

# Effectiveness of Multicomponent Instructional Module on Knowledge and Life Style Practices among Adult Patients with Non-Alcoholic Fatty Liver Disease in a Tertiary Care Centre, Thiruvananthapuram

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## ABSTRACT

Liver disease accounts for two million deaths annually and is responsible for 4% of all deaths worldwide. The present study was intended to assess the effectiveness of multicomponent instructional module on knowledge and lifestyle practices among adult patients with Non-Alcoholic Fatty Liver Diseases in a Tertiary Care Centre, Thiruvananthapuram. One group pre-test post-test study was conducted among 50 consecutively selected adult patients attending gastroenterology outpatient department. Pre-test knowledge and reported life style practices of the patients were assessed using structured questionnaire. The instructional module including video aid regarding Non-alcoholic fatty liver disease which lasted for 20 minutes was administered to participants. After the teaching session, patients were given an information booklet about prevention and management of non-alcoholic fatty liver disease. After four weeks, the post test was conducted to assess the effectiveness of teaching programme with multi component instructional module. The data were analysed using descriptive

and inferential statistics. The study revealed that mean knowledge score in pretest improved from  $45.9 \pm 13.5$  to  $66.12 \pm 12.29$  in the post test. The mean dietary practice score in pretest was 21.5(4.96). After intervention mean dietary practice score was 33.6 (5.05). The mean body weight of participants in the pretest was 72.2 kg (10.56) and it came down to 70.7 kg(10.31) during the post test. The mean score difference in knowledge, dietary practice, body weight, and physical activity before and after the administration of multicomponent instructional module was statistically significant at  $p < 0.001$ . It is evident from the study findings that the multicomponent instructional module was effective in improving the knowledge and life style practices of patients with Non-Alcoholic Fatty Liver Disease.

**Key words:** Effectiveness; Multicomponent instructional module; Knowledge; Lifestyle practices; Adult patients; Non-alcoholic fatty liver disease.

## INTRODUCTION

Non-Alcoholic Fatty Liver Disease (NAFLD) is a complex systemic disease

that is characterized by hepatic lipid accumulation, lipotoxicity, insulin resistance, gut dysbiosis and inflammation.<sup>1</sup> Non-alcoholic steatohepatitis (NASH) is part of the spectrum of non-alcoholic fatty liver disease that leads to progressive liver disease and presents a growing challenge to public health<sup>2</sup>. Non-alcoholic fatty liver disease is one of the leading causes of nonalcoholic steatohepatitis, cirrhosis, and hepatocellular carcinoma and is a major risk factor in hepatic insulin resistance and cardiovascular disease<sup>3</sup>. Approximately 26.2 million people are currently diagnosed with Non-Alcoholic Steatohepatitis (NASH), and the numbers are expected to rise by a drastic 63% by 2030.<sup>4</sup> Nonalcoholic fatty liver disease has been reported in all age groups, although the highest prevalence probably is between 40 and 60 years of age. NAFLD occurs with equal frequency in men and women. A recent meta-analysis showed that the pooled global prevalence of NAFLD is 29.8%.<sup>5</sup> In United States, the overall prevalence of NAFLD was 36.6% in 2015-2016 which was noted to increase with age from 21.7% among those 18-29 years old, 33.5% among those 30-44 years old, 38.6% among those 45-64 years old, and 47.6% among those  $\geq$  65 years old, equating to an estimated 87.0 million adults with NAFLD in the United States.<sup>6</sup>

Currently, the population prevalence of Non-Alcoholic Fatty Liver Disease in Asia is around 25%, like many Western countries. While hepatocellular carcinoma and end-stage liver disease secondary to NAFLD remain uncommon, a rising trend has emerged. Around 8-19% of Asians with body mass indexes less than 25kg/m<sup>2</sup> are also found to have NAFLD, a condition often described as "lean" or "non-obese" NAFLD.<sup>7</sup> In Saudi Arabia and UAE, the prevalence of Non-Alcoholic Fatty Liver Disease increased through 2030 parallel to projected increases in the prevalence of obesity and DM. Increases in NASH cases were relatively greater than the NAFLD cases due to aging of the population and

disease progression. Likewise, prevalent cases of compensated cirrhosis and advanced liver disease are projected to at least double by 2030, while annual incident liver deaths increase in both countries to 4800 deaths in Saudi Arabia and 140 deaths in UAE.<sup>8</sup>

