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Original Research

Impact of Diet and Lifestyle on the Prevalence of Non-Alcoholic Fatty Liver Disease (NAFLD)

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ABSTRACT

Introduction: Non-Alcoholic Fatty Liver Disease (NAFLD) is increasingly recognized as a significant public health concern, with diet and lifestyle factors playing a crucial role in its development. This study aims to assess the association between dietary habits, lifestyle factors, and the prevalence of NAFLD in a selected population.

Methodology: A cross-sectional study was conducted on 500 participants, utilizing a structured questionnaire that gathered data on demographic information, dietary habits, lifestyle factors, and health history. The chi-square test was employed using SPSS software to analyze the associations between these factors and the presence of NAFLD.

Results: Significant associations were found between the prevalence of NAFLD and high consumption of fried foods, sugary beverages, physical inactivity, and smoking. Additionally, a higher prevalence of NAFLD was observed in individuals with conditions such as diabetes, hypertension, hyperlipidemia, and hepatitis.

Discussion: The findings indicate that unhealthy dietary habits and sedentary lifestyles contribute to the risk of developing NAFLD. These results align with existing literature, reinforcing the need for targeted public health interventions. Conclusion: This study highlights the importance of dietary and lifestyle modifications in reducing the prevalence of NAFLD. Efforts to promote healthier eating and increased physical activity are essential in addressing this growing health issue.

Keywords: Non-Alcoholic Fatty liver disease (NAFLD); Dietary habits; Lifestyle factors; Physical activity; Cross-Sectional study public health

Introduction

NAFLD (Non-Alcoholic Fatty Liver disease) is an acquired metabolic disease induced by metabolic stress and characterized by fat deposition in the liver. It advances at different rates of progression among individuals but typically follows a four-stage course. The first stage involves hepatic fat deposition, also known as non-alcoholic fatty liver (NAFL). The second stage, marked by excessive hepatic fat deposition, occurs in approximately 7-30% of NAFLD patients and causes liver inflammation known as NASH. Persistent liver inflammation induces hepatic fibrous tissue formation; this stage is called fibrosis and is characterized by the activation of the hepatic stellate cells and the replacement of hepatocytes with fibrillar collagen and other extracellular matrix proteins which compromise hepatic function and structure. The last stage is cirrhosis, a severe stage of NAFLD during which hepatocytes are completely replaced by fibrosis, leading to liver failure[1,2].

Steatosis, ballooning, and lobular inflammation in liver biopsy are necessary for the primary histological features of non-alcoholic steatohepatitis (NASH); other histological changes include polymorphonuclear infiltrates, portal inflammation, apoptotic bodies, clear vacuolated nuclei, apoptosis, and megamitochondria[3]. The most common chronic liver disease worldwide is NAFLD[4]. Globally, the pooled prevalence of NAFLD is 25.24%, with significant regional heterogeneity. The Middle East and South American countries have reported the highest prevalence rates, which are primarily ultrasound-based, at over 30%. In contrast, the few studies from Africa report far lower prevalence rates, at around 13%[5]. However, the majority of research on the epidemiology of NAFLD has come from North America and the USA, where the prevalence of NAFLD is between 21 and 24.7%. Research that relied on blood indicators consistently found a lower prevalence than those that relied on imaging. Europe has a comparable frequency of NAFLD (24%), according to a meta-analysis of research released up until 2015[2]. 12.5-38% on the Chinese Mainland, 23-26% in Japan, 27% in Korea, 12-51% in Taiwan, 28% in Hong Kong, 9-32% in India, and 5-30% in other regions of South Asia and the Far East (Srilanka, Malayasia, Srilanka, and Indonesia) are among the variation. The so-called "lean NAFLD" or "Non-obese NAFLD," which accounts for about 10% of NAFLD cases and was first identified in Asian populations, is another facet of the epidemiology of NAFLD in Asia. It highlights Asians' extraordinary predisposition to develop MS-related clinical conditions at anthropometric parameters that are regarded as sub threshold for obesity. NAFLD in individuals who are considered "lean" also originates from an enlarged adipose tissue that defies traditional measurements but exhibits a comparable pattern of clinical consequences[6]. When compared to western nations, Asia and the Pacific region have seen a more noticeable increase in the prevalence of NAFLD throughout time, which is likely due to these regions' rapid and significant changes in[7].

