Prevalence Of Fatty Liver Disease And Associated Factors Among Outpatients At Muhas Academic Medical Centre,tanzania

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Abstract

Background: Fatty liver disease has become an important cause of chronic liver disease and an alarming public health problem. Several studies around the globe have revealed the prevalence of fatty liver disease to range between 10% and 63.5%. In recent times, fatty liver disease has gained global prominence because of its associated increased risk of end-stage liver disease, liver failure and hepatocellular carcinoma. In general, patients with fatty liver disease have increased all-cause mortality and liver-related mortality compared to the general population thus its prevention, diagnosis, and management is crucial in any given population. There is limited information regarding fatty liver disease in a Tanzanian population.

Methods: A cross-sectional study conducted from June 2018 to November 2018 at MUHAS Academic Medical Centre – Dar es Salaam, Tanzania. Consenting patients attending internal medicine clinics were interviewed, examined and investigated. Socio-demographic information, clinical, laboratory, and assessment of awareness about fatty liver disease parameters were gathered during the interviews. Fatty liver disease was identified with ultrasound imaging. Continuous variables were compared with the use of student's t-test and categorical data with the use of chi-squared test. To assess for associated factors, we performed logistic regression analyses, $p<0.05$ was used to denote significance.

Results: A total of 432 outpatients were enrolled. The prevalence of fatty liver disease was 13.9%. Independent associated factors of fatty liver disease were the male gender, having diabetes mellitus, waist circumference >99M/80F, high total cholesterol >220mg/dl, high triglycerides >170mg/dl, and low HDL < 40mg/dl.

Conclusion: Fatty liver disease is not uncommon among outpatients in Tanzania. Factors that were associated with fatty liver disease in this current setting were similar to the ones reported in several other settings around the globe. Strategies to improve health education are vital. Early diagnosis and timely management of fatty liver disease will certainly improve the quality of life and its expectancy at large.

Key words: Fatty liver disease, NAFLD, Tanzania

Background

Fatty liver disease is a spectrum of clinical and pathological conditions characterized by excessive (>5%) lipid (mainly triglycerides) deposition in the liver parenchyma regardless of any cause of hepatic diseases such as viral hepatitis, alcohol consumption and metabolic diseases (1–3). It is associated with a myriad of non-hepatic consequences including increased risk of cardiovascular disease, coronary artery disease, and peripheral vascular disease (4–6). Non-alcoholic fatty liver disease (NAFLD), is the most common cause of fatty liver, with a prevalence as high as 30% in many populations (7). We aimed to explore the prevalence and associated factors for FLD in an outpatient population in Tanzania, which is vital in implementing preventative measures among high risk population and awareness to the general population.

Methods

From June 2018 up to November 2018, a cross sectional study aimed at finding the prevalence of FLD was done. Using a systematic sampling, 432 participants aged 18 years and above were recruited from internal medicine clinics at MAMC, a tertiary hospital in Dar es Salaam, Tanzania. Socio-demographic, clinical and laboratory data were gathered during outpatient visits.

Fatty liver was diagnosed via abdominal ultrasound using a 4—5.5 MHz transducer Phillips GE (Voluson P8) machine and graded as

1. Mild, increase in fine echoes in liver parenchyma with normal visualization of diaphragm and intrahepatic vessel borders;
2. Moderate, increase in fine echoes with slightly impaired visualization of intrahepatic vessels and diaphragm;
3. Marked, increase in fine echoes with poor or nonvisualization of the intrahepatic vessel borders, diaphragm, and posterior right lobe of the liver.(8,9)

Statistical Analysis

SPSS v.20 software was utilized for both data entry and analysis. We compared categorical variables using Pearson chi-square tests; Student's t-test was used in comparison of continuous variables. To assess for associated factors for fatty liver disease, we performed logistic regression analyses. The multivariate models were fitted with baseline covariates associated with fatty liver disease by bivariate analysis at the <0.05 significance level. Crude and adjusted odds ratios with 95% confidence intervals and p-values were reported. All tests were 2-sided, and $p<0.05$ was used to denote statistical significance.

Results

Descriptive Findings

A total of 432 outpatients participated in the study, of which 199(46.1%) were male and 233(53.9%) female. The participants' mean (SD) age was 52.6±16.6 years old. Age ranged from 18–97 years old. Majority of the patients were in the age group ≥45 years old 295 (68.3%). Most of participants in this study lived in the urban area 379(87.7%), 330(76.4%) were married, 408(94.4%) had formal education, and 343(79.4%) were ever employed (currently employed plus retired). Among the participants 77 had DM, 125 had HTN, 23 had HIV and 161 had history of medication use within the past 12 months (NRTIs, CCB, and ASA). The mean (SD) BMI and waist circumference of the participants were 27.3±5.3 kg/m² and 95.8±14.8 cm respectively, table 1.