India has become the first country to include Non-Alcoholic Fatty Liver Disease in national programme and launched the operational guidelines for integration of NAFLD with National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS).<sup>9</sup> The prevalence of NAFLD among the general population in India ranges from 9% to 53%.<sup>10</sup> In Haryana prevalence of non-alcoholic fatty liver in adult population in a rural community was 30.7%. Eleven out of 33 males (33.3%) had NAFLD and 43 out of 143 females (30.1%) had NAFLD. When only USG-diagnosed fatty liver was considered, 374.1% cases had mild fatty liver, 22.2% had moderate fatty liver, and only two out of 176 cases had severe fatty liver.<sup>11</sup> In Western India, the prevalence of NAFLD in children of normal weight is found to be 3-10% and in overweight and obese children, it is between 8-80%.<sup>12</sup>

Emerging data from one of the large population-based studies in Thiruvananthapuram, designed to examine the interaction between genetic and lifestyle factors and its hepatic manifestations, has shown the prevalence of NAFLD amongst the population to be a whopping 49.8%.<sup>13</sup> Incidence of Non-Alcoholic Fatty Liver Disease is increasing with rising levels of obesity, type 2 diabetes and the metabolic syndrome, and it is predicted to become the leading cause of cirrhosis requiring liver transplantation in the next decade.<sup>14</sup>

Non-alcoholic fatty liver disease is a potentially serious liver disease that affects approximately one-quarter of the global adult population, causing a substantial burden of ill health with wide-ranging social

and economic implications. Unlike other highly prevalent conditions, NAFLD has received little attention from the global public health community. Health system and public health responses to NAFLD have been weak and fragmented, and, despite its pervasiveness, it is largely unknown outside hepatology and gastroenterology. There is only a nascent global public health movement addressing NAFLD, and the disease is absent from nearly all national and international strategies and policies for non-communicable diseases, including obesity.

Although NAFLD is generally less severe than that in more obese patients, steatohepatitis and fibrotic disease are well recognized. Central adiposity, insulin resistance and weight gain are major risk factors, and genetic predisposition, such as the PNPLA3 polymorphism appears to be more important in the development of NAFLD in the non-obese population. Lifestyle modification remains the cornerstone of management for NAFLD, but many are unaware of these preventive measures.<sup>15</sup>

The largest cause of death among patients with NAFLD is cardiovascular disease followed by extrahepatic malignancies, whereas liver-related mortality is only the third cause of death. Extrahepatic complications of NAFLD include chronic kidney disease, extrahepatic malignancies (such as colorectal cancer), psychological dysfunction, gastroesophageal reflux disease, obstructive sleep apnea syndrome, periodontitis, hypothyroidism, growth hormone deficiency, and polycystic ovarian syndrome.<sup>16</sup>

A cross sectional survey was conducted in United States among 5000 residents to ascertain the awareness of NAFLD, its risk factors, prevention and treatment. Eighty-four percentage of participants stated that they were not aware of the conditions that can potentially NAFLD and 98% reported that their physicians did not have a

discussion regarding Non-Alcoholic Fatty Liver Disease.<sup>17</sup>

In Tamil Nadu a study was conducted among 100 people to know the attitude and awareness of predisposing factors of fatty liver disease through online survey method. 83% of people heard about fatty liver, 59% of people thought fatty liver diseases are hereditary, 67% were aware of fatty liver diseases occur in nonalcoholic people, 82% thought fatty liver diseases was curable, and 75% of people thought fatty liver disease caused serious health problems.<sup>18</sup>

