognesi et al., 2020; Liu et al., 2020).**

In the era of patient-centered care, to assess the full burden of MAFLD, it is imperative to consider not only relevant clinical outcomes, but also its economic impact and the effect on patient-reported outcomes (PROs). Among PROs, health-related quality of life (HRQOL) typically is linked to patients' well-being and experience with their disease and its management **(Said et al., 2024).**

Health related quality of life refers to a multidimensional construct that patient reports of functioning and well-being in physical, mental, and social domains of life **(Kaplan & Hays, 2022).**

When compared to other liver diseases caused by alcohol, viruses, autoimmune, or cholestatic hepatopathies, MAFLD patients have lower HRQoL. MAFLD has a significant impact on HRQoL as well as societal and financial burdens. HRQoL results are generally viewed as clinical and scientific end-points in order to treat the disease and make life better **(Puneem et al., 2023).**

Intervening in patients' unhealthy lifestyles, such as weight loss through dietary changes and exercises to ameliorate patient-associated metabolic disorders and metabolic syndrome, is the first-line treatment for patients with MAFLD. With sufficient intrinsic motivation and adherence, the management of unhealthy lifestyles can reduce the severity of the disease, improve the quality of life, and increase the survival expectancy of patients with MAFLD **(Lv & Liu, 2024).** To provide effective and high quality care, it is necessary to integrate new knowledge, skills and favorable attitudes towards care **(Levett-Jones, 2021).**

Significance of the study:

Metabolic associated fatty liver disease has become the most common chronic liver disease with an estimated global prevalence of 25% of adults **(Tomah et al., 2021).** Worldwide prevalence of MAFLD is considerably higher than previously estimated and is continuing to increase at an alarming

rate. Greater awareness of MAFLD and the development of cost-effective risk stratification strategies are warranted to address the growing burden of MAFLD **(Riazi et al., 2022)**.

Metabolic associated fatty liver disease is estimated to affect up to 32% of the global population and is associated with an increased risk of all-cause mortality **(Riazi et al., 2022).**

Egypt, a Middle Eastern country with a population of ~100million, with 60% of them being younger than 30 years, is considered among the highest 10 nations in prevalence of obesity. Overall, the Middle East and North Africa (MENA) region has one of the highest MAFLD prevalence rates, which is estimated to affect 31.8% of all adults. Young adults are often overlooked under the presumption they are 'healthy'; however, the presence of MAFLD among this population could represent a major public health issue and may become a significant burden to healthcare systems in this region **(Tomah et al., 2022)**.

According to the annual report of the statistical office, Benha University Hospital (2022), the total number of patients admitted with MAFLD to general medicine department was 100 cases **(Statistical Office at Benha University Hospital, 2022).**

Aim of the study:

The present study aimed to evaluate effect of an educational program on health related quality of life among patients with metabolic associated fatty liver disease.

Research hypotheses:

To fulfill the aim of the study, the following hypotheses were formulated:

H1: knowledge score for metabolic associated fatty liver disease patients could be improved after educational program implementation than before.

H2: Health related quality of life scores for metabolic associated fatty liver disease

patients could be improved after educational program implementation than before.

Subjects & Method:

Research Design:

The quasi-experimental research design was used to achieve the aim.

Setting of the study:

This study was conducted in internal medicine department; internal medicine clinic and hepatology and gastroenterology outpatient clinic for patients follow up at Benha University Hospital, Qalyubia Governorate, Egypt.

Subjects:

A purposive sample of (81) adult patients with MAFLD were recruited in this study based on retrospective statistical data of the number of patients with MAFLD admitted to Benha University hospital was 100 patients in 2022. The sample size calculation done on Solvin's formula that was adopted from **(Saha& Paul, 2021)** as the following:

$$n = \frac{N}{1+N\,(e)2}$$

Where:

n= sample size (81)

N= total population (100)

e= margin error (0.05)

$$n = \frac{100}{1+100\,(0.05)2}$$

Inclusion Criteria: Patients aged 21-60 years old; Conscious and able to communicate with others and the patients who were willing to participate in the study and had the ability to provide informed consent.

Exclusion criteria: included Patients with neuropsychiatric conditions which may impair their ability to respond to the HRQoL evaluation ; Patients with other causes of chronic liver disease (viral hepatitis, autoimmune, alcohol-related) **(Younossi et al., 2019)**; Patients with history of hepatic decompensation (clinical ascites, hepatic encephalopathy, variceal bleeding) **(Younossi et al., 2019)** and Patients with hepatocellular

carcinoma, cholangiocarcinoma, gallstone disease and cardiovascular disease like Coronary heart disease **(Mantovani et al., 2020; Xiao et al., 2023)** were be excluded.

Data Collection Tools:

Two tools were utilized in the study for collecting pertinent data.

Tool 1: Patients Structured Interview Questionnaire: This tool was designed by the researchers after reviewing recent and related literature. It was used pre, immediately post, post one month and three months of the educational program implementation. It consists of three parts:

Part 1: Demographic data: It concerned with demographic characteristics of the study sample such as age, gender, marital status, place of residence, level of education and occupation.

Part 2: Patient's Medical history, it was used to assess the studied patient's past, present and family history of MAFLD, type of comorbid diseases, complaints, Risk factors, duration of MAFLD diagnosis, symptoms, smoking, height, weight, BMI.

Part 3: Patient' knowledge assessment: Adapted from (Aljahdli et al., 2021); pre and posttest, it was used to assess patients' knowledge related to MAFLD. It includes three sections:

Section one: Patient's knowledge about MAFLD disease included (13 items); liver organ, function of liver, definition of MAFLD, risk factors, clinical manifestation, investigations, management, medications, complications, surgeries, prevention and follow up

Section two: Patient's knowledge about the diet related to MAFLD included (5 items); healthy food for the liver, harmful food for the liver, importance of drinking water, principles in a healthy diet for liver health and

weight loss and important tips for dealing with fatty liver.