The prevalence of fatty liver disease

Out of the total sample, the prevalence of fatty liver disease among outpatients attending internal medicine clinics at MAMC was found to be 13.9% (60/432). The prevalence in male gender was 17.6% (35/199) and in females, 10.7% (25/233) figure 1.

In regards to grades, 38 participants had grade 1 (63.3%), 19 presented with grade 2 (31.7%), and 3 were grade 3 (5.0%), figure 2.

Determination of the associated factors for fatty liver disease

In a logistic regression model of 19 potential associated factors for FLD, 10 factors including Male gender, age ≥45 years, BMI>25, waist circumference >94M/80F, history of medication use, DM, high total cholesterol, high triglycerides and low HDL showed significance during bivariate analysis, table 2.

However, during multivariate logistic regression analysis of the 10 factors which showed significance during bivariate analysis just 6 remained independent associated factors, table 3.

For instance males had a 2.6 increased likelihood of having FLD compared to females, (OR 2.6, 95% CI 1.2–5.5, p = 0.02). Participants with diabetes mellitus displayed a 10 times risk of FLD compared to their diabetes free counterparts, (OR 10, 95% CI 5.0–21.3, p<0.001). Abdominal obesity was associated with a 3 fold increase in FLD, (OR 3.0, 95% CI 1.1–7.6, p = 0.03). Participants with elevated cholesterol had about 5 times increased chance of FLD compared to ones with normal cholesterol levels, (OR 4.9, 95% CI 2.2–10.7, p<0.001). Low HDL and high triglycerides were associated with 4 fold and a 2 fold increased likelihood of FLD respectively, (OR 4.3, 95% CI 2.1–8.9, p<0.001; OR 2.2, 95% CI 1.0–4.7, p = 0.04), table 3. Overall, during this analysis diabetes mellitus was found to be the strongest associated factor for FLD.

Discussion

To our knowledge, this study represents the first study on the prevalence of fatty liver disease in Tanzania. In this present study 13.9% of adults attending internal medicine clinics at the MUHAS Academic Medical Centre had fatty liver disease. Several studies have revealed variable rates of fatty liver disease. These variations are highly attributed to differences in characteristics of populations studied, their specifics and methods of assessing FLD. For instance, a Nigerian study by Asabamaka et al which involved 150 outpatients attending endocrine clinic revealed a prevalence of 8.7%, slightly lower than our present findings(10). In unison to our findings, a Chinese study which had over 9000 participants found prevalence of 12.5% of fatty liver disease in the general population(11). On the contrary, majority of studies have produced relatively higher rates of fatty liver disease in various populations. For example, study by Olusanya et al revealed a fatty liver prevalence of 16.7% in a diabetes sub population(2). Similarly, a study in Malaysian general population found a prevalence of 22.7%(12). Moreover, an Italian study by Bellentani et al involving nearly 7000 people from the general population published a fatty liver rate of 58.3%(13).

Several factors ranging from genetics to lifestyle have been attributed to FLD. In our study, male gender, overweight, increased waist circumference, diabetes mellitus, high total cholesterol, low HDL and high triglycerides were found to be independent associated factors for fatty liver disease. This observation was echoed by several studies within the literature. For instance, in an Asian community based study by Goh et al there was a preponderance of FLD in males, subjects with FLD were older, had higher BMIs and larger waist circumferences(14). Another study by Browning et al from a multiethnic population based sample showed men to have FLD more than women, obesity and insulin resistance were also associated risk factors(15). Several other Asian studies showed similar findings in associated factors of FLD, like a study by Fu et al obesity, increased waist circumference and high triglycerides were associated with FLD in adolescents(16). Likewise, a study by Liao et al had the male gender, high triglycerides, high cholesterol, hyperglycemia, with an addition of old age, hypertension and hyperuricemia as associated risk factors for FLD(17). In addition, a study by Li et al revealed male gender, obesity, diabetes mellitus, high triglycerides, high cholesterol, low HDL, increased age, hypertension, high LDL and ALT abnormalities to have a strong association with FLD(11). A population based study done in Iran by Amirkalali et al interestingly had the female gender as associated factor for FLD, other factors were high waist circumference, overweight, old age, diabetes mellitus, dyslipidemia and abnormal liver enzymes(18).

