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Original Research Article

Risk Factors for Nonalcoholic Fatty Liver Disease in Patients Presenting to Medical Unit of Secondary Healthcare Facility

Shah Zaib Alam Khan*, Arif Mumtaz

Department of Internal Medicine, DHQ TH KDA KOHAT, Pakistan
**Corresponding author`s email address: Shahzaibalam333@gmail.com*

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Abstract: *Non-alcoholic fatty liver disease (NAFLD) is increasingly prevalent and drives substantial metabolic and cardiovascular morbidity. Early recognition of context-specific risk factors is crucial, especially in secondary-care settings with high patient throughput.*. ***Objective:*** *To determine the risk factors for nonalcoholic fatty liver disease in patients presenting to the medical unit of a secondary healthcare facility.* ***Methodology:*** *Two hundred thirty patients aged 25 to 70 years diagnosed with NAFLD based on clinical symptoms such as jaundice, dark urine and itchy skin along with ultrasonographic findings were enrolled. Patients with other liver diseases were excluded. Data on demographics and risk factors were obtained. Risk factors assessed in our study were diabetes, hypertension, obesity and thyroid dysfunction. SPSS 27 was utilized for analysis.* ***Results:*** *The mean age of our 230 patients was 48.13±13.31 years with mean BMI 29.18±2.53 kg/m². The study population was mostly male (58.7%). A majority of patients were from lower and middle socioeconomic background (39.1% and 41.3% respectively). Regarding the risk factors diabetes was 56.1% and hypertension 52.2%, followed by obesity 40.9% and thyroid dysfunction 12.6%. Statistical analysis showed that diabetes and hypertension were associated with older age groups. Thyroid dysfunction showed a potential association with female gender and lower socioeconomic status.* ***Conclusion:*** *Diabetes, hypertension, obesity and thyroid dysfunction are the leading risk factors for NAFLD. Associations were found for diabetes and hypertension with increasing age, while thyroid dysfunction showed an association with female gender.*

Keywords: Nonalcoholic Fatty Liver Disease, Diabetes Mellitus, Hypertension, Obesity, Thyroid Dysfunction

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Introduction

Non-Alcoholic Fatty Liver Disease (NAFLD) is a widespread chronic liver condition around the world. Hepatic steatosis is described as the accumulation of fat within liver cells, occurring irrespective of excessive alcohol consumption or additional established secondary causes. NAFLD has been identified as an important threat to public health today. NAFLD refers to various liver conditions, including simple steatosis, fibrosis, cirrhosis, and malignancy (1–3). Initially, it was regarded as a benign disorder that rarely advances to chronic liver disease; however, it progresses to liver fibrosis and cirrhosis, resulting in associated health complications. The incidence of NAFLD globally is 25.24% among the adult population (4). The estimated incidence of NAFLD within Asia is 29.6% (5). The main risk factors that trigger NAFLD include dyslipidemia, hypertension, and diabetes mellitus (6).

Risk factors involve thyroid disorders that lead to malfunctions of the thyroid gland, resulting in various conditions that influence metabolism and overall health (7). Diabetes contributes to NAFLD, a chronic metabolic disorder with an intricate and diverse etiology—elevated levels of glucose result from fluctuations in insulin secretion and insulin action (8). Hypertension, a further contributor to NAFLD, is defined by increased blood pressure levels, which commonly adversely affect cardiovascular health (9). Obesity substantially contributes to the development of NAFLD, a complicated medical condition that involves excessive body fat buildup, which poses serious health hazards and difficulties globally (10). A study determined risk factors for patients with NAFLD were diabetes 48.6%, obesity 42.9%, hypertension 22.9%, and thyroid dysfunction 5.7% (11).

NAFLD has become a widespread and significant health concern worldwide. This disease indicates different levels of liver damage and inflammation, with the possibility of advancing to severe stages that present significant health risks, such as liver failure and cancer. This study aims to identify the risk factors for nonalcoholic fatty liver disease in patients presenting to the medical unit of a secondary healthcare facility, addressing the lack of regional literature on the subject. This study's findings will assist medical professionals in identifying the various risk factors linked to NAFLD, which is essential for developing targeted prevention strategies, early interventions, and personalized management approaches.