NAFLD/NASH may be considered a cognitive-behavioral disease, the most effective management being lifestyle changes, with emphasis on diet and exercise.<sup>19</sup> Exercise is a foundational treatment for NAFLD; however, the majority of patients are unable to initiate and maintain effective exercise habits and remain at increased risk for progressive liver disease.<sup>20</sup> A qualitative enquiry was conducted to study the knowledge, attitude and behaviours related to NAFLD among 29 patients. Most patients were asymptomatic, diagnosed incidentally, and reported low level of concern regarding their diagnosis. The primary barriers and facilitators to health behaviour change were the presence of social support, competing medical comorbidities and low motivation to change behaviours.<sup>21</sup> Empirical evidences demonstrated that low awareness was a major barrier among adults with Non-Alcoholic Fatty Liver Disease for care and treatment. Therefore, it is important to continue to understand the level of awareness regarding NAFLD so that targeted interventions can be developed alongside the treatment evolution for Non-Alcoholic Fatty Liver Disease (NAFLD).

The researcher noted that the prevalence of NAFLD was very high and the general public knowledge about it was comparatively very poor. The lack of seriousness in their approach towards the disease and unwillingness to change behaviour were the major hurdles in the

success of NAFLD treatment<sup>22</sup>. By providing an educational intervention their knowledge NAFLD could be improved. More studies need to be conducted to have evidence-based intervention in this area and hence the study.

## **OBJECTIVES**

1. To assess the effectiveness of multi component instructional module on knowledge of adult patients with Non-alcoholic fatty liver disease (NAFLD).
2. To assess the effectiveness of multi component instructional module on life style practices among adult patients with Non-alcoholic fatty liver disease (NAFLD).

## **RESEARCH HYPOTHESES**

1. There is a significant difference between pre and posttest knowledge scores of patients regarding Non-Alcoholic Fatty Liver Disease (NAFLD) after the administration of multi component instructional module.
2. There is a significant difference between pre and posttest lifestyle practices among patients with Non-Alcoholic Fatty Liver Disease after the administration of multi component instructional module.

## **MATERIALS AND METHODS**

Quantitative research approach and one group pre-test post-test research design was adopted for the study among 50 adult patients attending gastroenterology OPD. Pre-test knowledge and reported life style practices of the patients were assessed using structured questionnaire. The instructional module was administered with the help of video aid regarding Non-alcoholic fatty liver disease which lasted for 20 minutes. After the teaching session, instructional booklet about prevention and management of non-alcoholic fatty liver disease was given to patients. After four weeks, the post test was conducted with the same

questionnaire for assessing the effectiveness of teaching programme with multi component instructional media. The data were analyzed using descriptive and inferential statistics including paired t test and McNamar's test.

## **RESULTS**

### **Socio demographic data**

Among the participants 32 % belonged to the age group between 46 and 55 years and 26% participants were aged >55 years. 52% of participants were females and 48 % were males. 66% of participants were Hindus and 22 % were Muslims. 36 % participants completed high school education and 24% of participants had higher secondary education. Ten percent participants had professional education and 14 % were post graduates. 56 % participants belonged to BPL category and 44% belonged to APL category. 44% of participants were unemployed and 20% were unskilled workers. 78% resided in rural area and 22% were from urban area. 8.99 % participants were married.

### **Clinical Data**

The mean body weight of participants was 72.2 kg with a standard deviation of 10.56. 14% had hypertension, 14% had diabetes mellitus, 12% participants had dyslipidemia and 4% had PCOD. 42% participants were on medicines for NAFLD. 90.5% participants were having good adherence to medicines for NAFLD. 100% participants did not have habit of smoking. 50% participants had 6-8 hours of sleep and 48% had sleep duration <6hrs. The duration of NAFLD was less than one year for 68% participants and 26% participants had an illness duration of 1-3 years. 50% participants were inactive, 30% were moderately inactive and 16% were moderately active with regard to their physical activity.

