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Impact of a Health Educational Intervention on Knowledge of Patients with Nonalcoholic Fatty Liver Disease

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ABSTRACT

Background: Nonalcoholic fatty liver disease (NAFLD) is the most common liver disease affecting populations globally. Adequate knowledge and full understanding of the disease and its diagnosis are important for NAFLD patients to take an active role in managing their condition. **Aim:** The goal of this research was to examine the impact of a health educational intervention on the knowledge of patients with NAFLD. **Method:** This study employed a quasi-experimental approach. The research was performed at the outpatient clinics of the Department of Internal Medicine, Al-Azhar University Hospital in New Damietta, Egypt. A targeted sample of 92 individuals with NAFLD was allocated randomly into two groups. The study incorporated two tools. Tool I: A Structured Interview Sheet, including two parts: First part: The demographic characteristics of the participants in the study. Second part: Medical history of the patients. Tool II: Knowledge Assessment Questionnaire. **Results:** After three and six months of the intervention, a significant improvement in the patients' knowledge was observed within the study group, with a significant statistical difference between both groups ($P<0.001$). **Conclusion:** The health educational intervention was beneficial in increasing the knowledge of individuals with NAFLD. **Recommendations:** Further health education programs for NAFLD patients should be conducted to increase awareness about the disease.

Keywords: Health Educational Intervention, Knowledge, Nonalcoholic Fatty Liver Disease

Introduction:

Nonalcoholic fatty liver disease (NAFLD) is the primary cause of liver illness worldwide. The global incidence of NAFLD stands at around 47 cases per 1,000 individuals, with males being more affected than females (Teng et al., 2022). In Egypt, the rate of NAFLD is growing steadily, largely as a result of the increasing obesity rates (Eletreby et al., 2021). NAFLD is marked by fat buildup in more than 5% of liver cells, occurring in the absence of excessive alcohol consumption or other underlying causes of liver fat accumulation. It includes two separate pathological conditions, each with a different potential outcome: nonalcoholic fatty liver (NAFL) and nonalcoholic steatohepatitis (NASH) (Kumar, Priyadarshi, & Anand, 2020).

In most patients, NAFLD is frequently associated with one or more components of metabolic syndrome, such as obesity, diabetes, hypertension, and elevated cholesterol levels. As a result, it is viewed as a liver manifestation of metabolic syndrome (Gelli et al., 2017). Furthermore, various risk factors, including genetic predisposition, age, sex, and lifestyle patterns such as unhealthy dietary intake and low levels of physical exercise are associated with the incidence and progression of NAFLD (Huh, Cho, & Nam, 2022).

The diagnosis of NAFLD is based on clinical history, laboratory tests, and radiological imaging, and confirmed through histological biopsy findings. However, in clinical practice, abdominal imaging that detects hepatic steatosis is typically sufficient for diagnosing NAFLD if other diseases have been ruled out. The majority of patients with NAFLD remains asymptomatic or show vague symptoms before diagnosis. Commonly reported symptoms include tiredness and pain in the upper right abdomen, bloating, irregular bowel movements, and disturbed sleep patterns (Sharma & Arora, 2020).

Individuals with NAFLD have a greater likelihood of progressing to end-stage liver disease, developing liver cancer, and experiencing liver-related mortality. Furthermore, NAFLD is highly linked to a variety of extrahepatic consequences, such as cardiovascular disease, gastroesophageal reflux disease, chronic renal disease, and extrahepatic malignancies, all of which contribute to the overall burden of the condition (Tomeno et al., 2020).

There are different pharmacological and non-pharmacological approaches to manage nonalcoholic fatty liver disease. However, no pharmacotherapy has approved for its long-term treatment. Lifestyle modifications including changes to diet, regular physical activity, gradual weight loss, abstinence from alcohol, and stress management are the primary recommendations and the first step in managing and preventing the progression of NAFLD (Ahmadinezhad, Hassanzadeh, Roustaei, & Hosseini, 2022).

Knowledge about the disease is shaped by a variety of beliefs and influenced by the information that patients have collected about different elements of the disease throughout their lives, both before and after their diagnosis. These beliefs are typically related to the causes of the disease and contributing factors, the recognition of the symptoms, current treatment approaches, and potential outcomes (Szymona- Pałkowska et al., 2016).

