DOI: https://doi.org/10.54393/pjhs.v4i05.773

PAKISTAN JOURNAL OF HEALTH SCIENCES

https://thejas.com.pk/index.php/pjhs

Volume 4, Issue 5 (May 2023)

Original Article

Assessment of Risk Factors for Non-Alcoholic Fatty Liver Disease (NAFLD)

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ARTICLE INFO

Key Words:
Non-Alcoholic Fatty Liver Disease (NAFLD), Smoking, Hypertension, Obesity

How to Cite:
Hussain, Z. ., Rind, M. A., Nazir, M. ., & Saleem, M. (2023). Assessment of Risk Factors for Non-Alcoholic Fatty Liver Disease (NAFLD): Assessment of Risk Factors for NAFLD. Pakistan Journal of Health Sciences, 4(05). https://doi.org/10.54393/pjhs.v4i05.773

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Received Date: 8th May, 2023
Acceptance Date: 28th May, 2023
Published Date: 31st May, 2023

ABSTRACT

The most frequent cause of chronic liver disease globally is non-alcoholic fatty liver disease (NAFLD). Potential risk factors for NAFLD have not received enough attention in Pakistan even though NAFLD has received substantial research. **Objective:** To assess risk factors for Non-alcoholic fatty liver disease. This study was conducted at the Department of Medicine Liaquat University, Hospital Jamshoro from 7th September 2020 to 6th March 2021. **Methods:** This research was cross-sectional. The study recruited a total of 195 patients via nonprobability sequential sampling. The ultrasound of all the patients was done by a sonologist for detecting NAFLD. **Results:** The stratification of NAFLD according to smoking, hypertension, obesity, hyperlipidaemia, uncontrolled diabetes mellitus, vitamin D deficiency was done. The statistical significance was observed for NAFLD in accordance with smoking, (p=0.00), hypertension (p=0.04), obesity (p=0.04), hyperlipidaemia (p=0.03), uncontrolled diabetes mellitus (p=0.04), vitamin D deficiency(p=0.04). **Conclusions:** This study has shown that the percentage of NAFLD was highest in age group (40-49 years). Males were more affected as compared to females. Smokers, hypertensives, hyperlipidemics and diabetics were more prone to develop NAFLD.

INTRODUCTION

Non-alcoholic steatohepatitis (NASH) and fatty liver are two of the liver issues that are a part of non-alcoholic fatty liver disease (NAFLD) [1]. According to the literature, chronic liver disease (CLD), hepatocellular cancer, and liver transplantation have all been significantly attributed to NAFLD. NAFLD is linked to an increased risk of cardiovascular disease, type 2 diabetes, and chronic renal disease [2]. Patients with NAFLD have been found to exhibit metabolic syndrome symptoms. The leading risk factor for NAFLD has emerged to be type 2 diabetes mellitus [3]. The increased insulin resistance and compensatory hyperinsulinemia associated with type 2 diabetes mellitus and NAFLD might be the cause of this association. Worldwide pervasiveness of NAFLD in the public is around 15-30%, but 70% to 80 % incidence has been reported in the patients of obesity or T2DM [4]. This finding exhibits a link between type 2 diabetes mellitus and NAFLD, proposing that type 2 diabetes mellitus and NAFLD has identical pathologic mechanism [5]. Also, the corresponding presence of T2DM and NAFLD worsens insulin resistance, favors the advancement of dyslipidemia and makes ideal glycemic control challenging to accomplish, consequently creating major unfriendly cardiovascular events [6]. Transabdominal ultrasounds examine (US) is a generally involved indicative methodology for NAFLD due its free accessibility, high responsiveness,

DOI: https://doi.org/10.54393/pjhs.v4i05.773

minimal expense, and harmless nature contrasted with the gold standard histological evaluation which is restricted being used due to obtrusive nature and related confusions. Albeit, the advancing incidence of T2DM and obesity is linked with the rising frequency of NAFLD, the elements ensnared for this high pervasiveness of NAFLD up in diabetics is just inadequately studied [5]. Due to the difference between Asians and Caucasians in the total and circulation of muscle to fat ratio, Insulin resistance is more likely to be inherited in Asian cultures [7]. In Pakistan, where individuals with T2DM are not routinely evaluated for NAFLD, extremely few exams are conducted in this manner. In research conducted in an emergency clinic, NAFLD predominated (47%), and among 26 diabetic patients, NAFLD and NASH recurred (75% and 22.5%, respectively)[8]. In a study by Taseer *et al.*, individuals with T2DM had a 51% recurrence of NAFLD. 78.7% of individuals with type 2 diabetes had NAFLD recurrence, according to another analysis [9]. The goal of this evaluation was to determine if NAFLD has returned in our Type-2 diabetic patients and to investigate the many clinical and research facility limits associated with the existence of NAFLD in T2DM patients. Significant information on the prevalence of NAFLD among diabetics was also be provided. however, also determined its foreseeable risk factors, reinforcing the necessity of immediate action and critical management.