There is a strong pathogenic correlation between obesity and NAFLD, since obese individuals have a higher prevalence of NAFLD and NAFLD subjects are nearly invariably fat. NAFLD is linked to the full range of obesity, from overweight to obese and extremely obese. In this situation, NAFLD will be present in the majority (>95%) of patients with extreme obesity receiving bariatric surgery[8]. Different degrees of insulin resistance are thought to be the primary cellular defect underlying type 2 diabetes and non-alcoholic fatty liver disease (NAFLD). Since that NAFLD affects more than 70% of patients with type 2 diabetic mellitus (T2DM), a strong correlation between the two conditions has been demonstrated. Even in people with normal blood ALT levels, hyperglycemia and insulin resistance are thought to be risk factors for more severe liver damage in nonalcoholic fatty liver disease (NAFLD). Not only is diabetes a common co-morbidity of NAFLD, but it also plays a role in the disease's natural history, contributing to increased inflammation (NASH), faster liver fibrosis progression, and the emergence of hepatocellular carcinoma[9]. With up to 20% of people having both NAFLD and T2DM experiencing clinically meaningful fibrosis, the burden of NAFLD appears to be very high given the vast number of T2DM patients globally. Although NAFLD is predisposed to by type 2 diabetes, the opposite is also true. After accounting for several lifestyle and metabolic factors, there is a two- to five-fold greater risk of developing type 2 diabetes in patients with ultrasonography-defined NAFLD. Significantly, the risk of developing type 2 diabetes was significantly reduced to a level comparable to those without nonalcoholic fatty liver disease (NAFLD) upon resolution of the fatty liver as determined by ultrasonography. T2DM NAFLD was significantly higher in those with worsening fatty liver throughout a 5-year period of time, according to this study[10]. Ageing is significantly associated with NAFLD, and one of the most reliable epidemiological factors for NAFLD, NASH, and fibrosis is getting older[11]. It is not as simple to determine how sex affects the occurrence and progression of NAFLD, though. The research that are now available are lopsided in terms of sex, with some showing a preponderance of females and others showing a male preponderance in the prevalence of NAFLD[12].

Because there are typically no symptoms in the early stages of NAFLD, it is referred to as the silent illness[13]. Patients with non-alcoholic fatty liver disease (NAFLD) have been shown to consume considerably more calories per day overall, but their total dietary composition differs just slightly from that of healthy controls[14]. Vegetable consumption was linked to a decreased risk of HCC, but not fruit consumption, according to a meta-analysis by Yang Y et al. The varying nutritional contents of fruits and vegetables may account for these disparate impacts. Fruits are higher in calories and antioxidants, including carotenoids and vitamins A, C, and E. Whether vegetables are good sources of phytochemicals (carotenoids, tocopherols, and folate) that have anti-tumor properties in a variety of disorders, in addition to dietary fibre and vitamins A and E also provide such[15]. One way to effectively lose weight is by food, either by alone or in combination with increased physical activity and behaviour modification. On the other hand, poor eating habits and nutritional imbalances are risk factors for obesity and metabolic syndrome in addition to being closely linked to the onset and course of NAFLD. Furthermore, for all NAFLD patients-obesity-free and those with it-a balanced diet offers advantages beyond helping them lose weight[16].

Objectives

To assess the association between dietary habits (such as the frequency of consuming fried foods, high-fat dairy products, fruits and vegetables and sugary beverages) and the prevalence of NAFLD.

To evaluate the relationship between lifestyle factors (such as physical activity levels and smoking status) and the risk of developing NAFLD.

To investigate the correlation between certain medical conditions (like diabetes, hypertension, and hyperlipidemia) and the presence of NAFLD.