Understanding of the disease impacts health behaviors and the willingness to follow medical advice (Glass, Asefa, Volk, Lok, & Tincopa, 2022).Therefore, individuals are more likely to modify their behaviors easily when they recognize the risks associated with their disease. In other words, awareness about NAFLD and its complications acts as a motivational force for behavioral changes in these individuals (Nourian et al., 2020).

2.1 Significance of the study

Nonalcoholic fatty liver disease (NAFLD) has emerged as a major public health challenge due to its potential impact on individuals and its significant economic burden on families and society (Mobasheri, Ghahremani, Fallahzadeh Abarghooee, & Hassanzadeh, 2022). A satisfactory level of patients' knowledge about their disease has a significant effect on their ability to manage the condition, resulting in improved quality of life, greater life satisfaction, and better adaptation to treatment (Abdulfatah, Ali, & Mohamed, 2023).Thus, this study was designed to examine the impact of a health education intervention on the knowledge of individuals with NAFLD.

2.2 Aim of the Research

The purpose of this research was to investigate the impact of a health educational intervention on the knowledge of patients with NAFLD.

2.3 Research Hypotheses

Patients with nonalcoholic fatty liver disease who undergo the health educational intervention will exhibit a notable improvement in their knowledge compared to the control group.

3. Method

3.1 Design

This investigation employed a quasi-experimental design.

3.2 Setting

The research was executed at the outpatient clinics of the Department of Internal Medicine, Al-Azhar University Hospital, located in New Damietta Governorate, Egypt.

3.3 Subjects

The present study incorporated a purposive sample of 92 NAFLD patients, who were assigned randomly to two equal groups: a control group and a study group, with 46 participants in each group. Inclusion criteria included individuals diagnosed with NAFLD, aged 20-60 years, who accepted to engage in this study. Exclusion criteria involved individuals with known liver disorders such as AFLD, viral hepatitis, autoimmune liver conditions, genetic disorders, hepatic decompensation, and HCC. In addition, those with mental or behavioral abnormalities were excluded.

3.4 *Sample Size Calculation*

Using literature data (Tincopa et al., 2022), and applying a significance level of 5% with 80% power, the sample size was established using the following formula:

$$n = \frac{\left(\frac{Z\alpha}{2} + Z\beta\right)^2 \times 2(SD)^2}{d^2}$$

This calculation indicated that 46 patients per group were required. Participants in the control group were given only the routine hospital care, whereas participants in the study group were given both the routine hospital care and health education sessions on NAFLD.

3.5 Tools of Data Collection

The researcher developed two tools for this study, based on an investigation of the relevant literature (Barmak et al., 2021; Glass et al., 2022; Ghevariya et al., 2014; Zhang et al., 2019), as follows:

Tool I - A structured Interview Sheet

It composed of two parts:

Part I: Demographic Characteristics of the Studied Patients

This part incorporates six items designed to examine the demographic traits of NAFLD patients, such as their age, gender, social status, education level, employment status, and place of residence.

Part II: Medical History of the Patients

This part consists of four items to assess patients'medical history (e.g., Discovery of disease, NAFLD symptoms, comorbid conditions, and smoking behavior.

Tool II: Knowledge Assessment Questionnaire

This tool was utilized to evaluate patients' knowledge regarding NAFLD and consisted of a set of questions about: the definition of NAFLD (5 questions), stages of NAFLD progression, risk factors, symptoms, diagnosis, complications, and treatment options (9 questions), as well as healthy behaviors and lifestyle modification related to NAFLD (4 questions).

A scoring system was used to evaluate patients' knowledge, where each question had multiple-choice answers. Correct answers were awarded one point, while incorrect answers or 'I don't know' responses received zero points. The points from all questions were summed to calculate the total knowledge score, which was out of 50. The total score was transformed into a percentage: poor knowledge was defined as <50%, moderate knowledge as 50-65%, and good knowledge as >65%.

3.6 Validity and Reliability of the Tools

Validity: A group of five professionals in nursing and medicine verified the tools' content validity. According to their feedback, the tool's relevance, thoroughness, accuracy, and applicability were assessed and the required adjustments were made.