Methodology

A cross-sectional study was conducted in the Department of General Medicine at DHQ Teaching Hospital, KDA, in Kohat. Ethical approval was obtained from the hospital. Duration for the study was [12-07-2024—12-01-2025]. Two hundred thirty patients were enrolled using consecutive non-probability sampling. The sample was calculated based on the previous frequency of thyroid dysfunction in NAFLD patients (5.7%[11]), a margin of error of 3%, and a confidence level of 95%. The study consisted of patients of both genders aged between 25 and 70 years diagnosed with nonalcoholic fatty liver disease (NAFLD). The diagnosis was based on the presence of jaundice, dark urine, and itchy skin, confirmed by ultrasonographic findings that included bright hepatic echoes, increased hepatorenal echogenicity, and vascular blurring of the portal vein. Patients with a history of recent hepatotoxic medication exposure, metabolic liver diseases, or biliary tract disorders were excluded from participation.

Data collection was conducted after taking consent from the patients. A structured proforma was used for taking Demographic details like age, gender, body mass index (BMI), education status, occupation, socioeconomic status, and place of residence. We assessed the patients for risk factors like diabetes mellitus, hypertension, obesity, and thyroid dysfunction. Diabetes was identified in patients reporting frequent thirst, excessive urination, and fatigue. It was confirmed by a fasting blood sugar

level equal to or exceeding 126 mg/dl, an HbA1c level of 6.5% or higher, or a patient's use of anti-diabetic medications for the last five years. Hypertension was defined by the presence of complaints such as fatigue, blurry vision, or headache, along with a systolic blood pressure of 140 mmHg or higher, a diastolic blood pressure of 90 mmHg or higher, or a known history of taking antihypertensive drugs for at least three years. Obesity was determined by a Body Mass Index (BMI) calculation, with a value greater than 30 kg/m² classified as obese. Thyroid dysfunction was assessed in patients presenting with tiredness, weight gain, and difficulty sleeping. It was confirmed biochemically by a serum TSH level either greater than 4.5 mU/L (indicating hypothyroidism) or less than 0.4 mU/L (indicating hyperthyroidism). The entire evaluation process was supervised by a consultant having a minimum of five years of post-fellowship experience.

SPSS 27 was used for analysis. Numerical demographics were calculated using mean and SD. Categorical demographics and risk factors were assessed using frequency and percentage. Chi-Square test was used for the stratification of risk factors with demographics, keeping significance at $P \leq 0.05$.

Results

Our study had 230 patients with NAFLD. Their mean age was 48.13 ± 13.31 years. Their mean body mass index (BMI) was 29.18 ± 2.53 kg/m². Regarding demographic characteristics, we observed that 135 (58.7%) were male patients and 95 (41.3%) were female patients. Socioeconomic status distribution showed that 90 patients (39.1%) were from the lower class, 95 (41.3%) were from the middle class, and 45 (19.6%) were from the upper class. The education status revealed that 122 patients (53.0%) were illiterate. In terms of residence, 129 patients (56.1%) lived in urban areas and 101 (43.9%) in rural settings (Table 1).

Analysis of common risk factors indicated that diabetes was present in 129 patients (56.1%) and hypertension was found in 120 patients (52.2%). Obesity was identified in 94 patients (40.9%). Thyroid dysfunction was reported in 29 patients (12.6%). (Table 2). Association of risk factors with demographics is shown in Table 3.

Table 1: Demographics

Demographics of NAFLD patients		Frequency	Percentage
Gender	Male	135	58.7%
	Female	95	41.3%
Socioeconomic status	Lower class	90	39.1%
	Middle class	95	41.3%
	Upper class	45	19.6%
Education status	Literate	108	47.0%
	Illiterate	122	53.0%
Place of living	Rural	101	43.9%
	Urban	129	56.1%
Occupation status	Employed	112	48.7%
	Unemployed	118	51.3%

Table 2: Frequency of risk factors of NAFLD

Risk factors for NAFLD		Frequency	Percentage
Diabetes	Yes	129	56.1%
	No	101	43.9%
Hypertension	Yes	120	52.2%
	No	110	47.8%
Obesity	Yes	94	40.9%
	No	136	59.1%
Thyroid dysfunction	Yes	29	12.6%
	No	201	87.4%

Table 3: Association of risk factors with demographics

Demographics		Diabetes		HTN		Obesity		Thyroid dysfunction	
		Yes	No	Yes	No	Yes	No	Yes	No
		%	%	%	%	%	%	%	%
Age distribution (Years)	25 to 40	3.9	68.3	2.5	64.5	29.8	33.8	48.3	29.9
	41 to 55	37.2	26.7	32.5	32.7	29.8	34.6	34.5	32.3
	> 55	58.9	5.0	65.0	2.7	40.4	31.6	17.2	37.8
P value		P < 0.05		P < 0.05		P > 0.05		P > 0.05	
BMI (Kg/m^2)	18.5 to 24.9	6.2	4.0	5.0	5.5	0.0	8.8	3.4	5.5
	25 to 29.9	52.7	54.5	50.8	56.4	0.0	90.4	48.3	54.2
	>= 30	41.1	41.6	44.2	38.2	100.0	0.7	48.3	40.3
P value		P > 0.05		P > 0.05		P < 0.05		P > 0.05	
Gender	Male	62.0	54.5	61.7	55.5	57.4	59.6	20.7	64.2
	Female	38.0	45.5	38.3	44.5	42.6	40.4	79.3	35.8
P value		P > 0.05		P > 0.05		P > 0.05		P < 0.05	
SES	Lower class	42.6	34.7	44.2	33.6	38.3	39.7	41.4	38.8
	Middle class	37.2	46.5	37.5	45.5	44.7	39.0	24.1	43.8
	Upper class	20.2	18.8	18.3	20.9	17.0	21.3	34.5	17.4