To explore the demographic characteristics (age, gender) that may influence the risk of NAFLD in the population.

Methodology

Study Setting: This study was conducted in Saidu group of teaching hospital(SGTH) swat Khyber pakhtunkhwa Pakistan.

Study Design: This cross-sectional study was designed to explore the impact of diet and lifestyle on the prevalence of Non-Alcoholic Fatty Liver Disease (NAFLD). The study aims to assess the association between dietary habits, lifestyle factors, certain medical conditions, and the prevalence of NAFLD among a diverse population. The study was conducted using a self-administered questionnaire, which included sections on demographic information, dietary habits, lifestyle factors, and health history.

Study Population and Sample Size: The study was conducted on a sample of 500 participants, chosen to ensure a comprehensive analysis of the associations under investigation. A sample size of 500 was selected to allow for the generalization of the results across a broader population and to provide sufficient power for statistical analysis. The participants were selected from OPD of Saidu group of teaching hospital of various demographic groups to ensure diversity in age, gender, and other relevant characteristics.

Inclusion and Exclusion Criteria: Participants aged below 18 and above were included in the study. Individuals with pre-existing liver diseases other than NAFLD were excluded to avoid confounding factors that could affect the study's results. Participants were recruited through random sampling, with efforts made to ensure representation from different age groups, genders, and socio-economic backgrounds.

Data Collection

Data was collected using a structured questionnaire, which was divided into four sections: Demographic Information, Dietary Habits, Lifestyle Factors, and Health History. The questionnaire was designed to capture detailed information on the participants' diet, lifestyle, and medical history, which are critical in assessing the risk factors associated with NAFLD. The dietary habits section included questions on the frequency of consuming fried foods, high-fat dairy products, fruits, vegetables, and sugary beverages. The lifestyle factors section captured information on physical activity levels and smoking status, while the health history section inquired about medical conditions like diabetes, hypertension, and hyperlipidemia, as well as NAFLD diagnosis and liver function tests.

Data Analysis

The collected data was analyzed using the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics were used to summarize the demographic characteristics of the participants, as well as their dietary habits, lifestyle factors, and health history. The chi-square test was applied to examine the associations between dietary habits, lifestyle factors, medical conditions, and the prevalence of NAFLD. This statistical test was chosen because it is suitable for analyzing relationships between categorical variables, which are prevalent in this study. P value less than 0.05 was considered significant and above 0.05 was considered non-significant.

Ethical Considerations

Ethical approval was obtained from IREB Khyber medical college Peshawar prior to the commencement of the study. Informed consent was obtained from all participants, and confidentiality of the data was maintained throughout the study. Participants were informed of their right to withdraw from the study at any time without any consequences.

Results

The distribution of NAFLD cases across different age groups reveals significant variations in prevalence rates (**Table 1**). Among participants under 18, NAFLD was present in 16.6% of the 55 individuals, indicating a relatively lower occurrence in this age group (**Table 1**). However, the prevalence was markedly higher in the 18-24 age group, with 89.2% of the 112 participants affected by NAFLD. Similarly, the 45-54 age group showed a high prevalence of 93.6%, with 104 out of 111 participants diagnosed with the condition. In contrast, the 25-34 and 35-44 age groups had lower prevalence rates of 50.4% and 14.2%, respectively, despite having similar total participant numbers. The 55-64 age group also exhibited a significant prevalence rate of 72.2% among its 55 participants. These findings suggest that NAFLD prevalence varies considerably with age, with the highest rates observed in the 18-24 and 45-54 age groups.

Table 1: Distribution of NAFLD cases across different age groups.