Section three: Assessment of patient's knowledge about the Physical activity/exercises related to MAFLD included (3 items); recommended sports for liver health, benefits of exercising and increasing physical activity and guidelines recommendations about physical activity regimen related to MAFLD.

Scoring system:

The correct answer was scored one and incorrect answer was scored zero. The total score of knowledge was 21 (100). These scores were summed up and converted into percentage score.

The total level of patient's ' knowledge score was categorized as follows:

- \> 80% of total score considered good level of knowledge
- 60 - 80 % of total score considered average level of knowledge.
- < 60 % of total score considered poor level of knowledge.

Tool 2: The chronic liver disease questionnaire for Nonalcoholic fatty liver disease CLD-NAFLD/NASH:

It was adapted by the researchers from **(Younossi et al., 2019)**, modified and translated into Arabic. It was used three times; pre, post one month and post three months of educational program implementation. This tool assesses aspects of HRQoL that are related directly to the underlying disease. For patients with MAFLD, several tools have been developed and validated. One of the more popular tools is Chronic Liver Disease Questionnaire–nonalcoholic fatty liver disease **(Golabi et al., 2019)**.

This tool was used to assess HRQoL of patients with MAFLD. The CLDQ-NAFLD instrument had 36 items grouped into 6

domains: abdominal symptoms, activity, emotional, fatigue, systemic symptoms, and worry. All the questions were formulated as "How much of the time" or "How often you experienced a problem", and a 1–7 Likert scale was introduced for the responses (the score of 1 would correspond to "All of the time", and the score of 7 to "None of the time") **(Younossi et al., 2019).**

Scoring system:

The overall CLDQ score was calculated as an average of all domains. Higher score on the questionnaire was indicative of minimum symptoms and lower score indicated more pronounced symptoms **(Huang et al., 2021).**

The total CLDQ- NAFLD/NASH score was categorized as follows:

- <50% of total score considered Low health related quality of life.
- 50-70% of total score considered average health related quality of life.
- >70% of total score considered good health related quality of life.

Administrative design

An official permission to carry out the study was obtained by submission of an official letter from the dean of Faculty of Nursing at Benha University to the director of Benha university hospital. This letter explained and clarified the aim and objectives of the study to obtain permission to conduct the study. Also, official permissions for data collection were generated from hospital directors and head managers of the internal medicine inpatient and outpatient departments at Benha university hospital.

Tools Validity and reliability

The face and content validity of the tools were ascertained for comprehensiveness, relevance, simplicity, clarity and ambiguity through a jury of five experts from the medical and surgical nursing department, Faculty of Nursing at Benha University. Based on the opinion of the panel of expertise

some modifications were made and then the final form was developed based on recent literatures and used for data collection.

Reliability was tested statistically to ensure that the tools were reliable before data collection. It was evaluated using test-retest method by Cronbach's alpha test which is used to measure internal consistency. Reliability of the Knowledge Assessment Questionnaire was 0.896. Reliability of the CLD – NAFLD was 0.903.

Ethical considerations:

An approval was obtained from the Scientific Research Ethics Committee of Faculty of Nursing Code, REC-MSN-P 113 before initiating the study work. Oral & written informed consents were obtained from patients after explaining the aim of the study. They also were informed that their participation was optional, and they had the right to withdraw at any time without any consequences. The researchers assured patient's anonymity and confidentiality of data and explained that these data would be used only for patient's benefits and the purpose of the study.

Pilot study

Pilot study was conducted on 10% of the patients (8) to test the applicability and clarity of the study tools and to estimate the time needed for each tool to be filled in as well as to identify any possible obstacles that may hinder data collection. Based on the results of the pilot study, the minor modifications were done to be more applicable tools for data collection. Patients involved in the pilot study were excluded from the study sample. The pilot study was done before starting the study from the beginning of December 2023 to end of December 2023.

Field work

The collection of data and application of educational program was carried out through six months from beginning of January 2023 to

the end of June 2023. It was collected according to the policy of the study settings, the researchers attended the setting 3 days/week (Saturday, Tuesday and Thursday) during morning and afternoon shifts.

The process of data collection was achieved through four phases: assessment phase, planning, implementation and evaluation.

Assessment Phase (baseline data):

The researchers once explained the aim of the study to all participants in simple Arabic words. Each patient was interviewed individually using the structured interview questionnaire (tool 1) as a baseline data assessment before implementation of the program.

Planning phase:

Once the initial assessment was completed, the educational program was designed by the researchers to meet the needs, deficiencies and objectives of the program.

General objectives:

✓ Improve patients' knowledge
✓ Improve their health-related quality of life related to metabolic associated fatty liver disease

▪ Specific objectives:

✓ Identify anatomy & functions of liver.
✓ Recognize diseases of the liver
✓ Demonstrate how to maintain healthy liver.
✓ Define Metabolic Fatty Liver Disease.
✓ Identify MAFLD stages.
✓ Mention risk factors for MAFLD.
✓ State signs and symptoms of MAFLD.
✓ Identify methods of diagnosis of MAFLD.
✓ Identify management of MAFLD.
✓ Demonstrate knowledge of medications.
✓ Demonstrate knowledge of bariatric surgery.
✓ Illustrate how to prevent MAFLD.
✓ Identify complications of MAFLD.

✓ Demonstrate instructions for weight loss.
✓ Demonstrate instructions for how to maintain diet
✓ Demonstrate instructions of regimen for physical exercises.
✓ Demonstrate instructions on how to manage fatigue.

Implementation phase:

❖ The educational program implementation was conducted in 5 sessions. Each session lasted about 30-45 minutes, including periods of discussion according to the patients' progress, health condition and feedback. The patients were divided into groups, each group contained (3-5 patients) and total number of groups were (20).

