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Relation between waist circumference and MAFLD (metabolic associated fatty liver disease) in Hypertensive Patients.

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Keywords

MAFLD

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Abstract

Objective: Finding the relation between waist circumference and metabolic associated fatty liver disease (MAFLD) in Hypertensive patients. **Patients and Methods:** Two hundred subjects were enrolled in our study. They were recruited from The Cardiology Department, Beni-Suef University Hospitals in the duration from February 2021 to July 2021 after obtaining an informed consent. **Results:** Prevalence of MAFLD among the hypertension population was high (68.5%). There was significant association between waist circumference and body mass index and development of metabolic associated fatty liver disease (MAFLD) in studied population as they increase prevalence of MAFLD. As regarding laboratory investigations only triglyceride was higher in MAFLD patients. **Conclusion:** The present study shows that Prevalence of MAFLD among the hypertensive population was high. Waist circumference was high in MAFLD patients. MAFLD is associated with higher level of triglyceride.

1. Introduction:

Nonalcoholic fatty liver disease (NAFLD) is a spectrum of diseases that covers nonalcoholic fatty liver (NAFL) or simple steatosis, nonalcoholic steatohepatitis (NASH), cirrhosis and hepatocellular carcinoma. It is one of the

leading causes of liver disease and cirrhosis[1].It is associated with extra hepatic diseases that include cardiovascular disease (CVD) [1].

There is a change of nomenclature from Nonalcoholic fatty liver disease (NAFLD) to Metabolic dysfunction-associated fatty liver disease (MAFLD) that has been recently proposed by the panel of international experts but still under discussion, it represents the first step toward a better identification of this common metabolic liver disease [2]. There is association between NAFLD with CVD that is related to the common metabolic risk factors as obesity, diabetes mellitus (DM), hypertension and dyslipidemia [3]. CVD has been shown to be the most common cause of death in patients with NAFLD and this risk is more in patients with NASH as compared with simple steatosis or NAFL [4]. Although NAFLD and CVD are associated with metabolic risk factors, several potential links, which are independent of other risk factors, make NAFLD important for pathogenesis of CVD. These possible links which may cause atherosclerosis acceleration including genetics, atherogenic dyslipidemia, chronic inflammation, and imbalance of procoagulant and anticoagulant factors[5]. In addition to NAFLD; insulin resistance, oxidative stress, and adiponectin imbalance also contribute to CVD[6]. NAFLD or NASH to cirrhosis transition takes many years and thus patients with NASH-related cirrhosis are at higher risk of CVD and should be screened. While many studies have shown that cardiovascular events are higher in patients with NASH, less data are available for patients with NASH-related cirrhosis as patients with cirrhosis may have less ischemic events [7].

2. Aim Of The Study:

Studying the relation between waist circumference and Metabolic associated fatty liver disease (MAFLD) in Hypertensive patients.

3. Patients and Methods:

Two hundred hypertensive patients were consecutively enrolled in this cross-sectional study. They were recruited from the Cardiology Department, Beni-Suef University Hospitals in the duration from February 2021 to July 2021 after obtaining an informed consent.

Ethics: The study was performed in compliance with the declaration of Helsinki and after obtaining approval of the ethical committee of Beni-Suef University Hospitals. A written informed consent was obtained from all patients. Only patients fulfilling the inclusion criteria were included in the study.

Inclusion criteria:

1. Hypertensive patients.
2. All patients aged ≥18 years.
3. Gender: both.
4. Patients accepted to sign the written

informed consent.

Exclusion criteria:

Patients with the following conditions were excluded from the study:

1. Patients with hepatitis B or C infection.
2. Decompensated liver cirrhosis.
3. Alternative causes of fatty liver (e.g., consumption of amiodarone and tamoxifen).
4. Congestive hepatopathy.
5. Have any missing data or refused to be involved in the study.

Methods: All patients were subjected to followings:

1. Full history taking: including age, sex, education, behavior, medical history, current drugs, smoking and alcohol consumption. Physical activity was recorded using standard questionnaires.

2. Clinical examination: including

a. General examination:

1. Body mass index (BMI) was calculated by: Kg / m2.
2. Waist circumference.
3. Heart rate.
4. Blood pressure was measured on both arms in the sitting position after resting for at least 15 min.

b. Abdominal examination: Hepatomegaly, splenomegaly or ascites.