**Table 1. Effect of multicomponent instructional module on Knowledge of participants regarding NAFLD (n=50)**

Knowledge	Knowledge score		Paired difference		Paired t test	
	Mean	SD	Mean	SD	T	P
Pre test	45.9	13.57	20.22	9.96	0.71***	0.001
Post test	66.12	12.29				

\*\*\*P<0.001

The mean knowledge score in pretest was 45.9, with SD 13.5. After intervention mean knowledge score was 66.12, and SD was 12.29.

Since there is significant difference in mean knowledge score (mean difference =20.22) before and after intervention (p<0.001) it can be concluded that the multicomponent

instructional module is effective in improving the knowledge regarding prevention and management of NAFLD.

Life style practices studied were the dietary practice, control of bodyweight, improvement in physical activity, and medication adherence.

**Table 2. Effect of multicomponent instructional module on Dietary Practice of participants (n = 50)**

Dietary Practice	Practice score		Paired difference		Paired t	
	Mean	SD	Mean	SD	T	P
Pre test	21.5	4.96	12.08	4.6	0.58***	0.001
Post test	33.6	5.05				

\*\*\*P<0.001

Mean dietary practice score in pretest was 21.5 with a SD 4.96. After intervention mean dietary practice score was 33.6 with

SD 5.05. The mean score difference in practice score was 12.08 and it was statistically significant at p<0.001.

**Table 3. Effect of multicomponent interventional module on Body Weight of participants (n = 50)**

Body weight	Body weight(kg)		Paired difference		Paired t test	
	Mean	SD	Mean	SD	T	p
Pre test	72.2	10.56	1.5	1.18	8.98***	<0.001
Post test	70.7	10.31				

\*\*\*P<0.001

The mean body weight of participants in the pretest was 72.2 with a SD 10.56. After intervention mean dietary practice score was

70.7 with SD 10.31. The mean score difference in practice score was 1.5 and it was statistically significant at p<0.001.

**Table 4. Effect of multicomponent instructional module on Physical Activity (n = 50)**

Physical activity before intervention	After intervention				df	χ <sup>2</sup>	P
	Inactive		Active				
	f	%	f	%			
Inactive	16.0	32.0	24.0	48.0	1	24.0***	0.001
Active	0.0	0.0	10.0	20.0			

\*\*\*P<0.001

Out of 80 % participants who were inactive, 48% became active following the intervention. Ten participants who were active remained to be active after the intervention. The McNamar test determined

that there was a statistically significant difference in the proportion of physical activity pre and post-intervention at p<0.001 level. Hence it can be concluded that the

intervention was effective in improving the practice regarding physical activity.

**Table 5. Effect of multicomponent instructional module on Adherence to Medications (n = 21)**

Medication adherence before intervention	After intervention				df	$\chi^2$	P
	Good		Poor				
	f	%	f	%			
Good	19	90.5	0	0	1	2.0	0.157
Poor	2	9.5	0	0			

Among participants who were on medications for NAFLD, 90.5% had good medication adherence which improved to 100% after the administration of instructional module. McNamar test revealed that there was no statistically significant difference in the proportion of adherence to medication before and after the intervention ( $p>0.05$ ). Hence it can be concluded that the intervention was not effective in improving the medication adherence.

The mean score difference in dietary practice, body weight, and physical activity before and after the administration of multicomponent instructional module was statistically significant at  $p<0.001$ . Hence  $H_0$  is rejected and it was concluded that the multicomponent instructional module was effective in improving the life style practices of patients with NAFLD.