Findings from this study have made known epidemiological data of FLD among outpatients in Tanzania and its potential importance in public health. Our study has also revealed several associated risk factors of FLD, which opens room for the policy makers and clinicians in preventive medicine to tackle on these problems before they become unbearable. The limitation of the study could be a possibility of performance and observer bias of ultrasound as all patients were screen and diagnosed via ultrasound, although we did try our best to mitigate this by having our ultrasound images being confirmed by a senior radiologist.

Conclusions

Fatty Liver Disease is not uncommon in an outpatient population of Tanzania. Factors that were associated with FLD in this current setting were similar to the ones reported in several other settings around the globe. In view of this, to aid in prevention of FLD via provision of health education on risk factors and outcomes of unmanaged FLD are vital especially in this era where NCDs are blooming. Early detection and timely management through implementation of screening for high-risk individuals should be adopted by policy makers.

List Of Abbreviations

AASLD - American Association for the Study of Liver Diseases

AFLD - Alcoholic Fatty Liver Disease

ALT - Alanine Aminotransferase

AST - Aspartate Aminotransferase

BMI - Body Mass Index

CTC - Care and Treatment Clinic

FLD - Fatty Liver Disease

HBsAg - Hepatitis B surface antigen

Hep CAb - Hepatitis C antibodies

HDL - High Density Lipoprotein

HIV - Human Immunodeficiency Virus

HS - Hepatic Steatosis

MAMC - MUHAS Academic Medical Centre

MUHAS - Muhimbili University of Health and Allied Sciences

NAFLD - Non- Alcoholic fatty Liver Disease

USS - Ultrasound Sonography

Declarations

Ethics and Consent to participate

Ethical approval for this study was given by the Directorate of Research and Publications of the Muhimbili University of Health and Allied Sciences, this authority has the jurisdiction and is an appropriate body to provide ethical approval. Permission to conduct the study was granted by the MUHAS Academic Medical Center. All the participants provided written informed consent.

Consent for publication

Written consent for publication of personal and clinical data was sought from all study participants during the recruitment process.

Availability of Data and Materials

A soft copy of the study material will be available through the MUHAS Repository.

The corresponding author will be more than willing to email the data set to the editorial committee whenever it's needed.

Competing interests

The authors have no conflict of interest to declare.

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Authors' contributions

NN, PP, EK, and FM conceived the study. NN conducted all the interviews, physical examinations, data entry and analysis. The corresponding author wrote the first draft of the manuscript, and other authors contributed to and approved it. All the authors made the decision to submit the manuscript for publication. All the authors assume responsibility for the accuracy and integrity of the analysis.

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Tables

Table 1: Socio-demographic and Clinico-laboratory correlates of study population N=432

Characteristic		All patients (n=432)	FLD 60	NO FLD 372	P- value
Demographics					
Age, mean (SD), years		52.6 (16.6)	57.9 (11.9)	51.8 (17.1)	0.008
Age groups					
<45 (%)		137 (31.7)	8 (13.3)	129 (34.7)	
≥45 (%)		295 (68.3)	52 (86.7)	243 (65.3)	0.001
Gender	Male (%)	199 (46.1)	35 (58.3)	164 (44.1)	0.050
	Female (%)	233 (53.9)	25 (41.7)	208 (55.9)	
Marital status: Married (%)		330 (76.4)	47 (78.3)	283 (76.1)	0.870
Residency: Urban (%)		379 (87.7)	54 (90.0)	325 (87.4)	0.675
Level of education: Formal Education (%)		408 (94.4)	58 (96.7)	350 (94.1)	0.555
Job: Ever Employed (%)		343 (79.4)	44 (73.3)	299 (80.4)	0.229
Alcohol intake: Significant (%)		130 (30.1)	21 (35.0)	109 (29.3)	0.367
Exercise: ≥days /week (%)		227 (52.5)	32 (53.3)	195 (52.4)	1.000
Anthropometrics, mean (SD)					
BMI		27.3 (5.3)	29.1 (5.5)	27.0 (5.2)	0.019
Waist Circumference		95.8 (14.8)	100.2 (13.7)	95.0 (14.8)	0.013
Mid arm muscle circumference		23.0 (3.8)	24.1 (3.8)	22.9 (3.8)	0.040
Laboratory investigations, mean (SD)					
AST		25.1 (23.3)	26.6 (15.7)	24.9 (24.3)	0.405
ALT		23.3 (19.0)	23.9 (12.0)	23.3 (20.0)	0.859
Serum Albumin		4.3 (0.7)	4.4 (0.6)	4.3 (0.7)	0.698
Total Cholesterol		188.8 (70.0)	256.3 (134.6)	178.0 (44.2)	<0.001