3. Routine laboratory investigations:

1. Complete blood count (CBC).
2. Renal function test (urea, creatinine).
3. Highly sensitive CRP.
4. Liver function tests (Alanine transaminase (ALT), Aspartate transaminase (AST), Total bilirubin, serum albumin and International normalization ratio (INR)).
5. Lipid profile (cholesterol, triglycerides, high density lipoprotein and low density lipoprotein).
6. Glycated hemoglobin (HbA1c).
7. The degree of liver fibrosis was estimated by clinical non-invasive scores: (APRI, FIB-4 and NFS).

4. Abdominal ultrasonography:

Abdominal ultrasonography was performed using PHILIPS HD5 scanner equipped with 3.5 HZ curved array probe to assess the presence of liver staeatosis (bright liver), hepatomegaly, focal fatty sparing, splenomegaly, gall bladder mud or stones.

5. Transient elastography and controlled attenuation parameter (CAP) examination: Fibroscan 502 machine (Echosens, Paris, France) for liver stiffness (LSM) and controlled attenuation parameter (CAP) measurement.

6. Echocardiography:

It was performed by trained sonographers who made measurements.

7. **Statistical analysis**

Analysis of data was performed using SPSS v. 25 (Statistical Package for Social science) for Windows.

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Description of variables was presented as follows:

I. Description of quantitative variables was in the form of mean and standard deviation (SD).

II. Description of qualitative variables was in the form of numbers (No.) and percentage (%).

III. The significance of the results was assessed in the form of P-value that was differentiated into:

1. Non-significant when P-value > 0.05
2. Significant when P-value ≤ 0.05

4. Results:

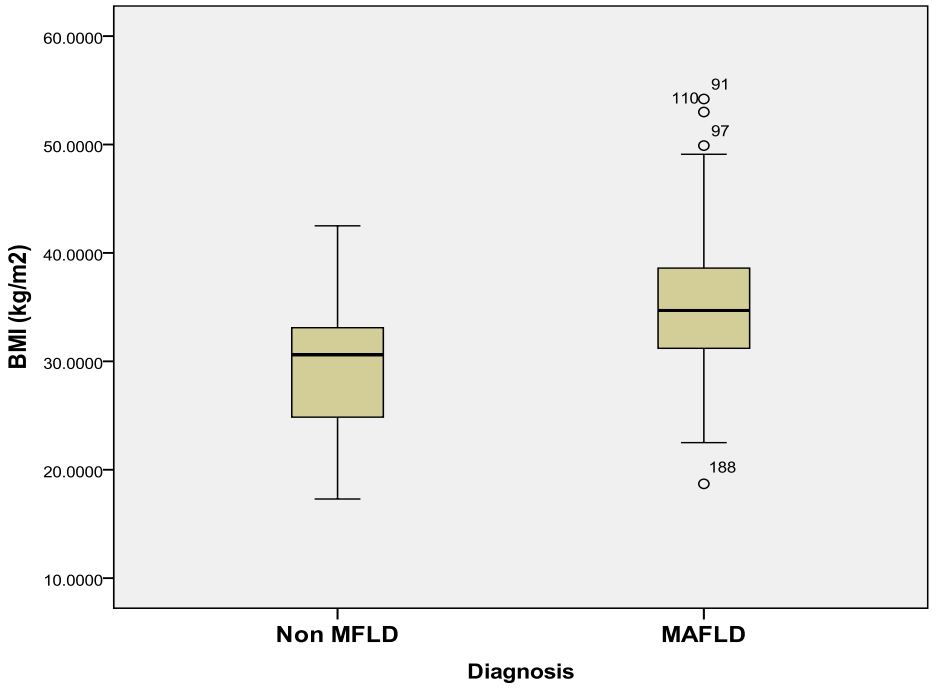
Two hundred hypertensive patients were consecutively enrolled in this cross-sectional study. They were recruited from The Cardiology Department, Beni-Suef University Hospitals in the duration from February 2021 to July 2021 after obtaining an informed consent.

This cross-sectional study was conducted to find the relation between waist circumference and MAFLD in hypertensive patients.