## DISCUSSION

The present study revealed that 52% of participants were females and 48% were males. This is in agreement with a study conducted to find the prevalence of non-alcoholic fatty liver in adult population in a rural community in Haryana, which found out that 33.3% males and 30.1% females had Non Alcoholic Fatty Liver Disease (NAFLD).<sup>23</sup>

The main objective of the study was to assess the effectiveness of multi component instructional module on knowledge of adult patients with NAFLD. The study result showed that mean knowledge score in pretest was 45.9, with SD 13.5. After intervention mean knowledge score was 66.12, and SD was 12.29. This finding is supported by a community-based study

conducted using a convergent parallel mixed-methods approach in Mexican-origin women regarding awareness, knowledge, perceptions, and information sources related to NAFLD which revealed low awareness regarding risk factors of liver disease.<sup>24</sup>

Another study was conducted among 29 patients with NAFLD to assess the disease knowledge, attitude and behaviour related to non-alcoholic fatty liver disease which reported that most patients were asymptomatic, diagnosed incidentally, and reported low level of concern regarding their diagnosis. Although patients were aware that lifestyle interventions were the primary therapy for NAFLD, there was a gap in knowledge about the condition which could be corrected with the help of multi component instructional modules.<sup>21</sup>

The present study found that mean knowledge score in pretest was 45.9, with SD 13.5. After intervention mean knowledge score was 66.12, and SD was 12.29. A similar study was conducted among 420 participants on awareness and knowledge on Non-alcoholic fatty liver disease in China as both the pre- and post-surveys. Only 31.2% had awareness of NAFLD, the median baseline knowledge score was 17 in participants with and 16 in those without a diagnosis of NAFLD. After the seminar, 30.9% of participants with and 50.8% without a diagnosis of NAFLD increased their knowledge score by  $\geq 3$  points.<sup>25</sup>

There was a significant difference in mean knowledge score (mean difference =20.22) before and after intervention ( $p<0.001$ ) in the present study and it concluded that the multicomponent instructional module was effective in improving the knowledge

regarding prevention and management of NAFLD. This finding is supported by a qualitative research conducted on the basis that NAFLD affect 70% of Type 2 Diabetes Mellitus patients (T2DM). It was estimated using semi-structured interviews with T2DM patients and the result outlined a low knowledge level in the above case. The study was concordant with the present study and pointed out the need for improving awareness of NAFLD among patients with NAFLD and comorbidities.<sup>26</sup>

In the present study there was statistically significant difference between pre-test and post test score after intervention. This is congruent with the qualitative systematic research study conducted on different data base regarding patient's perspective on NAFLD. The result revealed that there was a lack of sufficient communication between healthcare providers and patients with a distinct knowledge gap.<sup>27</sup> In another study conducted in United States, among 11,700 adults, awareness of liver disease among adults with NAFLD improved from 4.4% to 6.3%. Nearly 96% of adults with NAFLD in the United States were unaware they had liver disease, especially among young adults and non-Hispanic Blacks. Findings indicated the need to improve awareness of NAFLD.<sup>28</sup>

In the present study mean body weight of participants in the pretest was 72.2 with a SD 10.56. After intervention mean body weight score was 70.7 with SD 10.31. The mean score difference in practice score was 1.5 and it was statistically significant at  $p < 0.001$ . A similar report was obtained from a prospective study conducted in Cuba among 293 patients with histologically proven NASH and they were encouraged to adopt recommended lifestyle changes to reduce their weight over 52 weeks, from 2009 – 2013 in Cuba. At week fifty-two, 88 subjects (30%) had lost  $\geq 5\%$  of their weight.<sup>29</sup>

It was revealed from the present study that mean dietary practice score in pretest was 21.5 with a SD 4.96. After intervention mean dietary practice score was 33.6 with

SD 5.05. The mean score difference in practice score was 12.08 and it was statistically significant at  $p < 0.001$ . This study was strongly supported by a comparative study on 'One-Year Intense Nutritional Counselling Results in Histological Improvement in Patients with Non-Alcoholic Steatohepatitis conducted among 16 patients. At month 12, mean weight decreased from 98.3 to 95.4 kg. The findings suggested that dietary intervention can be effective in improving histology in patients with biopsy-proven NASH.<sup>30</sup>