❖ The researchers attended the clinical setting (Internal medicine inpatient and out-patient clinic) in the morning & afternoon shifts three times weekly during the time of study to collect data. Patients were assessed before and after the implementation of the educational program using (tool1 & tool 2).

❖ Different teaching and learning methods were used during the sessions, which included PowerPoint presentation, pictures, and videos to enhance learning of patients about improving their health related quality of life related to metabolic associated fatty liver disease.

❖ The instructional colored booklet was given to each patient enrolled in the study as a reward in order to help review and support teaching. It was written in a simple Arabic language and supplemented by photos and illustrations to help the patient understand the content.

❖ At the beginning of the first session, patients were oriented regarding the program contents, its purpose and its effect on knowledge and their quality of

life. Patients were informed about the time of the next session at the end of the session.

❖ Each session was started by a summary about what has been discussed in the previous session and the objectives of the new session. Also, the session ended by a conclusion of its content and feedback was obtained from the patients to ensure that he/she got the maximum benefits.

❖ Patients always had the opportunity to ask questions, express their feelings and anxiety concerning their symptoms and their disease and to have more in-depth discussions.

❖ The duration of the educational program implementation was (6) months

❖ The researchers continued to reinforce the patients to gain information, answered any raised questions and encouraged them to give feedback.

Contents of each session:

➢ **Session one:** (Introductory session) including orientation and explanation of reasons, importance of educational program and general knowledge regarding the anatomy & functions of the liver, diseases of the liver, how to maintain healthy liver, definition of metabolic associated fatty liver disease and its stages.

➢ **Session two:** Risk factors for MAFLD, signs and symptoms of MAFLD, methods of diagnosis of MAFLD and management of MAFLD.

➢ **Session three:** knowledge about medications, knowledge about bariatric surgery, how to prevent MAFLD and complications of MAFLD.

➢ **Session four:** Instructions for weight loss and instructions for how to maintain diet to support heath literacy. Motivational interviewing techniques for discussing the favorable effects of moderate weight loss,

healthy dietary composition (The daily protein intake, fat, sugar, carbohydrates, vitamins and the overall combination of foods that can produce synergistic health effects), consumption of coffee and Mediterranean diet.

➢ **Session five:** detailed instructions of regimen for physical exercises and instructions on how to manage fatigue. Training of relaxation exercises which could help in anxiety and depression relieving. Emphasizing the necessity of social engagement and family support.

Evaluation Phase:

The evaluation of the patients' knowledge was done immediately post educational program implementation and follow up post one month and post three months using tool I. Health related quality of life was evaluated post one month and post three months of educational program implementation using tool II.

Statistical analysis:

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean ±standard deviation (SD). Categorical data were expressed in number and percentage. Chi-square test (or fisher's exact test when applicable) was used for comparison of variables with categorical data. Correlation co-efficient test was used to test correlations between two variables with continuous data. The reliability (internal consistency) test for the questionnaires used in the study was calculated. Statistical significance was set at $p < 0.05$.

Results:

Table (1) illustrates that the age of 49.4% of the patients was between 50 and 60 years old, with Mean ±SD 50.6 ±7.6, 71.6% were females, 81.5% were married, 69.1% were living in an urban areas, 48.1% had secondary

education, 39.5% were working in a private work, 92.6% of them their nature of work changed after their illness and 61.3% of those patients reported that they need to rest from time to time, respectively.

Table (2) shows that 59.3% of the patients had been diagnosed with MAFLD for less than 6 months, 100% of them hadn't been hospitalized previously due to fatty liver disease and 92.6% hadn't a family history of metabolic associated fatty liver disease. Regarding risk factors for MAFLD, 100% of the studied patients had high cholesterol level and reported that they were taking a high calories diet, 96.3% of the patients were obese and 76.5% had lack of physical activity. Concerning comorbidities diseases, 100.0% of the studied patients suffered from hyperlipidemia and 55.6% were diabetic patients. 76.5% of the studied patients weren't smokers and 38.3% were moderately obese.

Figure (1) illustrates that, immediately post program implementation 84% of them had a good level of knowledge and post three months there was a slight decline in the knowledge in their level of knowledge 75.3%. There were high significant differences in knowledge levels between pre-program implementation and one-month post program implementation, and three months post program implementation ($P<0.001**$).

Table (3) shows that there was an increase in the mean score and standard deviation of all domains one month and three months post educational program implementation than pre-program implementation. Also, it shows that pre-educational program implementation, mean ±SD of the abdominal pain and emotional function of the studied patients were 6.7 ±2.3 and 20.2 ±6.8, respectively, which increased to 15.2 ±2.8 and 45.3 ±8.3 one month post program implementation and to 15.5 ±2.8 and 46.3 ±8.3 three months post program implementation, respectively.

There were strong significant differences between the studied patients Health Related Quality of life domains pre-program implementation and one month post program implementation and three months post program implementation ($P<0.001**$).

Figure (2) illustrates that pre-program implementation, 9.9% of the studied patients had high HRQoL, while 61.7% and 74.1% of the studied patients had high HRQoL one month post program implementation and three months post program implementation, respectively.
There were high significant differences between the studied patients Health Related Quality of life domains total score pre-program implementation and one month post program implementation and three months post program implementation ($P<0.001**$).

Table (4) shows that there were high significant correlations between studied patients at one month and three months post educational program implementation (r= 0.295) ($p<0.001**$) and (r= 0.328) ($p<0.001**$), respectively.