Reliability: Reliability was estimated statistically by the Cronbach alpha test for the knowledge assessment questionnaire and yielded 0.903.

3.7 Pilot Study

A pilot investigation was performed with nine patients, constituting 10% of the overall sample size, selected from the same setting. The goal was to assess the research tools' applicability, clarity, and reliability, and to estimate the duration for data collection. The patients involved in the pilot phase were excluded from the final research group.

3.8 Field of Work

After obtaining the official approval from the Research Ethics Committee of the Faculty of Nursing at Mansoura University, Egypt (Ref. No.344), and receiving permission from the hospital director, data collection began in July 2023 and ended in June 2024. This research was executed in four separate stages: assessment, planning, implementation, and evaluation.

1) Assessment Phase

It represented the beginning of this study, where individuals who met the research criteria were enrolled after the study's purpose was explained to them and their consent was obtained. The individuals were then distributed randomly to two equal groups, the control group and the study group. Each individual in the two groups was interviewed separately to gather the baseline data utilizing all the tools of the research. Time needed to complete each tool was around 30-40 minutes.

2) Planning Phase

The researcher developed the health education sessions, which aimed at improving NAFLD patients' knowledge. Furthermore, the researcher developed an instructional colored booklet to be distributed to each participant in the study group in the implementation phase.

3) Implementation Phase

The designed health education sessions were applied for the patients in the study group either individually or in small groups of 4-6 patients in the form of four consecutive sessions, each session lasted between 30 and 45 minutes. The educational sessions covered the following: An overview about NAFLD, nutrition management, physical activity and exercise, in addition to behavioral therapy and stress management strategies for NAFLD patients. A colored booklet was distributed to every participant in the study group to help them in reviewing and understanding the contents of the educational intervention, and whatsApp was used for communication. The control group was given only the routine hospital care.

4) Evaluation Phase

Data were obtained using all the study tools at baseline. After three and six months of the implementation of the educational sessions, the researcher evaluated the patients in both groups using the study tool II: Knowledge Assessment Questionnaire.

3.9 Ethical Considerations

Before data collection, formal approval for the study was obtained from the hospital director to allow its commencement. Subsequently, informed consent was gathered from the participants who decided to take part, after receiving a complete explanation of the study's objectives, benefits, and design. They were reassured that their data would remain confidential and safeguarded, and that they may withdraw from the research at any moment with no consequences.

3.10 Statistical Design

SPSS for Windows version 20.0 was used for all statistical analyses (SPSS, Chicago IL). Categorical data were displayed as numbers and percentages, continuous variables were normally distributed and presented as mean ± SD. Fisher's exact test or the chi-square test were used as needed to compare categorical variables. To compare mean values and identify statistical differences, the Student's t-test was employed. At $p<0.05$, statistical significance was taken into account.

4. Results

The study's findings indicated that, prior to the intervention, the distribution of patients in both the control and study groups was similar, with no significant statistical differences detected in the baseline demographic features, medical history, or patients' knowledge between the two groups.

Table 1 shows that the mean age of participants was 45.58 ± 8.96 in the control group and 46.41 ± 8.89 in the study group. Additionally, males represented 56.5% of the control group and 60.9% of the study group. The majority of participants in both groups were married, with 84.8% in the control group and 80.4% in the study group. Regarding education, 54.3% of participants in the control group and 52.2% in the study group had a secondary level of education. Furthermore, 69.6% of participants in the control group and 65.2% in the study group were employed, while 73.9% of those in the control group and 71.7% in the study group lived in rural regions.

Table 2 illustrates that 58.7% of the patients in the control group and 56.5% in the study group discovered the disease accidently. Other patients reported non-specific symptoms such as fatigue, abdominal discomfort, severe bloating and acidity. Furthermore, the two groups had similar rates of comorbidities: obesity or overweight (87.0% vs. 89.1%), hyperlipidemia (76.1% vs. 82.6%), diabetes mellitus (43.5% vs. 47.8%), and hypertension (45.7 vs. 43.5%). In terms of smoking, 50.0% of the control group and 45.7% of the study group were smokers.