METHODS

From 7th September 2020 to 6th March 2021, this cross-sectional research was undertaken at the Department of Medicine Liaquat University, Hospital Jamshoro. Using nonprobability consecutive sampling, for this study, 195 patients in total were enrolled. The known cases of diabetes mellitus for ≥ 3-year duration and age of 30-60 years and either gender were included in the study. While known cases of type 1 diabetes mellitus, gestational diabetes and hypothyroidism were excluded from this study. The research also excluded individuals who had taken corticosteroids, low dosage oestrogen (0.3 mg conjugated oestrogen) in the previous year, as well as those who were actively receiving medication therapy for obesity. Informed consent was taken from all patients. The ultrasound of all the patients was done by a sonologist having ≥5 years experience in sonography for detecting NAFLD. The lead researcher carried out all the tasks (history taking, physical examination, sampling, and data collecting), and the data were gathered using a pre-designed proforma. The researcher also carried the whole financial burden of the study. The study was pertinent and focused on its goal, and appropriate exclusion criteria were applied to manage any bias or confounding. whereas the effect modifiers and other explanatory variables were age, gender, and residence (urban or rural), duration of diabetes mellitus and haemoglobin A1C (HBA1c), hypertension, smoking, obesity (BMI), hyperlipidaemia, low AST to ALT ratio, low platelet count, un-controlled diabetic mellitus, vitamin D deficiency and hypomagnesemia also explored. Data analysis: The data of all patients were analysed in SPSS version-21.00. The frequency and percentage were calculated for gender and residence (urban or rural), hypertension, smoking, obesity (BMI), hyperlipidaemia, low AST to ALT ratio, low platelet count, un-controlled diabetic mellitus and NAFLD. Quantitative variables such as age, duration of diabetes mellitus and haemoglobin A1C (HBA1c) were estimated using the mean and standard deviation (SD). The stratification was done for age, gender, and residence (urban or rural), hypertension, smoking, obesity (BMI), hyperlipidaemia, low AST to ALT ratio, low platelet count, un-controlled diabetic mellitus, vitamin D deficiency and hypomagnesemia and residence to see the effect on outcome and to control the effect modifiers.

RESULTS

The demographical parameters of the study population are shown in Table 1.

Table 1: The demographical parameters of study population

Parameter	Frequency (N=195)
Age (years)	
30-39	39(20)
40-49	98(50.3)
50-60	58(29.7)
Gender	
Male	112(57.4)
Female	83(42.6)
Residence	
Urban	100(51.3)
Rural	95(48.7)

While the mean ± SD for age (years), duration of diabetes mellitus, body mass index (kg/m^2) and HbA1c in Table 2.

Table 2: Quantitative variables of the study population

Quantitative variables	Mean ± SD
Age (years)	58.61 ± 8.83
Duration of diabetes mellitus (years)	10.92 ± 4.65
Body mass index - BMI (kg/m2)	32.65 ± 3.96
Haemoglobin A1c - HbA1c (%)	12.96 ± 4.53

The stratification of NAFLD according to smoking, hypertension, obesity, hyperlipidaemia, uncontrolled diabetes mellitus, vitamin D deficiency is presented in Table 3. The statistical significance was observed for NAFLD in accordance with smoking, (p=0.00), hypertension (p=0.04), obesity (p=0.04), hyperlipidaemia (p=0.03), uncontrolled diabetes mellitus (p=0.04), vitamin D deficiency (p=0.04).

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Table 3: Analysis of risk factors associated with NAFLD

Risk factors	NAFLD		p-value
	Yes	No	
Smokers	79(65.8%)	17(22.7%)	0.00
Non-smokers	41(34.2%)	58(77.3%)	
Hypertensives	77(64.2%)	37(49.3%)	0.04
Non-hypertensives	43(35.8%)	38(50.7%)	
Obese	74(61.7%)	35(46.7%)	0.04
Non-obese	46(38.3%)	40(53.3%)	
Hyperlipidemic	79(65.8%)	38(50.7%)	0.03
Non-hyperlipidemic	41(34.2%)	37(49.3%)	
Uncontrolled DM	78(65.0%)	38(50.7%)	0.04
Controlled DM	42(35.0%)	37(49.3%)	
Vitamin D deficient	75(62.5%)	36(48.0%)	0.04
Vitamin D non-deficient	45(37.2%)	39(52.0%)	