Table (1) Frequency distribution of the demographic characteristics of the studied patients with MAFLD (n=81)

Demographic characteristics:	No.	%
Age (Years)		
30 < 40	9	11.1
40 < 50	32	39.5
50 – 60	40	49.4
Mean ±SD	50.6 ±7.6	
Gender		
Male	23	28.4
Female	58	71.6
Marital status		
Single	15	18.5
Married	66	81.5
Residence		
Rural	25	30.9
Urban	56	69.1
Educational level		
Illiterate	8	9.9
Read & write	23	28.4
Secondary	39	48.1
Higher education	11	13.6
Occupation		
Work (Governmental)	15	18.5
Work (Private)	32	39.5
Not work (Housewife)	30	37.0
Not work (on Retirement)	4	4.9
Did the nature of your work change after illness?		
No	6	7.4
Yes	75	92.6
If the answer is yes, what is the type of change? (n=75)		
Inability to work for long periods	24	32.0
I need to rest from time to time	46	61.3
I became completely unable to move	5	6.7

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Table (2) Frequency Distribution of the studied patients with MAFLD regarding their medical history (n=81)

| Medical History	No.	%
Onset of the diagnosis with MAFLD		
Less than 6 months	48	59.3
From 6 months to a year	33	40.7
Previous hospitalization		
No	81	100.0
Yes	0	0.0
Family History of Metabolic Associated Fatty Liver Disease		
No	75	92.6
Yes	6	7.4
If the answer is yes, what is the relationship? (n=6)		
First degree (Father/Mother)	6	100.0
Risk Factors		
Obesity	78	96.3
Hypertension	41	50.6
High cholesterol level	81	100.0
Intake of fast-food meals	21	25.9
High calories diet	81	100.0
Lack of physical exercises	62	76.5
Genetic	3	3.7
Comorbidities Diseases (Chronic)		
Diabetes	45	55.6
Hyperlipidemia	81	100.0
Hypertension	39	48.1
Smoking		
No	62	76.5
Yes	19	23.5
If the answer is yes, how long have you been smoking? (n=19)		
From one year to less than five years	0	0.0
More than five years	19	100.0
Number of cigarettes per day? (n=19)		
Less than a pack of cigarettes	10	52.6
A pack of cigarettes	9	47.4
Height (meters) (Mean ±SD)	1.65 ±0.09	
Weight (K.G.) (Mean ±SD)	99.56 ±8.03	
BMI (K.G./M²)		
Overweight	3	3.7
Moderately Obese	31	38.3
Severely Obese	22	27.2
Morbidly Obese	25	30.9
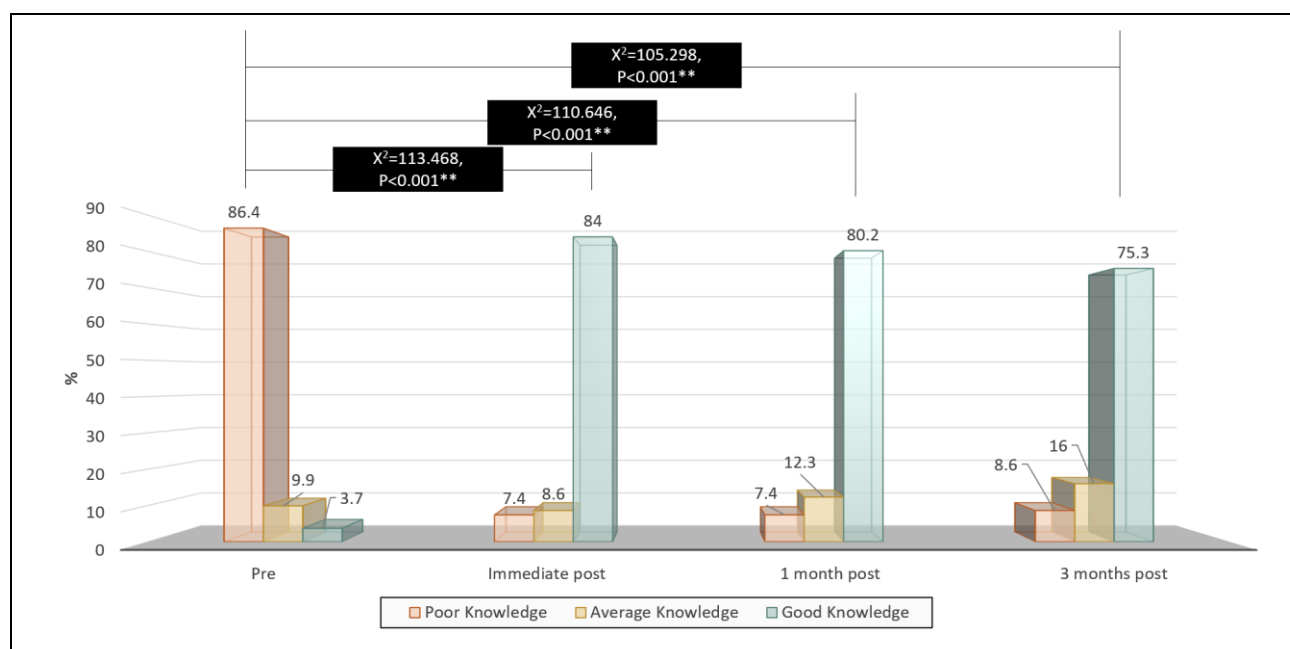
Figure (1) Comparison of studied patients' total knowledge level regarding MAFLD Pre & post educational program implementation (n=81).