Table 3 reveals a significant improvement in the mean scores of total and all items of patients' knowledge in the study group at three months after the intervention, with the improvement sustained at the 6-month follow-up when compared to the baseline ($P< 0.001$). In contrast, the control group exhibited no significant changes ($P>0.05$). Furthermore, the difference between the two groups at both three and six months post-intervention was found to be statistically significant ($P<0.001$).

Figure 1 demonstrates that, following three and six months of the intervention, most of the participants in the study group exhibited a good level of knowledge, with 91.3% and 87.0% respectively, compared to only 6.5% and 4.3% in the control group.

Table 1. Demographic Characteristics of the Studied Patients (n=92).

Items	Control		Study		Chi - square / Fisher exact test	
	n= (46)	%	n= (46)	%	X^2	*P*
Age (in years)						
20 – < 30	4	8.7	3	6.5	0.262	0.967
30 – < 40	11	23.9	12	26.1		
40 – < 50	21	45.7	22	47.8		
50 – ≤ 60	10	21.7	9	19.6		
Mean ±SD	45.58 ±8.96		46.41 ±8.89		0.444	0.658
Sex						
Female	20	43.5	18	39.1	0.179	0.672
Male	26	56.5	28	60.9		
Social status						
Single	7	15.2	9	19.6	0.303	0.582
Married	39	84.8	37	80.4		
Level of education						
Not read and write	3	6.5	2	4.3	0.366	0.947
Primary	4	8.7	5	10.9		
Secondary education	25	54.3	24	52.2		
Higher education	14	30.4	15	32.6		
Employment status						
Working	32	69.6	30	65.2	0.198	0.656
Not working	14	30.4	16	34.8		
Area of residence						
Urban	12	26.1	13	28.3	0.055	0.815
Rural	34	73.9	33	71.7		

Not statistically significant at p>0.05

Table 2. Medical History of the Studied Patients (n=92).

Items	Control		Study		Chi- square / Fisher exact test	
	n= (46)	%	n= (46)	%	X^2	*P*
Discovery of disease						
Through symptoms	19	41.3	20	43.5	0.045	0.833
Accidentally	27	58.7	26	56.5		
NAFLD symptoms #						
Lack of strength and fatigue	13	28.3	12	26.1	0.055	0.815
Irregular bowel habits and bloating	18	39.1	19	41.3	0.045	0.832
Abdominal pain and discomfort	15	32.6	14	30.4	0.050	0.822
Heart burn / Severe acidity	17	37.0	18	39.1	0.046	0.830
NAFLD comorbidities #						
Obesity or overweight	40	87.0	41	89.1	0.103	0.748
Hyperlipidemia	35	76.1	38	82.6	0.597	0.440
Diabetes mellitus	20	43.5	22	47.8	0.175	0.675
Hypertension	21	45.7	20	43.5	0.044	0.834
Smoking habit						
Yes	23	50.0	21	45.7	0.174	0.676
No	23	50.0	25	54.3		

Not significant at p>0.05 *# The answers are not exclusive NAFLD: Nonalcoholic Fatty Liver Disease*

Table 3. Comparison of the Mean Knowledge Scores Between the Control and Study Groups Through Program Phases (n=92).