Age group	NAFLD cases (n)	NAFLD prevalence %	Total participants (n)
Under 18	9	16.6%	55
18-24	100	89.2%	112
25-34	56	50.4%	111
35-44	8	14.2%	56
45-54	104	93.6%	111
55-64	40	72.2%	55

The distribution of NAFLD cases among gender indicates that the prevalence of the condition is slightly higher in females compared to males (**Table 2**). Among the 233 male participants, 125 were diagnosed with NAFLD, resulting in a prevalence rate of 53.6%. In contrast, out of 277 female participants, 167 were affected by NAFLD, leading to a prevalence rate of 60.2%. The chi-square test yielded a significant p-value of 0.001 for both genders, indicating a statistically significant difference in NAFLD prevalence between males and females. This suggests that gender may play a role in the susceptibility to NAFLD, with females being at a slightly higher risk in this study population (**Figure 1**).

Table 2: Distribution of NAFLD cases among gender.

Gender	NAFLD cases (n)	NAFLD prevalence %	Total participants (n)	P value
Male	125	53.6%	233	0.001
Female	167	60.2%	277	0.001

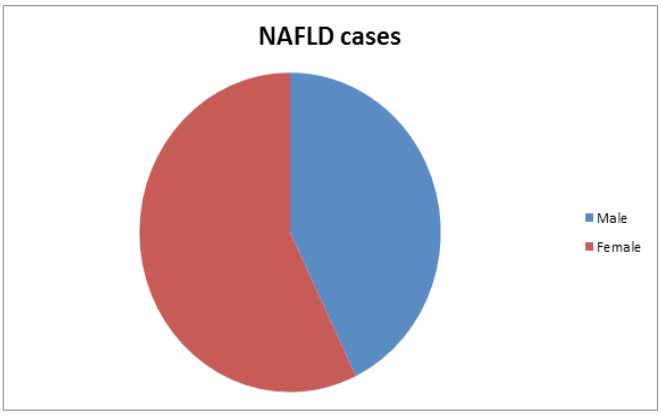

Figure 1: NAFLC Cases.

The association between the frequency of consuming fried foods and NAFLD prevalence demonstrates a clear trend (**Table 3**), where higher consumption of fried foods is significantly associated with increased NAFLD prevalence. Among participants who consumed fried foods daily, 89.6% (200 out of 223) were diagnosed with NAFLD, while only 10.4% did not have the condition. Similarly, those who consumed fried foods 2-3 times a week had a NAFLD prevalence of 71.6%, with 28.4% remaining unaffected. In contrast, participants who consumed fried foods once a week or less had much lower NAFLD prevalence rates, with only 7.4% of those eating fried foods once a week and 3.6% of those eating them less than once a week being diagnosed with the condition. The chi-square test produced a significant p-value of 0.001 for all consumption frequencies, indicating a strong and statistically significant association between the frequency of fried food consumption and the prevalence of NAFLD. This suggests that frequent consumption of fried foods is a significant risk factor for developing NAFLD (**Figure 2**).

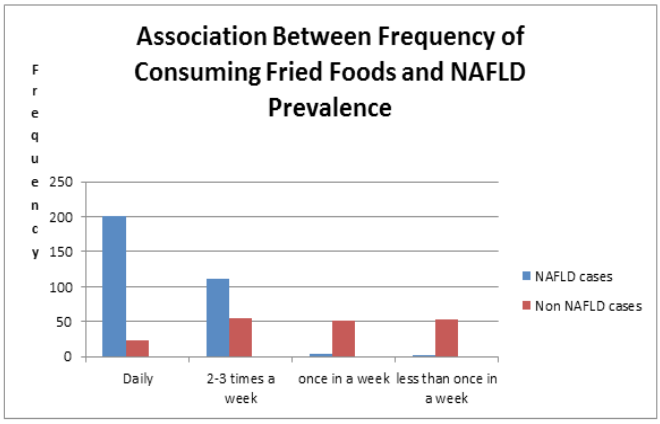

Figure 2: Association between the frequency of consuming fried foods and NAFLD prevalence.