Table (3) Comparison of studied patients HRQoL domains mean scores and standard deviation pre and post educational program implementation (n=81):

CLD – NAFLD domains	Pre-program Mean ±SD	1 month post program Mean ±SD	3 months post program Mean ±SD	Significance 1	Significance 2
Abdominal symptoms	6.7 ±2.3	15.2 ±2.8	15.5 ±2.8	T=20.785, **P<0.001****	T=21.649, **P<0.001****
Fatigue	13.5 ±4.4	30.2 ±5.5	30.9 ±5.6	T=21.328, **P<0.001****	T=22.071, **P<0.001****
Systemic symptoms	13.5 ±4.4	30.2 ±5.5	30.9 ±5.6	T=21.328, **P<0.001****	T=22.071, **P<0.001****
Activity	11.2 ±3.7	25.2 ±4.6	25.8 ±4.6	T=21.233, **P<0.001****	T=22.054, **P<0.001****
Emotional function	20.2 ±6.8	45.3 ±8.3	46.3 ±8.3	T=21.001, **P<0.001****	T=21.819, **P<0.001****
Worry	15.7 ±5.2	35.2 ±6.5	35.9 ±6.4	T=21.093, **P<0.001****	T=21.980, **P<0.001****
Chronic liver questionnaire score	80.5 ±26.9	180.8 ±33.3	184.8 ±33.3	T=21.108, P<0.001**	T=21.952, P<0.001**

Sig.1: Pre – intervention / 1 month post paired t-test, Sig. 2: Pre – intervention / 3 months paired t-test
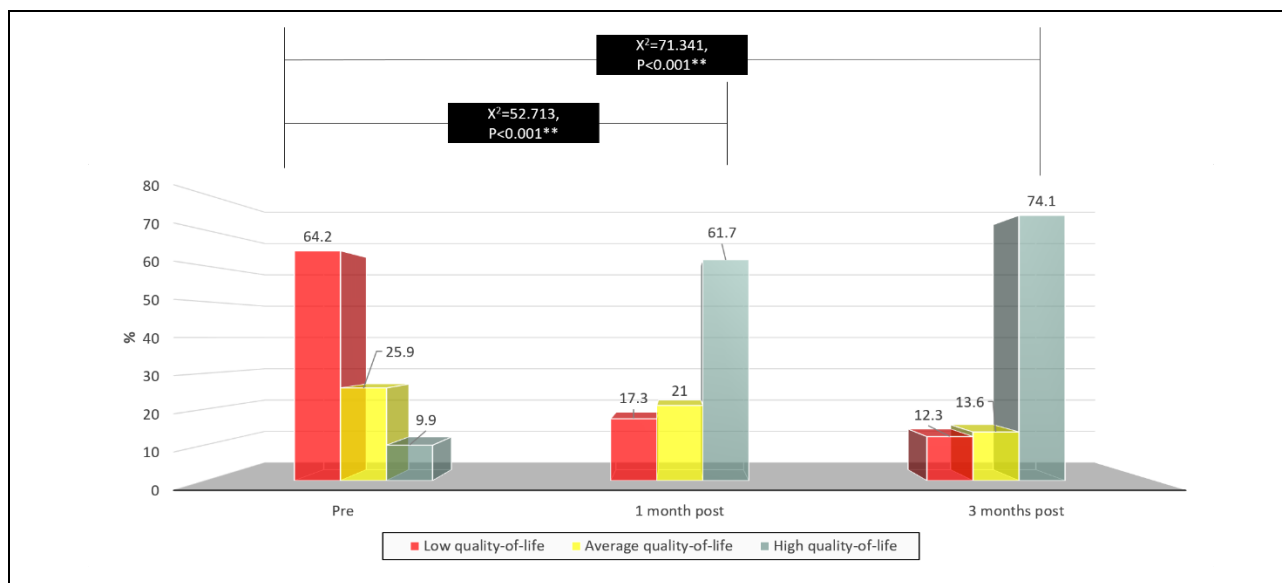
Figure (2) Comparison of the studied patients HRQoL total scores by Nonalcoholic fatty liver disease CLD – NAFLD pre and post educational program implementation.

Table (4) Correlation between studied patients Knowledge total score with Health Related QoL total score:

HRQOL	Knowledge Total Score					
	Pre- program		1 month post program		3 months post program	
	r	P	r	p	r	P
HRQOL total score	0.150	0.180	0.295	**<0.001****	0.328	**<0.001****

Discussion:

The present study result illustrated that slightly less than half of the studied patients their ages were between 50 and 60 years old. This might be due to MAFLD tending to be more prevalent in middle-aged adults, particularly those between 50 and 60 years old. Possible reasons for this result might include the following: some individuals may die of other diseases at older ages as fatty liver can significantly increase overall mortality, and thus these individuals are not counted as part of the MAFLD population; compared with older population who typically retire, middle-aged who are at the peak of their careers may experience more pressure

and engage in social behavior that may lead to unhealthy lifestyles, which can increase their risk of having metabolic disorders.

This result agreed with **Chen et al. (2021)** who studied "Prevalence of and risk factors for metabolic associated fatty liver disease in an urban population in China: A cross-sectional comparative study" and found that the peak prevalence in the 50–54 age group also indicated that MAFLD is more prevalent in their Middle Ages.

On the other hand, this result disagreed with **Kandil et al. (2024),** who studied "Echocardiographic Abnormalities and Carotid Artery Atherosclerosis in Metabolic Associated Fatty Liver Disease Patients" in

Egypt and documented that the mean age of the studied group was 43.69 ± 11.36.

Concerning gender; the present study result represented that more than two third of the studied patients were females. This might be due to sex-specific genetic predispositions that affect lipid metabolism, and fat storage making females more susceptible to MAFLD. In addition, the prevalence of MAFLD in women aged over 50 years old could be related to the age range for menopause.

Similarly, the results of the present study were consistent **Kandil et al. (2024),** who found that three quarters of the studied patients were female.

While, this result disagreed with **Huang et al. (2021),** who studied "Gender-specific prevalence of metabolic-associated fatty liver disease among government employees in Tianjin, China: a cross-sectional study", and found that more than half of the studied patients were males. The result of the present study also disagreed with **Ruiz-Manriquez et al., (2022),** who studied "Prevalence of metabolic-associated fatty liver disease in Mexico and development of a screening tool: The MAFLD-S-Score" and found that more than half of the studied patients were males.