Patients' Knowledge		Control n= (46) Mean ±SD	Study n= (46) Mean ±SD	t(P3)
Definition of the NAFLD term	Pre – Intervention	2.1 ±0.6	2.2 ±0.9	T = 0.627, P = 0.532
	3 Months post	2.0 ±0.0	4.7 ±0.9	T =21.737, P < 0.001**
	6 Months post	2.0 ±0.3	4.6 ±0.7	T =25.191, P < 0.001**
	$t(P_1)$	T=1.130, P=0.261	T =13.321, P < 0.001**	
	$t(P_2)$	T=1.011, P=0.314	T =14.276, P < 0.001**	
Stages of NAFLD progression, risk factors, disease symptoms, diagnosis, complications and treatment modalities	Pre – Intervention	12.8 ±2.2	12.4 ±1.9	T= 0.933, P = 0.353
	3 Months post	13.6 ±3.8	29.6 ±3.9	T=19.647, P < 0.001**
	6 Months post	13.5 ±3.3	27.8 ±4.9	T=16.302, P < 0.001**
	$t(P_1)$	T=1.390, P=0.167	T =26.890, P < 0.001**	
	$t(P_2)$	T=1.197, P=0.234	T = 19.745, P < 0.001**	
Healthy behaviors and lifestyle modifications	Pre – Intervention	6.4 ±0.8	6.6 ±1.5	T =1.141, P = 0.257
	3 Months post	6.5 ±0.9	9.9 ±0.3	T =24.307, P < 0.001**
	6 Months post	6.7 ±1.1	9.6 ±0.6	T =15.697, P < 0.001**
	$t(P_1)$	T = 0.563, P=0.574	T=14.188, P < 0.001**	
	$t(P_2)$	T = 1.495, P=0.138	T= 12.174, P < 0.001**	
Total knowledge score	Pre – Intervention	21.3 ±2.8	21.2 ±4.9	T= 0.120, P = 0.904
	3 Months post	22.1 ±4.2	44.2 ±5.0	T=22.768, P< 0.001**
	6 Months post	22.2 ±4.3	42.1 ±5.9	T=18.372, P< 0.001**
	$t(P_1)$	T=1.063 P=0.290	T=22.282, P < 0.001**	
	$t(P_2)$	T=0.209, P=0.834	T =18.482, P < 0.001**	

t(P1): Pre – Intervention / 3 Months post for the group, t(P2): Pre – Intervention / 6 Months post for the group, t(P3): between study and control at current phase.

Not significant at p>0.05 *** Highly significant at p< 0.001*

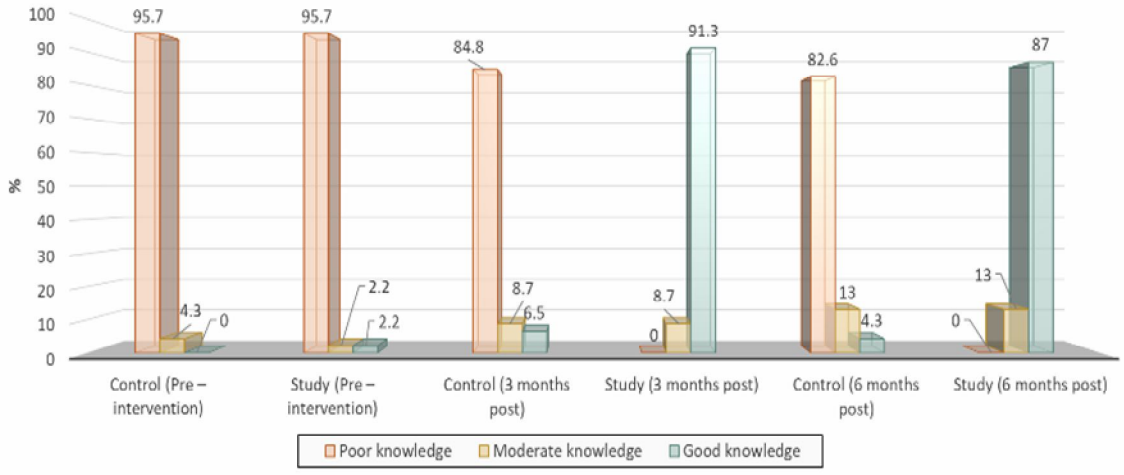

Figure 1. Comparison of Knowledge Levels Between the Control and Study Groups Through Program Phases (n=92).

5. Discussion

Knowledge and awareness about NAFLD among general populations remain inadequate, with a significant gap between awareness, knowledge, and effective disease management (Lee et al., 2023). In this regard, our study attempted to explore the impact of a health educational intervention on the knowledge of patients with NAFLD, seeking to determine the influence of educational strategies in enhancing disease awareness and promoting better health outcomes.

The findings of this study demonstrated that the mean age of participants in the control group was about forty-five and a half years, whereas the study group had a mean age of approximately forty-six and a half years. Additionally, males were more commonly represented in the study sample. These results align with those of Gelli et al. (2017), who reported a mean age of about forty-seven and a half years for their study group, with a higher proportion of males than females in the studied sample. In contrast, Mobasheri et al. (2022) reported a younger mean age in both groups, with the control group had a mean age of around thirty six years and the intervention group had a mean age of around thirty five years. Additionally, a higher proportion of females were observed in their study.