HDL	45.9 (13.6)	38.8 (16.1)	47.1 (12.8)	<0.001
Triglycerides	150.7(228.5)	272.3 (572.0)	131.1 (76.3)	<0.001
Co morbidities				
DM (%)	77 (17.8)	37 (61.7)	40 (10.8)	<0.001
HTN (%)	125 (28.9)	27 (45.0)	98 (26.3)	0.005
HIV (%)	23 (5.3)	4 (6.7)	19 (5.1)	0.543
Hepatitis B (%)	11 (2.5)	2 (3.3)	9 (2.4)	0.655
Hepatitis C (%)	2 (0.5)	1 (1.7)	1 (0.3)	0.259
Medication History (%)	161 (37.3)	39 (65.0)	122 (32.8)	<0.001

Table 2: The associated factors of fatty liver disease among outpatients at MAMC N=432

FACTOR	COMPARISON	OR	95% CI	P VALUE
Female	Male	0.563	0.324-0.979	**0.042**
AGE <45	≥ 45	3.451	1.591-7.485	**0.002**
No significant alcohol	Significant intake	0.770	0.433-1.369	0.373
EXERCISE < 3 days/week	≥3 days/week	0.964	0.558-1.665	0.895
Non-diabetic	diabetic	0.075	0.040-0.139	**0.000**
Non-hypertensive	hypertensive	0.437	0.250-0.764	**0.004**
HIV negative	positive	0.754	0.247-2.297	0.619
Negative medication history	positive	0263	0.148-0.466	**0.000**
BMI ≤ 25 kg/m²	> 25 kg/m²	1.901	1.055-3.425	**0.033**
WAIST CIRCUMFERENCE ≤ 94M/80F cm	> 94M/80F cm	2.504	1.192-5.259	**0.015**
MID ARM MUSCLE CIRCUMFERENCE ≤23M/18F cm	>23M/18F cm	1.311	0.719-2.392	0.377
AST ≤40 U/L	>40 U/L	1.379	0.503-3.780	0.532
ALT ≤40 U/L	>40 U/L	0.763	0.223-2.617	0.667
ALBUMIN <3.5mg/dL	≥3.5mg/dL	2.815	0.848-9.345	0.091
HEP B S Ag Negative	positive	0.719	0.152-3.412	0.678
HEP C AB Negative	positive	0.159	0.010-2.577	0.196
T.CHOLESTEROL≤ 220	>220	8.744	4.806-15.910	**0.000**
HDL < 40	≥40	0.212	0.119-0.377	**0.000**
TRIGLYCERIDES ≤170	>170	4.931	2.789-8.718	**0.000**

Table 3: Multivariate logistic regression

VARIABLES	ODDS RATIO	CI of 95%		P-VALUE
Male gender	2.569	(1.202	5.493)	0.015
DM	10.278	(4.958	21.303)	0.000
Waist >94M,80F	2.945	(1.147	7.567)	0.025
T. Cholesterol >220	4.870	(2.210	10.733)	0.000
HDL <40	4.326	(2.108	8.879)	0.000
Triglycerides >170	2.196	(1.034	4.666)	0.041
Medication History	0.960	(0.334	2.761)	0.940
HTN	1.083	(0.499	2.352)	0.840
Age ≥ 45	0.710	(0.282	1.787)	0.467
BMI >25.5	0.554	(0.237	1.297)	0.174