P value		P > 0.05		P > 0.05		P > 0.05		P < 0.05	
Education status	Literate	48.1	45.5	50.8	42.7	53.2	42.6	62.1	44.8
	Illiterate	51.9	54.5	49.2	57.3	46.8	57.4	37.9	55.2
P value		P > 0.05		P > 0.05		P > 0.05		P > 0.05	
Place of living	Rural	45.0	42.6	45.8	41.8	45.7	42.6	55.2	42.3
	Urban	55.0	57.4	54.2	58.2	54.3	57.4	44.8	57.7
P value		P > 0.05		P > 0.05		P > 0.05		P > 0.05	
Occupation status	Employed	49.6	47.5	48.3	49.1	45.7	50.7	48.3	48.8
	Unemployed	50.4	52.5	51.7	50.9	54.3	49.3	51.7	51.2
P value		P > 0.05		P > 0.05		P > 0.05		P > 0.05	

Discussion

The most central finding of our study is the demographic profile of the NAFLD patient. Our patients' mean age of 48.13 years situates it within a critical risk period identified across multiple studies. This aligns closely with the work of Wang et al., who identified a cut-off age of 46.5 years for increased NAFLD risk in their study. Wang et al., in their logistic regression model, calculated a 2.9% increase in NAFLD risk with each additional year of age, firmly establishing aging as a key risk multiplier (12). Similarly, Hussain et al. reported the highest burden of NAFLD in the 40-49 year age group (13). This consistency underscores middle age as a critical life stage for the development and clinical recognition of NAFLD, likely driven by the cumulative impact of metabolic stressors over time.

Furthermore, our finding of a male majority (58.7%) is a consistent theme in the literature. Hussain et al. similarly reported that 57.4% of their study population was male and concluded that males were more affected by the study's findings. This pattern was also evident in the study by Ali et al., where a higher proportion of males were found in the moderate-to-severe NAFLD categories (13,14). The review by Huh et al. provides a pathophysiological basis for this, explaining that pre-menopausal women benefit from the protective effects of estrogen (15).

The prevalence of diabetes (56.1%) and hypertension (52.2%) in our patients is consistent with reports from other studies. Hussain et al. found that 65.0% of their NAFLD patients had uncontrolled diabetes and 64.2% were hypertensive (13). Our finding that both diabetes and hypertension were notably associated with older age groups supports the concept of NAFLD as a progressive, age-related metabolic disorder.

The mean BMI of 29.19 kg/m² in our study classifies the average patient as overweight, bordering on obese. This is a critical risk factor, with Ali et al. demonstrating that a greater BMI was a prevailing predictor of NAFLD in diabetic patients (14). Huh et al. reported that NAFLD prevalence can be as high as 50-90% among obese individuals (15).

A notable and unique finding is the significant association of thyroid dysfunction with female gender and lower socioeconomic status. A study reported that in female patients with NAFLD, the TSH levels were notably higher (16). A study conducted in Pakistan reported that among the patients of NAFLD, the prevalence of hypothyroidism was notably higher in females (17).

Our study confirms that the NAFLD population shares a typical profile of a middle-aged, predominantly male gender, burdened by the classic triad of obesity, diabetes, and hypertension. We suggest that these modifiable risk factors must be addressed through community-based programs and through social media campaigns. Physicians must play their role in appropriately counselling middle-aged patients presenting with symptoms related to NAFLD.

Conclusion

In conclusion, our study found that diabetes, hypertension, obesity, and thyroid dysfunction are the leading risk factors for NAFLD. Notable associations were found for diabetes and hypertension with increasing age, while thyroid dysfunction showed an association with female gender.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRB)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

SZAK (Postgraduate Resident)
Manuscript drafting, Study Design,
Review of Literature, Data entry, Data analysis, and drafting an article.
AM (Associate Professor)
Supervision, Conception of Study, Development of Research Methodology Design, Study Design, manuscript review, and critical input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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