Furthermore, our study showed that the majority of participants in the two groups were married, and over half had a secondary educational level. These results align with Arefhosseini, Ebrahimi-Mameghani, Naeimi, Khoshbaten, & Rashid (2011), who also reported that most patients in their study were married, with about half having a high school education.

Additionally, this study found that over two thirds of participants in the two groups were employed, and about three quarters of them came from rural areas. These results are in agreement with Mazzotti et al. (2018), who indicated that more than half of the participants in their study were employed. In contrast, our results differ from those of Katsagoni et al. (2018), who found that most of their participants resided in urban regions.

The results of this study found that more than half of participants in both groups discovered the disease accidentally, while some participants reported non-specific symptoms such as fatigue, weakness, abdominal discomfort, severe bloating and acidity. These finding are supported by Gronkjaer, Wernberg, & Lauridsen (2020), who mentioned that NAFLD is often discovered incidentally during investigations for other conditions or routine examinations. However, some patients may experience discomfort, a general feeling of illness, pain in the right upper abdomen, and fatigue.

Numerous studies, including those by Almomani et al. (2022) and Manikat & Nguyen (2023) have shown that individuals with NAFLD are more likely to experience comorbidities such as obesity, diabetes, abnormal lipid levels, hypertension, and metabolic syndrome. In this study, both the control and study groups exhibited similar characteristics, with a significant proportion of participants in each group being either obese or overweight, having hyperlipidemia, and nearly half also suffering from diabetes and hypertension. As a result, the presence of these multiple conditions complicates clinical management and contributes to worse health outcomes.

Smoking is widely acknowledged as a leading risk factor for a variety of health conditions. In our study, we found that approximately half of the participants in both groups were smoking. This finding is consistent with Mansour-Ghanaei, Mansour-Ghanaei, Naghipour, & Joukar (2019), who noted that around half of the NAFLD participants in their study were smokers.

In healthcare interventions, ensuring that patients have sufficient knowledge about their condition is crucial for effective disease management. This knowledge enhances treatment adherence and empowers patients to make informed decisions, which, in turn, reduces healthcare costs and improves long-term health outcomes (Valery et al., 2015).

The results of our study showed no significant difference in knowledge scores between both groups prior to the intervention, with both groups had poor knowledge levels at baseline. However, following three and six months of the intervention, the study group showed a notable improvement in their knowledge scores and demonstrated a much higher level of knowledge than the control group. This result aligns with Nourian et al. (2020), who investigated the knowledge of patients with NAFLD following an educational intervention. The study indicated that the intervention group had a significantly greater knowledge score than the control group, with a significant statistical difference between both groups.

Additionally, this result is supported by Glass et al. (2022), who evaluated the influence of an instructional intervention on disease knowledge in individuals with NAFLD. Their study found that the intervention group demonstrated an improvement in their overall knowledge score at the follow-up evaluation. It also highlighted that the educational intervention which included information about the disease, diet, and physical exercise guidelines was effective in increasing participants' total disease knowledge.

In the researcher's viewpoint, this consistency can be attributed to the success of the intervention in achieving its goal of enhancing patients' knowledge. Additionally, our findings emphasize the effectiveness of the educational intervention as a key independent predictor for making significant changes and improvement in the knowledge level of the patients.

6. Conclusion and recommendations

According to the outcomes of this study, it can be concluded that the application of the health educational intervention was effective in improving knowledge of individuals with NAFLD.

According to the study's findings, these recommendations are proposed:

- Further health instructional programs for NAFLD patients should be conducted to improve their knowledge.
- All health care providers should stay up to date with NAFLD research, and clinical guidelines to ensure optimal patient care.
- Future researches in different centers should be done with long-term follow-up to ensure a more effective intervention.

7. Acknowledgments

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8. Declaration of conflicting interests

The authors confirm that there are no possible conflicts of interest related to the research, authorship, or publishing of this work.

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