Supportive findings were reported in another study conducted among 100 dieticians in 2019. The results displayed that less than half (45%) of the dieticians knew that non-alcoholic fatty liver disease was a serious disease that can progress to cirrhosis if left untreated. Only 3.6% of the dieticians did not consider non-alcoholic fatty liver disease a serious disease followed up their patients for  $>6$  months ( $P < 0.05$ ).<sup>31</sup>

In the present study out of 80 % participants with NAFLD who were inactive, 48% became active this study is supported by a study conducted on 'Breaking Down Barriers to Physical Activity in Patients with Non-alcoholic Fatty Liver Disease' among 87 subjects. Result showed that lack of exercise, resources and education from treating provider (47%) was one barrier. Better understanding of these barriers and behaviours were important to improve morbidity and mortality in NAFLD.<sup>32</sup>

It is revealed in the present study that the mean score difference in dietary practice, body weight, and physical activity before and after the administration of multicomponent instructional module was statistically significant at  $p < 0.001$  this study is supported by another quantitative study conducted among 101 patients with NAFLD on determinants of physical activity engagement in patients with nonalcoholic fatty liver disease. Lack of willpower, time, and energy were the most frequently cited barrier domains. Scores for lack of willpower (odds ratio [OR] = 1.445, 95% CI = 1.088–1.919) and lack of resources (OR =

1.378, 95% CI = 1.003–1.893), and reporting 3 or more “significant” barrier domains (OR = 5.348, 95% CI = 1.792–15.873) were significant predictors of physical activity levels.<sup>33</sup>

## CONCLUSION

Awareness regarding the prevention and management of NAFLD should be improved among general population through health education through mass media and outpatient departments of hospitals.

### Declaration by Authors

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## REFERENCES

1. Tilg H, Adolph TE, Dudek M, Knolle P. Non-alcoholic fatty liver disease: the interplay between metabolism, microbes and immunity. *Nat Metab.* 2021 Dec;3(12):1596–607
2. Fazel Y, Koenig AB, Sayiner M, Goodman ZD, Younossi ZM. Epidemiology and natural history of non-alcoholic fatty liver disease. *Metab - Clin Exp.* 2016 Aug 1;65(8):1017–25.
3. Anjum S, A T, Cp N, Mr S, Jayaram S, Nageshappa S, et al. Association of non-alcoholic fatty liver disease [Non Alcoholic Fatty Liver Disease (NAFLD)] and insulin resistance in type 2 diabetes. *RGUHS J Med Sci [Internet].* 2020 [cited 2022 Jul 20];10(1). Available from: <https://journalgrid.com/view/article/rjms/151>
4. What’s the deal: Liver disease NASH - MSC Nordics [Internet]. [cited 2022 Jul 19]. Available from: <https://mscnordics.com/whats-the-deal-liver-disease-nash/>
5. Michael H Lee et al. 2019 Global non alcoholic fatty liver disease (NAFLD) Prevalence: A Systematic Review and Meta-analysis, *Clinical Gastroenterology and Hepatology*, 2021
6. Alqahtani SA, Paik JM, Biswas R, Arshad T, Henry L, Younossi ZM. Poor Awareness of Liver Disease Among Adults With non alcoholic fatty liver disease (NAFLD) in the United States. *HepatoL Commun.* 2021;5(11):1833–47.
7. Fan JG, Kim SU, Wong VWS. New trends on obesity and non alcoholic fatty liver disease (NAFLD) in Asia. *J HepatoL.* 2017 Oct;67(4):862–73.
8. Alswat K, Aljumah AA, Sanai FM, Abaalkhail F, Alghamdi M, Hamoudi WKA, et al. Nonalcoholic fatty liver disease burden – Saudi Arabia and United Arab Emirates, 2017–2030. *Saudi J Gastroenterol.* 2018 Jan 7;24(4):211.
9. Directorate General of Health Services, MOHFW, Government of India. Operational Guideline for integration of Non Alcoholic Fatty Liver Disease (NAFLD) with NPCDCS. Available at <https://main.mohfw.gov.in/newshighlights-42>. Published 2021
10. Arka De ,Ajay Duseja Non Alcoholic Fatty Liver Disease Indian Perspective AASLD, 2021 September 10. 1002
11. Majumdar A, Misra P, Sharma S, Kant S, Krishnan A, Pandav CS. Prevalence of nonalcoholic fatty liver disease in an adult population in a rural community of Haryana, India. *Indian J Public Health.* 2016 Jan 1;60(1):26.
12. M, T NB, Piyush D. Non-alcoholic fatty liver disease in general paediatric population - associated factors and screening by Ultrasonography. *Int J Contemp Pediatr.* 2019 Oct 21;6(6):2438–43.
13. Chalmers J, Ban L, Leena KB, Edwards KL, Grove JL, Aithal GP, et al. Cohort profile: The Trivandrum non-alcoholic fatty liver disease (NAFLD) cohort. *BMJ Open.* 2019 May;9(5):e027244.
14. Maurice J, Manousou P. Non-alcoholic fatty liver disease. *Clin Med (Lond) [Internet].* 2018 Jun [cited 2024 Aug 2];18(3):245–50. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6334080/>
15. Lazarus JV, Mark HE, Anstee QM, Arab JP, Batterham RL, Castera L, et al. Advancing the global public health agenda for Non Alcoholic Fatty Liver Disease (NAFLD): a consensus statement. *Nat Rev Gastroenterol HepatoL.* 2022 Jan;19(1):60–78.
16. Ghevariya V, Sandar N, Patel K, Ghevariya N, Shah R, Aron J, et al. Knowing What’s Out There: Awareness of Non-Alcoholic