DISCUSSION

NAFLD is a common liver disorder. In obese and diabetic patients, it is most commonly observed. In Western industrialised nations, NAFLD is is becoming increasingly prevalent [10]. The ideal diagnostic procedure is the one that examine for signs of liver damage or inflammation. The liver is sampled for the detection of NAFLD and associated diseases, liver biopsies can be quite useful. The results can include anything from triglyceride droplet deposition to to more severe types of non-alcoholic steatohepatitis (NASH) in the hepatocyte. The aforementioned lipid droplets in hepatocytes, together with concurrent inflammation and varying degrees of hepatic fibrosis, are the typical characteristics of NASH. The majority of people with liver steatosis have 'non-progressive' illness; however, a tiny percentage of these people also have the previously stated NASH, which can result in liver failure and even hepatocellular cancer [11]. In several studies, different prevalence rates have been reported. The incidence of NAFLD has been detected to be 29% in the recently conducted Japanese study on healthy individuals [12]. This figure has been reported as 20% by a study carried out in Italy. NAFLD incidence is 20% in the general population of the United States [13]. The frequency of NAFLD was reported to be 60.8% in a study conducted by Luxmi *et al.*, in 120 diabetic patients in Karachi, Pakistan [14]. NAFLD is estimated to impact 10-39% of the world's population, with a 20 percent incidence rate on average [15]. The frequency is still likely to be understated, although it is the second-most frequent diagnosis after chronic viral hepatitis [16]. A decrease in the percentage of patients advancing to cirrhosis can be achieved by early identification of the risk factors for NAFLD and proper therapy of those variables. NAFLD risk factors may include cigarette smoking as a major risk factor. In our study, there has been an increase in the incidence of NAFLD in smokers when compared with non-smokers. Masashi *et al.*, conducted a on 7905 patients in Japan and found similar link between smoking and NAFLD [17]. The incidence of NAFLD in hypertensive and non-hypertensive individuals was also assessed in this study. The results suggest that the probability of NAFLD is increased in hypertensives when compared with non-hypertensives. A recent study, published in February 2023, has shown similar results which support the results of our study [18]. Although frequently reported in patients with NAFLD, hypertension has not been identified as a separate risk factor, as was also discovered in this study [19]. Obesity is one of the notable risk factors for NAFLD. According to results of this study, the chances of NAFLD are greater in obese people when compared to non-obese people. The results of the study conducted by Elisa *et al.*, have also shown the association of obesity with NAFLD [20]. Hyperlipidaemia is one of the metabolic disorders which have very close relation with NAFLD. The results of our study support the fact that hyperlipidemic individuals, when compared with non-hyperlipidemic individuals, are more prone to develop NAFLD [21]. Another important metabolic disorder very closely associated with NAFLD, is diabetes mellitus. No matter one's BMI, type 2 diabetes mellitus significantly raises both the risk and severity of NAFLD [22]. According to Jimba *et al.*, study, those with normal fasting glucose had a prevalence of 27% for NAFLD; those with impaired fasting glycaemia had a prevalence of 43%; and those with newly diagnosed diabetes had a prevalence of 62% for NAFLD [11]. The results of our study, show that the incidence of NAFLD is greater in the individuals with uncontrolled diabetes when compared with individuals with controlled diabetes. Several scientific studies have shown that NAFLD patients have lower levels of vitamin D. It is believed that deficiency of vitamin D may contribute to the incidence of NAFLD [23]. In our study, it is observed that A strong correlation exists between decreased levels of vitamin D and an increased prevalence of NAFLD. The metabolic syndrome is characterised by low HDL cholesterol and elevated blood triglycerides. In the Gupte *et al.*, research, individuals with moderate NASH had mean cholesterol levels that were greater than those with mild NASH. [24]. Hyperlipidaemia is seen in NAFLD with a frequency of 21-60%. Obese, diabetic, and female individuals were more likely to have these dyslipidaemias. NAFLD risk was observed to be higher in hypertriglyceridemia than hypercholesterolemia. Approximately one-third of NAFLD patients have the complete syndrome. The majority of NAFLD patients have at least one metabolic syndrome feature [25]. The chance of developing NAFLD increases with both the quantity and severity of metabolic risk factors.

CONCLUSIONS

This study has shown that the percentage of NAFLD was

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highest in age group (40-49 years). Males were more affected as compared to females. Smokers, hypertensives, hyperlipidemics and diabetics were more prone to develop NAFLD.

Authors Contribution

Conceptualization: ZA, MAR
Methodology: ZA
Formal Analysis: ZA, MAR, MN
Writing-review and editing: MS, MN, MAR

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

Acknowledgment

The authors would like to acknowledge the Medical Affairs Department of Getz Pharma for their technical support and assistance in the publication process.

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