The association between the frequency of consuming high-fat dairy products and NAFLD prevalence indicates a significant correlation, with higher consumption linked to a greater prevalence of NAFLD (**Table 4**). Among participants who consumed high-fat dairy products daily, 76.2% (212 out of 278) were diagnosed with NAFLD, while 23.8% did not have the condition. Those who consumed these products 2-3 times a week had an even higher NAFLD prevalence of 81%, with 19% unaffected. In contrast, participants who consumed high-fat dairy products less frequently, such as once a week or less, had much lower NAFLD prevalence rates. Specifically, 16% of those consuming these products once a week and 27.2% of those consuming them less than once a week were diagnosed with NAFLD. The chi-square test revealed a significant p-value of 0.001 across all frequencies of consumption, indicating a statistically significant association between the intake of high-fat dairy products and the prevalence of NAFLD. These findings suggest that frequent consumption of high-fat dairy products is a considerable risk factor for developing NAFLD (**Figure 3**).

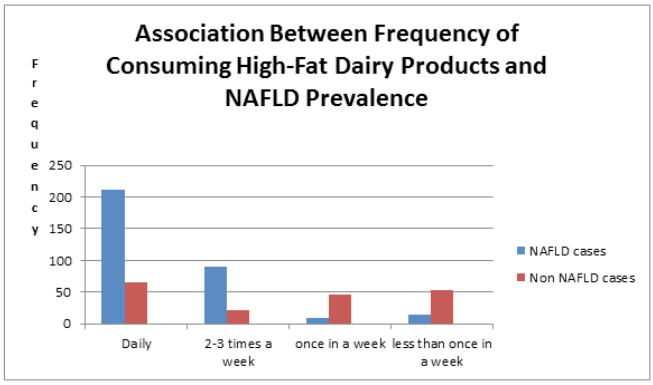

Figure 3: Association between the frequency of consuming high-fat dairy products and NAFLD prevalence.

The association between the frequency of consuming fruits and vegetables and NAFLD prevalence highlights a significant inverse relationship (**Table 5**). Among participants who consumed fruits and vegetables daily, only 33.5% (56 out of 167) were diagnosed with NAFLD, while a majority of 66.5% did not have the condition. Conversely, those who consumed fruits and vegetables only once a week showed a much higher NAFLD prevalence of 83.4%, with only 16.6% of participants remaining unaffected. The chi-square test produced a significant p-value of 0.001, indicating a strong and statistically significant association between lower frequency of fruit and vegetable consumption and higher NAFLD prevalence. These findings suggest that regular consumption of fruits and vegetables may be protective against the development of NAFLD.

The association between physical activity levels and NAFLD prevalence reveals a significant inverse relationship (**Table 6**), where lower levels of physical activity are associated with higher NAFLD prevalence. Among participants who reported no physical activity, 89.6% (200 out of 223) were diagnosed with NAFLD, while only 10.4% were not affected. Those engaging in less than 1 hour of physical activity per week had a NAFLD prevalence of 71.4%, with 28.6% remaining unaffected. In contrast, participants who engaged in 1-2 hours and 3-4 hours of physical activity per week had much lower NAFLD prevalence rates of 31.8% and 27.9%, respectively. The majority in these groups did not have NAFLD, with non-NAFLD prevalence rates of 68.2% and 72.1%, respectively. The chi-square test yielded a significant p-value of 0.001 across all physical activity levels, indicating a statistically significant association between higher levels of physical activity and a reduced risk of NAFLD. These findings suggest that regular physical activity plays a protective role against the development of NAFLD (**Figure 4**).

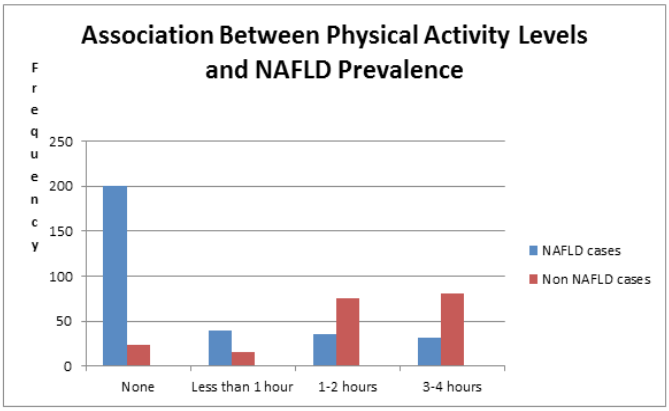

Figure 4: Association Between Physical Activity Levels and NAFLD Prevalence.