The present study result indicated that the majority of the studied patients were married. This might be explained as most of studied population and the age of MAFLD susceptibility were middle aged, and most people in such age are married. This result was in accordance with **Shalaby et al. (2023),** who conducted a study entitled " Prevalence and Possible Risk Factors of Metabolic Associated Fatty Liver Disease (MAFLD) in Non-Obese Individuals in El-Minia Governorate–Egypt" and found that more than two thirds of the studied patients were married.

Also, these results agreed with **Abebe et al. (2022),** who studied "Assessment of fatty liver and its correlation with glycemic control in patients with type 2 diabetes mellitus attending Dessie Comprehensive Specialized Hospital" and found that three quarters of studied population were married.

The findings of the present study disagree with **Al Tawil et al. (2024),** who carried out a study entitled "Exploring the knowledge and attitudes towards metabolic dysfunction associated fatty liver disease in Lebanon" and found that the majority of the studied patients were single.

Regarding the residence, the current study's result indicated that more than two thirds of the studied patients were living in urban areas. This might be due to the urban population often have a greater access to processed, and fast foods that is rich in refined carbohydrates, fats, and sugars which can lead to obesity, the primary risk factors for MAFLD.

These results were consistent with **Du et al., (2024),** who studied "Effects of Interventions for Improving Awareness and Knowledge of Nonalcoholic Fatty Liver Disease Among Chinese Young Adults for Prevention of Liver Cancer—A Randomized Controlled Trial" and revealed that more than half of the studied patients were living in urban areas. Moreover, these results agreed with **Younossi et al., (2024),** who studied "The impact of stigma on quality of life and liver disease burden among patients with nonalcoholic fatty liver disease " and found that the majority of the studied patients were living in urban or suburban areas.

The same result was against **Papadakis et al., (2023),** who studied "Development and implementation of a continuing medical education program on non-alcoholic fatty liver disease for primary care practitioners in Europe" and found that more than half of the studied group were living in rural areas.

Concerning the educational level, the current study result illustrated that slightly less than half of the studied patients had secondary education. This might be due to people with secondary level of education may have limited health literacy, which affects their ability to understand the main risk factors for MAFLD disease such as poor dietary choices, sedentary lifestyles, and limited access to healthcare resources.

The results of the present study agreed with **Koutny et al., (2023),** who performed a study entitled "Relationships between education and non-alcoholic fatty liver disease in Salzburg, Austria", and found that two fifths of the studied patients had secondary education. This result disagreed with **Zhu et al., (2024),** who studied " The association between educational attainment and the risk of nonalcoholic fatty liver disease among Chinese adults" and found that most of the studied patients had middle educational level lower than secondary school.

Regarding the occupation, the present study results showed that slightly less than two fifths of the studied patients were working in private work. This might be because the private sector offers a wide range of employment options, including entrepreneurial opportunities. This result is supported by **Abebe et al., (2022),** who mentioned that more than one third of the studied patients were a private employee. The same result disagreed with **Younossi et al., (2024),** who found that more than half of the studied patients were governmental employers.

The present study findings indicated that slightly less than three fifths of the studied patients had been diagnosed with MAFLD for less than 6 months, all of them didn't hospitalize due to fatty liver, and the majority of them didn't have family history of MAFLD. This might be because MAFLD is often silent or asymptomatic condition, especially in the early stages. Therefore, many individuals with simple fatty liver do not experience significant clinical symptoms that would lead to hospitalization.

The results of the present study were supported by **Abdelkhalik et al., (2024),** who found that slightly less than two thirds of the studied participants had no previous history of hospitalization due to MAFLD. In addition, the same results agreed with **Someili et al., (2024),** who found that more than three-quarters of the studied population had no family history of MAFLD.

Whereas these finding was in disagreement with **Guo et al., (2022),** who studied "Non-alcoholic fatty liver disease (NAFLD) pathogenesis and natural products for prevention and treatment" and found that more than half of participants had family history of metabolic diseases including hypertension, dyslipidemia and T2DM which highlights both the role of genetics, as well as habits and sociocultural norms in the development of metabolic syndrome.

Regarding the risk factors for MAFLD; the results of the present study indicated that all the studied patients had high cholesterol level and taking high calories diet, the vast majority of them were obese, and more than three quarters of them don't perform physical exercises. This might be because these are the most commonly seen risk factors among patients with MAFLD. Therefore, previous study of **Zhang et al., (2023)** assumed that the triglyceride is sensitive in forecasting early MAFLD.

The results of the present study agreed with **Roesch-Dietlen et al., (2023),** who found that the main reported risk factors among most of the studied patients with MAFLD had hypercholesterolemia and

obesity. Also, these results were also similar to **Zhang et al., (2023),** who found that MAFLD is strongly associated with more than three quarters of the studied patients who had high cholesterol level, as well as those who were obese, and who don't perform regular physical activity.

This result disagreed with **Li et al., (2020),** who studied "Prevalence and Risk Factors of Metabolic Associated Fatty Liver Disease in Xinxiang, China" and found that the participants with MAFLD were more likely to have moderate physical activity.

Concerning the comorbidities diseases; the present study results denoted that all the studied patients were suffering from hyperlipidemia, and more than half of them were diabetic. This might be because hyperlipidemia and diabetes mellitus are closely related conditions, and their connection is both metabolic and pathophysiological. The relationship between them is often bidirectional: hyperlipidemia (elevated blood lipid levels) can increase the risk of developing diabetes, and conversely, diabetes (especially type 2 diabetes) can worsen hyperlipidemia.