- Fatty Liver Disease. *Front Med (Lausanne)* [Internet]. 2014 Mar 24 [cited 2024 Aug 2];1:4. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4351614/>
17. Tomeno W, Imajo K, Takayanagi T, Ebisawa Y, Seita K, Takimoto T, et al. Complications of Non-Alcoholic Fatty Liver Disease in Extrahepatic Organs. *Diagnostics (Basel)* [Internet]. 2020 Nov 7 [cited 2024 Aug 2];10(11):912. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7695175/>
  18. Kaviya. L , Dr. M. P. Brundha and Dr.Preejitha.V.B, Knowledge, Awareness and Attitude of Predisposing Factors of Fatty Liver Among the General Population, *Biosc.Biotech.Res.Comm. Special Issue Vol 13 No 8 2020* Pp-65-71
  19. Macavei B, Baban A, Dumitrascu DL. Psychological factors associated with NAFLD/NASH- a systematic review
  20. Glass O, Liu D, Bechard E, Guy CD, Pendergast J, Mae Diehl A, et al. Perceptions of Exercise and Its Challenges in Patients With Nonalcoholic Fatty Liver Disease: A Survey-Based Study. *Hepatol Commun.* 2022 Feb;6(2):334–44.
  21. Tincopa MA, Wong J, Fetters M, Lok AS. Patient disease knowledge, attitudes and behaviours related to non-alcoholic fatty liver disease: a qualitative study. *BMJ Open* (2)34193468; PMID: PMC8246278.
  22. BSCOhost | 128101412 | Non Alcoholic Fatty Liver Disease: Problems in Perception and Solution. [Internet]. [cited 2022 Aug 16]. DOI :10.7860/JCDR/2018/34088.11076.
  23. Prashanth M, Ganesh HK, Vima MV, John M, Bandgar T, Joshi S, et al. Prevalence of Nonalcoholic fatty liver disease in patients with type 2 Diabetes Mellitus. *The Journal of the Association of Physicians of India.* 2009 Apr 1;57:205–10.
  24. Morrill KE, Crocker RM, Hingle MD, Thomson CA, Garcia DO. Awareness, Knowledge, and Misperceptions Related to Nonalcoholic Fatty Liver Disease in a Community Sample of Mexican-Origin Women: A Mixed Methods Study. *Frontiers in Public Health* [Internet]. 2021 [cited 2023 Oct 7];9. Available from: <https://www.frontiersin.org/articles/10.3389/fpubh.2021.626428>
  25. Wei Zhang, Samantha Chao, Anna S Lok, Awareness and knowledge of Non alcoholic fatty liver disease among office employees in Beijing, China, *Digestive diseases and sciences*,64,708-717
  26. Alemany-Pagès M, Moura-Ramos M, Araújo S, Macedo MP, Ribeiro RT, do Ó D, et al. Insights from qualitative research on NAFLD awareness with a cohort of T2DM patients: time to go public with insulin resistance? *BMC Public Health* [Internet]. 2020 Jul 20 [cited 2023 Oct 2];20(1):1142. Available from: <https://doi.org/10.1186/s12889-020-09249-5>