Table 3: Association Between Frequency of Consuming Fried Foods and NAFLD Prevalence.

Frequency of Consuming Fried Foods	NAFLD cases(n)	NAFLD prevalence %	Non NAFLD cases (n)	Non NAFLD prevalence %	Total participants (n)	P value
Daily	200	89.6%	23	10.4%	223	0.001
2-3 times a week	111	71.6%	55	28.4%	155	0.001
Once a week	4	7.4%	52	92.6%	56	0.001
Less than once a week	2	3.6%	53	96.4%	55	0.001

Table 4: Association Between Frequency of Consuming High-Fat Dairy Products and NAFLD Prevalence

Frequency of Consuming High-fat dairy products (e.g., full-fat milk, cheese):	NAFLD cases(n)	NAFLD prevalence%	Non NAFLD cases (n)	Non NAFLD prevalence %	Total participants (n)	P value
Daily	212	76.2%	66	23.8%	278	0.001
2-3 times a week	90	81%	21	19%	111	0.001
Once a week	9	16%	47	84%	56	0.001
Less than once a week	15	27.2	40	72.8%	55	0.001

Table 5: Association Between Frequency of Consuming Fruits and Vegetables and NAFLD Prevalence.

Frequency of Consuming Fruits and Vegetables	NAFLD cases(n)	NAFLD prevalence%	Non NAFLD cases(n)	Non NAFLD prevalence%	Total participants(n)	P value
Daily	56	33.5%	111	66.5%	167	0.001
Once a week	278	83.4%	55	16.6%	333	0.001

Table 6: Association Between Physical Activity Levels and NAFLD Prevalence.

Physical Activity (hrs)	NAFLD cases (n)	NAFLD prevalence%	Non NAFLD cases (n)	Non NAFLD prevalence%	Total participants (n)	P value
None	200	89.6%	23	10.4%	223	0.001
Less than 1 hour	40	71.4%	16	28.6%	56	0.001
1-2 hours	35	31.8%	75	68.2%	110	0.001
3-4 hours	31	27.9%	80	72.1%	111	0.001

The association between the frequency of consuming sugary beverages and NAFLD prevalence shows a significant positive correlation (**Table 7**), where higher consumption of sugary beverages is linked to an increased prevalence of NAFLD. Among participants who consumed sugary beverages daily, 83.8% (140 out of 167) were diagnosed with NAFLD, while only 16.2% were not affected. Those who consumed sugary beverages 2-3 times a week had a NAFLD prevalence of 60.2%, with 39.8% remaining unaffected. In contrast, participants who consumed sugary beverages once a week or less showed much lower NAFLD prevalence rates, with 30.3% of those consuming them once a week and 27% of those consuming them less than once a week being diagnosed with the condition. The chi-square test yielded a significant p-value of 0.001 across all consumption frequencies, indicating a strong and statistically significant association between the intake of sugary beverages and the prevalence of NAFLD. These findings suggest that frequent consumption of sugary beverages is a considerable risk factor for developing NAFLD.

The association between smoking status and NAFLD prevalence indicates a clear pattern where smoking is associated with higher NAFLD prevalence (**Table 8**). Among participants who smoked daily, 89.2% (100 out of 112) were diagnosed with NAFLD, while only 10.8% were not affected. Those who smoked occasionally had a NAFLD prevalence of 58%, with 42% remaining unaffected. In contrast, non-smokers had a much lower NAFLD prevalence of 25.2%, with 74.8% not having the condition. The chi-square test revealed a significant p-value of 0.001 for all smoking statuses, highlighting a strong and statistically significant

association between smoking and the prevalence of NAFLD. These results suggest that smoking is a significant risk factor for NAFLD, with daily smoking particularly associated with a high prevalence of the condition (**Figure 5**).