In the same line, the results of the present study were consistent with **Cheng et al., (2024),** who carried out a study entitled "Prevalence and clinical outcomes in subtypes of metabolic associated fatty liver disease in Taiwan Bio-Bank" and found that slightly less than two thirds of the studied participants were suffering from hyperlipidemia while more than two thirds of them were diabetic.

These results also agreed with This result agreed with **Yilmaz et al., (2021),** who studied "The prevalence of metabolic-associated fatty liver disease in the Turkish population: A multicenter study", and found that more than half of the patients were diabetic patients and those with dyslipidemia

These results disagreed with **Abdelkhalik et al., (2024)**, who found that more than one third of the studied participants were suffering from hyperlipidemia and diabetes mellitus.

As for the smoking habit; the present study result showed that more than three quarters of the studied patients were nonsmokers. This might be because two third of the study patients were females and have adopted a non-smoking culture based on their Arab culture. Also, the studied patients might have the knowledge that smoking is a well-established risk factor for many diseases, including MAFLD. The result of the present study was similar to **Takenaka et al., (2020),** who studied "Non-alcoholic fatty liver disease is strongly associated with smoking status and is improved by smoking cessation in Japanese males: A retrospective study" and found that slightly less than three quarters of the studied patients were never smokers.

Similarly, these findings agreed with **Du et al., (2024),** who found that more than three-quarters of the studied patients were nonsmokers. The result of the current study was contradicted with **Abdelkhalik et al. (2024),** who found that nearly half of the studied participants were active smokers.

As for the Body Mass Index (BMI); the present study results represented that more than two thirds of the studied patients were moderately obese. This might be explained as obesity is strongly associated with dyslipidemia, which is considered a major component of metabolic syndrome and closely linked to MAFLD. These results of the current study were consistent with **Someili et al., (2024)**, who found that nearly one third of the studied population were obese.

The results of the present study contradicted with **Lee et al., (2023),** who studied "A survey on the awareness, current management, and barriers for non-alcoholic

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fatty liver disease among the general Korean population" and found that half of the studied patients were normal weight. In addition, these results contradicted with **Spinelli et al., (2024),** who conducted a study entitled "Nutritional diagnoses and interventions in people with metabolic dysfunction-associated fatty liver disease: Cross-sectional study" and stated that more than half of the studied patients were lean.

The present study findings described that most of the studied patients were suffering from weight gain, fatigue, abdominal discomfort and increased waist circumference, as well as elevated liver enzymes. This might be due to these are the most common symptoms among individuals with MAFLD due to metabolic dysfunction, fat accumulation, and the livers' inability to process fats efficiently.

These results were in the same line with **Tincopa et al., (2021),** who conducted a study entitled "Patient disease knowledge, attitudes and behaviours related to non-alcoholic fatty liver disease: A qualitative study" and found that most of the studied patients tended to report associated symptoms, primarily fatigue, abdominal pain and elevated liver enzymes.

The present study result indicated that the majority of them had poor total level of knowledge regarding MAFLD pre-educational program implementation, which decreased to include the minority of them immediately post the educational program implementation. This might be due to the educational program succeeded in providing the studied patients with an accurate, accessible, and relevant information related MAFLD.

Similarly, these results were consistent with **Du et al., (2024)** who revealed that participants in intervention groups had higher knowledge scores of NAFLD compared to the control group. Specifically, the odds of having NAFLD awareness among intervention groups were three times higher immediately after interventions and 1.5 times higher 1 month after interventions compared to the control group.

Moreover, this result agreed with **Chen et al., (2019),** who carried out a study entitled "Survey of nonalcoholic fatty liver disease knowledge, nutrition, and physical activity patterns among the general public in Beijing", and found that the majority of the studied patients had poor total knowledge regarding NAFLD, and recommended that programs to increase the public health awareness regarding NAFLD is critical to curb this growing epidemic.

In addition, this result also supported by **Alqahtani et al., (2024),** who carried out a study entitled "Knowledge about metabolic dysfunction-associated steatotic liver disease among the medical professionals from countries in the Mena region", and found that most of the studied participants had poor total level of knowledge regarding MAFLD, and recommended that educational programs is needed to improve this knowledge gap among the studied participants.

Also, these results were in the same line with **Khani et al., (2015),** who demonstrated that before the intervention there was no significant difference between the two groups in terms of knowledge. However, immediately after the intervention, the case group showed a significant increase compared to the control group in all knowledge scales.

This result was against **Abdulfattah et al., (2024),** who performed a study entitled "Awareness of non-alcoholic fatty liver disease and its determinants in Jazan, Saudi Arabia: A cross-sectional study", and found that more than half of the studied participants

were aware of MAFLD. Also, the result of the current study was not in the same line with **Hegazy et al., (2023),** who performed a study entitled "Non-alcoholic fatty liver disease related knowledge among a sample of Egyptians: An exploratory cross-sectional study" and found that most of the studied participants had fair to moderate total level of knowledge regarding MAFLD.

Concerning the studied patients' HRQOL pre and post educational program implementation; the current study result revealed that there was an increase in the mean score of all HRQOL domains and total HRQOL mean score among the studied patients one month and three months post educational program implementation than pre-program implementation. This might suggest that the educational program had a positive impact on studied patients' quality of life.

This result agreed with **Glass et al., (2022),** who found that the educational program succeeded to improve the studied patients' total HRQOL post the educational intervention implementation, as well as after six months of the educational program implementation.

This result also supported by **Papatheodoridi et al., (2023)**, who carried out a study entitled "Health-related quality of life in patients with nonalcoholic fatty liver disease: A prospective multi-center UK study", and found that all the studied patients had low total HRQOL mean score, and suggested that an educational intervention should be carried out in order to improve their awareness regarding the nature of the disease as well as to improve their quality of life. Further, this result was similar to **Younossi et al., (2024)**, who found that all the studied patients with MAFLD substantially had lower total HRQOL mean score, and recommended the importance of conducting a health

education program in order to improve their quality of life.