Figures

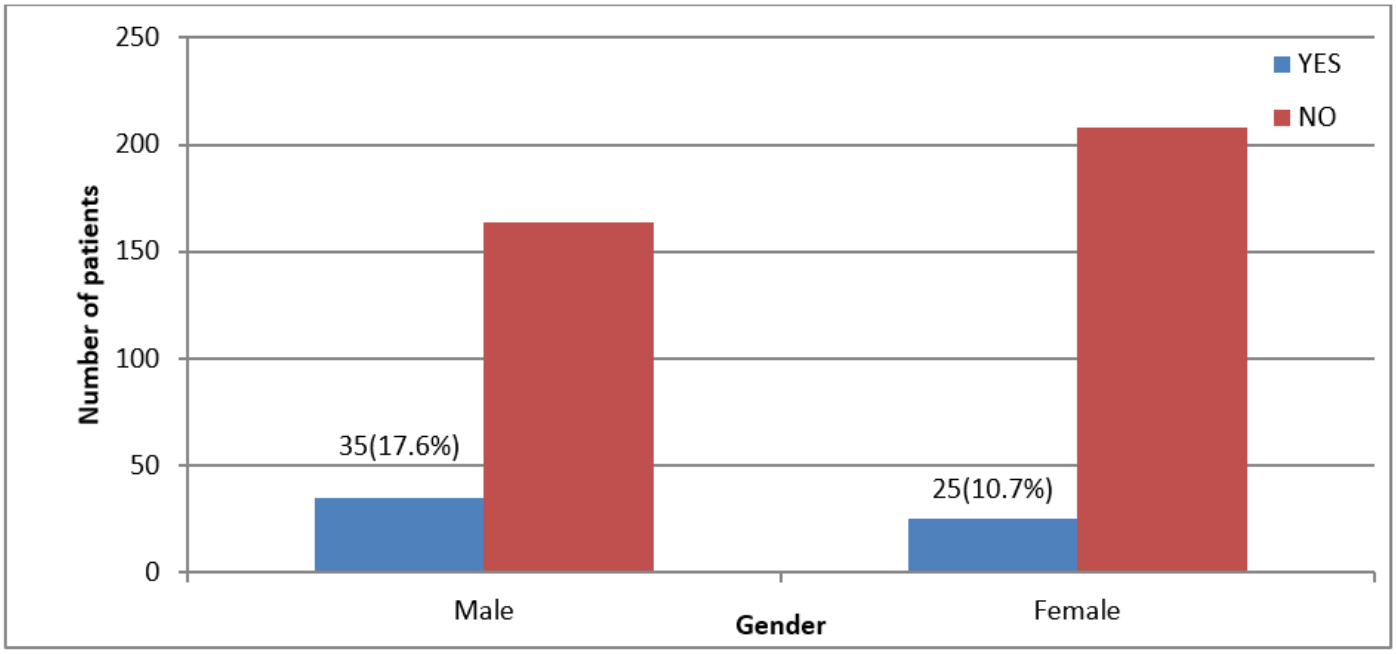

Figure 1

Figure 1

The distribution of gender with fatty liver disease among outpatients at MAMC.N=432

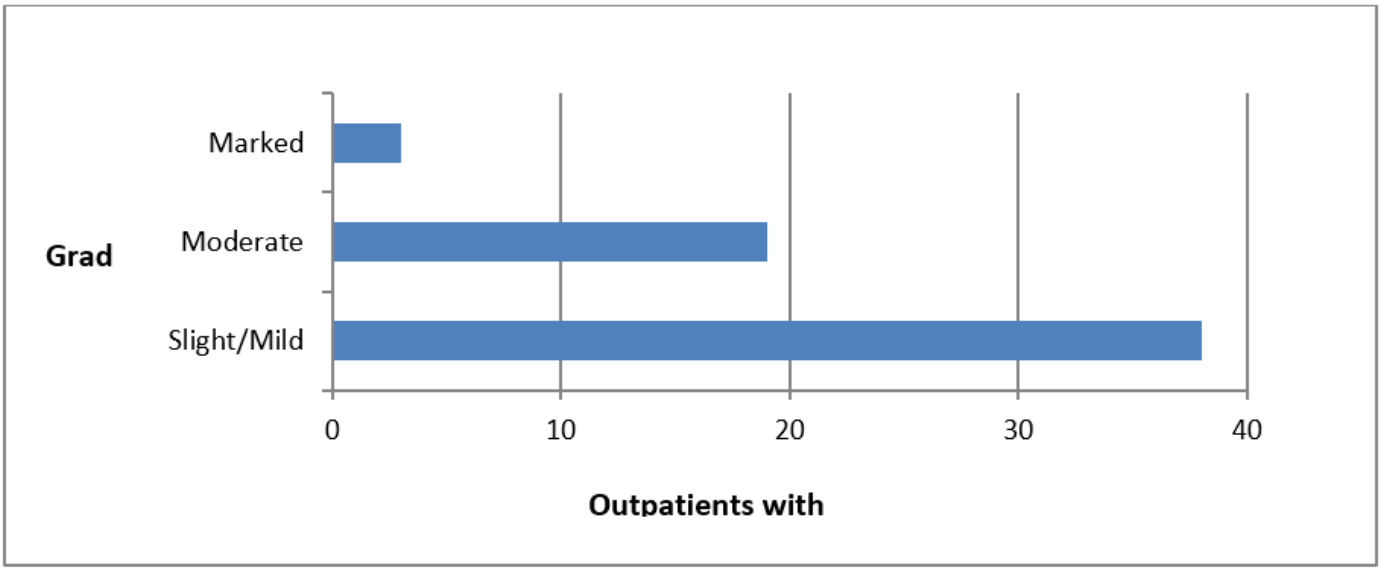

Figure 2

Figure 2

The grades of fatty liver disease among outpatients at MAMC.N=432

Supplementary Files

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