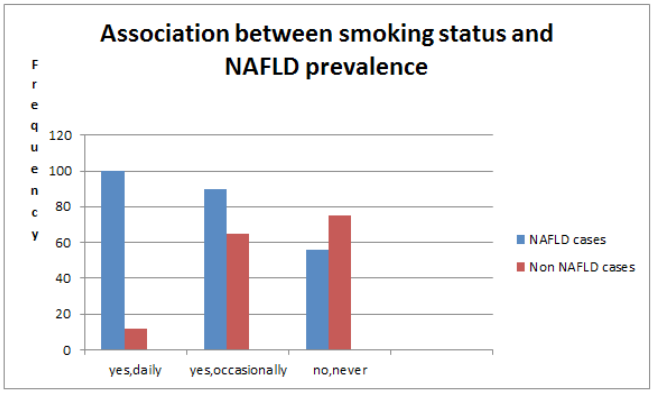

Figure 5: Association between smoking status and NAFLD prevalence.

The prevalence of NAFLD among patients with various medical conditions shows a significant association with each condition. Among patients with diabetes, 72.7% (40 out of 55) were diagnosed with NAFLD, while 27.3% were not affected. Similarly, 82.2% of those with hypertension (46 out of 56) had NAFLD, compared to 17.8% without the condition. For patients with hyperlipidemia, the prevalence of NAFLD was notably high at 88.3%, with only 11.7% remaining unaffected. In individuals with hepatitis, 74.5% (41 out of 55) had NAFLD, whereas 25.5% did not. In contrast, among participants with no other diseases, the prevalence of NAFLD was significantly lower at 33.7% (56 out of 166), with 66.3% being free of the condition. The chi-square test yielded a significant p-value of 0.001 for all conditions, indicating strong and statistically significant associations between these medical conditions and the prevalence of NAFLD. These findings suggest that diabetes, hypertension, hyperlipidemia, and hepatitis are substantial risk factors for NAFLD (**Table 9**).

Discusion

A study was done showing that Emerging evidence underscores the critical role of diet and specific nutrients in influencing the pathophysiology of NAFLD. High-calorie diets, rich in saturated fatty acids (SFA), cholesterol, and sugary beverages, are known to exacerbate hepatic lipid accumulation and advance the progression to Non-Alcoholic Steatohepatitis (NASH). Conversely, interventions that reduce caloric intake, enhance consumption of soy protein and whey, and incorporate supplements such as monounsaturated fatty acids (MUFA), omega-3 fatty acids, and probiotics have demonstrated preventive and therapeutic benefits. Sustainable weight loss through lifestyle modifications, including caloric restriction (whether low in carbohydrates or fats), is identified as the most effective strategy for managing NAFLD. Moreover, a balanced dietary pattern, along with specific nutrients, offers additional advantages beyond mere weight reduction[17]. In comparison, our study highlights similar trends, showing that dietary habits like high consumption of fried foods and sugary beverages are strongly associated with NAFLD prevalence. Our findings align with the broader literature, suggesting that dietary choices and lifestyle interventions play a pivotal role in NAFLD management and prevention.

Table 7: Association Between Frequency of Consuming Sugary Beverages and NAFLD Prevalence.

Frequency of Consuming Sugary Beverages and NAFLD Prevalence	N A F L D cases (n)	NAFLD prevalence %	Non NAFLD cases (n)	Non NAFLD prevalence %	Total participants (n)	P value
Daily	140	83.8%	27	16.2%	167	0.001
2-3 times a week	100	60.2%	66	39.8%	166	0.001
Once a week	17	30.3%	39	69.7%	56	0.001
Less than once a week	30	27%	81	73%	111	0.001

Table 8: Association between smoking status and NAFLD prevalence.