Also, this result agreed with **Puneem et al., (2023),** who studied "Health-related quality of life and its determinants among South Indian type 2 diabetes patients with and without non-alcoholic fatty liver disease " and found that the mean score of HRQOL domains among all the studied patients significantly were low. And added, the studied patients should be regularly screened and instructed about the importance of HRQOL improvement

Concerning the studied patients' total HRQOL; the present study findings revealed that more than three fifths of them had poor total HRQOL pre-program implementation, which decreased to include less than one fifth of them one month post program implementation, and three months post program implementation. This might be explained by patients who feel supported and encouraged by others tend to show better adherence to educational program and experience better outcomes.

These findings supported with **Tincopa et al. (2024)**, who carried out a study entitled "Implementation of a randomized mobile-technology lifestyle program in individuals with nonalcoholic fatty liver disease in Malaysia" and found that more than two thirds of the studied patients had poor total HRQOL pre-program implementation, which decreased to include less than one fourth of them post program implementation, and in follow up.

Concerning the correlation between the studied patients' total score of knowledge regarding MAFLD and the total score of HRQOL pre and post program implementation; the current study results revealed that there were no statistically significant correlations found between studied patients' total score of knowledge regarding

MAFLD pre-program implementation. This might be due to pre-program implementation the studied patients had limited or incorrect knowledge related MAFLD, which may not yet influence their HRQOL domains. While their HRQOL was being affected by other factors like the disease process.

Also, the present study results described that one month and three months post the educational program implementation there were strongly statistically significant positive correlations found between the studied patients' total score of knowledge regarding MAFLD, and the total score of HRQOL. This might be due to the fact that the educational program succeeded in improving the studied patients' total level of knowledge regarding MAFLD, which lead to the improvement of their self-management, better symptom control, and enhanced well-being and their HRQOL subsequently.

The results of the present study agreed with **Tincopa et al., (2024)**, who found that there were highly statistically significant positive correlations found between the studied patients' total level of knowledge regarding MAFLD and their total HRQOL score.

On the same line, the results were supported by **Huber et al. (2019),** who found that there were highly statistically significant positive correlation found between the studied patients total knowledge related to MAFLD and their total HRQOL. Moreover, these results were similar to **Funuyet-Salas et al., (2024)**, who performed a study entitled "Health-related quality of life in non-alcoholic fatty liver disease: A cross-cultural study between Spain and the United Kingdom", and found that there were highly statistically significant correlations found between the studied patients' total knowledge

score regarding MAFLD and their total HRQOL score

Conclusion:

A significant statistical improvement in knowledge about MAFLD was found post program implementation among studied patients. In addition, a significant statistical improvement in health related quality of life post program implementation. As well as there was a highly significant correlation between knowledge levels and HRQOL domains one month and three months post program implementation.

Recommendations:

- The need for continuous educational and training programs for patients with metabolic associated fatty liver disease to support patients, improve their HRQOL.

- Activating the educator role of the nurse in health care centers to raise awareness among people about the importance of early diagnosis, proper investigations, relevant management, importance of healthy diet and exercises, adherence to medications and follow up.

- Replication of the study using a larger probability sample from different geographical regions for generalization of results.

- Implementing further studies to investigate factors affecting compliance of MAFLD patients with healthy lifestyle.

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تأثير برنامج تعليمي على جودة الحياة المتعلقة بالصحة بين مرضى الكبد الدهني المرتبط بالتمثيل الغذائي

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يُعدّ مرض الكبد الدهني المرتبط بالتمثيل الغذائي حالةً متعددة الأجهزة، تؤثر على الصحة البدنية والنفسية، مما يؤدي إلى تراجع جودة الحياة الصحية. لذا **هدف هذا الدراسة** إلى تقييم تأثير برنامج تعليمي على جودة الحياة المتعلقة بالصحة بين مرضى مرض الكبد الدهني المرتبط بالتمثيل الغذائي. **تصميم البحث:** وتم استخدام تصميم شبه تجريبي (مجموعة واحدة، اختبار ما قبل وبعد). **مكان البحث:** قسم داخلي الباطنة وعيادات أمراض الكبد والجهاز الهضمي وعيادة الباطنة العامة الخارجية في مستشفى جامعة بنها. **عينة الدراسة:** عينة مقصودة مكونة من ٨١ مريضًا بالغًا مصابًا بمرض الكبد الدهني المرتبط بالتمثيل الغذائي. **أدوات جمع البيانات:** تم جمع البيانات باستخدام أداتين أساسيتين استبيان مقابلة منظم واستبيان أمراض الكبد المزمنة لمرض الكبد الدهني غير الكحولي. **النتائج:** وأظهر البرنامج زيادة كبيرة ملحوظة في معدل وعي المرضي بمرض الكبد الدهني المرتبط بالتمثيل الغذائي وكذلك تحسن كبير في جميع محاور جودة حياة المرضى المتعلقة بالصحة، ولوحظ أيضا فرق ذو دلالة إحصائية عالية بين مرحلتي ما قبل التدخل وما بعده في كلا من مستوى المعرفة وجودة الحياة. **الاستنتاج:** لوحظت ارتباطات إيجابية ذات دلالة إحصائية بين درجات المعرفة الكلية وجودة الحياة المتعلقة بالصحة خلال مرحلة ما بعد التدخل. **التوصيات:** وأوصت الدراسة بأنه ينبغي تنفيذ برامج تعليمية مستمرة للمرضى الذين يعانون من مرض الكبد الدهني المرتبط بالتمثيل الغذائي لتعزيز المعرفة ودعم اتخاذ القرارات العلاجية وتحسين النتائج الصحية وجودة الحياة.
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