  27. Ng CH, Lim WH, Chin YH, Yong JN, Zeng RW, Chan KE, et al. Living in the non-alcoholic fatty liver disease silent epidemic: a qualitative systematic review of patients' perspectives. *Alimentary Pharmacology & Therapeutics* [Internet]. 2022 [cited 2023 Oct 2];56(4):570–9.
  28. Alqahtani SA, Paik JM, Biswas R, Arshad T, Henry L, Younossi ZM. Poor Awareness of Liver Disease Among Adults With NAFLD in the United States. *Hepatology Communications* [Internet]. 2021 [cited 2023 Oct 6];5(11):1833–47. Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1002/hep4.1765>
  29. Vilar-Gomez E, Martinez-Perez Y, Calzadilla-Bertot L, Torres-Gonzalez A, Gra-Oramas B, Gonzalez-Fabian L, et al. Weight Loss Through Lifestyle Modification Significantly Reduces Features of Nonalcoholic Steatohepatitis. *Gastroenterology* [Internet]. 2015 Aug 1 [cited 2023 Sep 28];149(2):367-378.e5. Available from: <https://www.sciencedirect.com/science/article/pii/S0016508515004965>
  30. Huang MA, Greenson JK, Chao C, Anderson L, Peterman D, Jacobson J, et al. One-Year Intense Nutritional Counseling Results in Histological Improvement in Patients with Non-Alcoholic Steatohepatitis: A Pilot Study. *Official journal of the American College of Gastroenterology | ACG* [Internet]. 2005 May [cited 2023 Oct 2];100(5):1072. Available from: [https://journals.lww.com/ajg/abstract/2005/05000/one\\_year\\_intense\\_nutritional\\_counseling\\_results\\_in.15.aspx](https://journals.lww.com/ajg/abstract/2005/05000/one_year_intense_nutritional_counseling_results_in.15.aspx)
  31. Stine JG, Soriano C, Schreiber I, Rivas G, Hummer B, Yoo E, et al. Breaking Down Barriers to Physical Activity in Patients with

- Nonalcoholic Fatty Liver Disease. *Dig Dis Sci* [Internet]. 2021 Oct 1 [cited 2023 Oct 2];66(10):3604–11. Available from: <https://doi.org/10.1007/s10620-020-06673-w>
32. Budak I, Güveli H. Awareness of Non-Alcoholic Fatty Liver Disease Among Dieticians. *Journal of Enterocolitis* [Internet]. 2023 [cited 2023 Oct 6];2(2):30. Available from: <https://jenterocolitis.org/article/29>
33. O’Gorman P, Monaghan A, McGrath M, Naimimohasses S, Gormley J, Norris S. Determinants of Physical Activity Engagement in Patients With Nonalcoholic Fatty Liver Disease: The Need for an Individualized Approach to Lifestyle Interventions. *Physical Therapy* [Internet]. 2021 Feb 1 [cited 2023 Oct 2];101(2):pzaa195. Available from: <https://doi.org/10.1093/ptj/pzaa195>
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