Smoking status	NAFLD cases (n)	NAFLD prevalence %	Non NAFLD cases (n)	Non NAFLD prevalence%	Total participants(n)	P value
Yes, daily	100	89.2%	12	10.8%	112	0.001
Yes, occasionally	90	58%	65	42%	155	0.001
No, never	56	25.2%	155	74.%	222	0.001
Total	246		232		500	

Table 9: Prevalence of NAFLD in Patients with Diabetes, Hypertension, and Hyperlipidemia.

Medical condition	NAFLD cases (n)	NAFLD prevalence %	Non NAFLD cases (n)	Non NAFLD prevalence %	Total participants (n)	P value
Diabetes	40	72.7%	15	27.3%	55	0.001
Hypertension	46	82.2%	10	17.8%	56	0.001
Hyperlipidemia	99	88.3%	13	11.7%	112	0.001
Hepatitis	41	74.5%	14	25.5%	55	0.001
No other diseases	56	33.7%	166	66.3%	22	0.001

Another study was done showing that Lifestyle changes, including adopting a healthy diet and engaging in regular physical activity, are crucial for managing NAFLD. Aiming for a 7-10% weight loss and maintaining it is a key goal for NAFLD patients. Reducing caloric intake, improving the balance of macronutrients, and increasing physical activity can independently contribute to halting disease progression. Adherence to dietary recommendations is vital for sustainable weight loss, necessitating high-quality,

practical dietary interventions for NAFLD. High consumption of carbohydrates, simple sugars, saturated fats, trans fats, red meat, and processed foods, coupled with low fiber intake, is linked to the development of NAFLD[18]. In our study, the findings resonate with these principles. For instance, daily consumption of high-fat dairy products and sugary beverages was associated with a high prevalence of NAFLD, with prevalence rates reaching 76.2% and 83.8%, respectively. Conversely, a lower NAFLD prevalence was observed among participants with higher fruit and vegetable intake and increased physical activity. These results underscore the importance of dietary adherence and physical activity in managing NAFLD, aligning with broader recommendations for lifestyle modifications.

In the study, NAFLD patients were more likely to be smokers, have a lower physical activity level, and be married, with significantly higher BMI and socioeconomic status (SES) compared to healthy participants ($P < 0.05$). Their diets were characterized by higher intakes of energy, red and processed meat, sugar-sweetened beverages, and trans fats, while they had lower vegetable intake and scored lower on the Alternative Healthy Eating Index (AHEI) and Healthy Lifestyle Score (HLS) ($P < 0.05$)[19]. In comparison, my study found that the prevalence of NAFLD was highest among individuals aged 18-24 (89.2%) and 45-54 (93.6%), with significant associations observed between NAFLD and frequent consumption of fried foods (daily: 89.6%), high-fat dairy products (daily: 76.2%), and sugary beverages (daily: 83.8%). Smoking, particularly daily smoking, was strongly associated with NAFLD (89.2%), as were lower levels of physical activity (none: 89.6%) and the presence of comorbid conditions such as hyperlipidemia (88.3%) and hypertension (82.2%). These findings are consistent with the referenced study, emprisk of NAFLD. Additionally, lifestyle factors like physical inactivity and smoking further exacerbate this risk, particularly among individuals with pre-existing conditions such as diabetes, hypertension, hyperlipidemia, and hepatitis.

The strong associations observed between these modifiable factors and the prevalence of NAFLD emphasize the urgent need for public health initiatives aimed at promoting healthier eating patterns and more active lifestyles. Educating the population about the risks associated with poor dietary choices and sedentary behavior, along with providing accessible resources for making healthier lifestyle changes, could significantly reduce the burden of NAFLD.

Moreover, the findings suggest that targeted interventions in populations with a high prevalence of comorbid conditions could be particularly effective in mitigating the risk of NAFLD. These results not only add to the growing body of evidence linking diet and lifestyle to liver health but also highlight the importance of early detection and prevention strategies.

In conclusion, addressing the modifiable risk factors identified in this study could play a crucial role in reducing the prevalence of NAFLD, thereby improving overall public health outcomes. Future research should continue to explore these associations in more diverse populations and consider longitudinal studies to better understand the causal relationships between diet, lifestyle, and NAFLD.

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