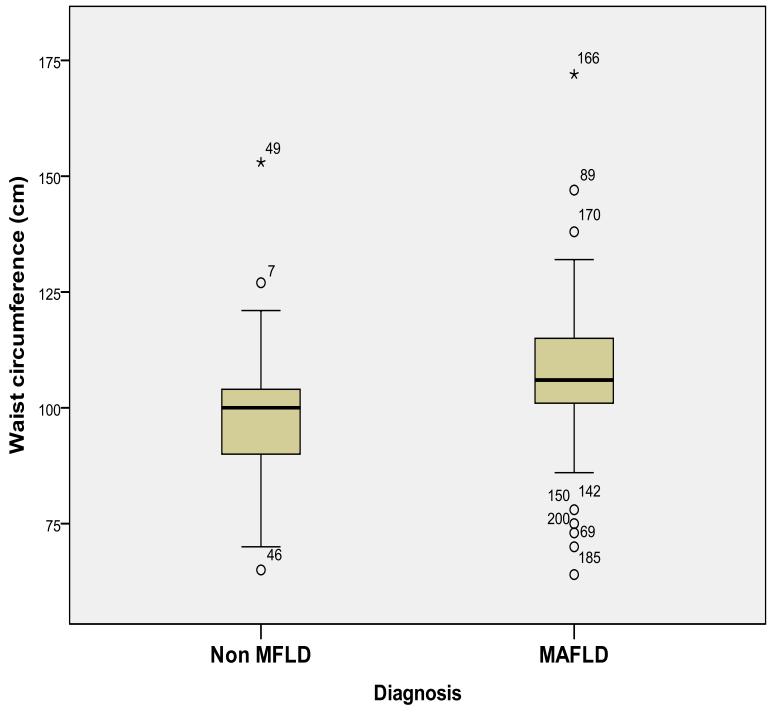
Table (1) Baseline characteristics of the studied patients:

Items	Non MAFLD (no=63)	MAFLD (no=137)	P-value
Age (mean±SD)	51.8±15.2	52.2±10.8	0.835
Sex **Males** **Females**	 38 (60.3%) 25 (39.7%)	 65 (47.4%) 72 (52.6%)	0.091
DM **Drugs of DM** **Insulin** **Oral hypoglycemic drugs**	10 (15.9%) 5 (50%) 5 (50%)	34 (24.8%) 20 (58.8%) 14 (41.2%)	0.156 0.763
BMI	29.5±5.8	35±5.8	<0.001*
Waist circumference	97.8±14.1	107.8±13.3	<0.001*
Residence **Urban** **Rural**	 30 (47.6%) 33 (52.4%)	 74 (54%) 63 (46%)	0.821
Occupation **Clerks** **Nurses** **Farmers** **Doctors**	 20 (31.7%) 20 (31.7%) 15 (23.8%) 8 (12.7%)	 40 (29.2%) 40 (29.2%) 30 (21.9%) 27 (19.7%)	0.901
Smoking	30 (47.6%)	59 (43.1%)	0.863
Drugs of HTN **Beta blocker** **ACEI** **ARBs**	 20 (31.7%) 20 (31.7%) 23 (36.6%)	 40 (29.2%) 40 (29.2%) 57 (41.6%)	0.811

The above table displays baseline characteristics of the studied population. It showed that mean age of the studied populations among MAFLD group was (52.2±10.8) years. Males represented 65 patients (47.4%) while females represented 72 patients (52.6%) from the same group (MAFLD). Diabetic patients of studied populations represented 34 patients (24.8 %) in MAFLD group and 10 patients (15.9%) in non-MAFLD group. Patients' waist circumference was (104.8±13.3) cm and BMI was (35.2±5.8) kg/m2 in MAFLD group. This table showed that there was no statistically significant difference between MAFLD and non- MAFLD regarding their characteristics except BMI and Waist Circumference which were statistically significantly higher in MAFLD as p- value was (<0.001).(figure 1, 2).



1)BMI of studied patients.



2)Waist circumference in studied patients.

Table (2) Laboratory parameters of the studied patients:

Items	Studied populations (no=200)	Normal range
WBCs X 10^3	7.01±1.9	(4-11)x1000/mm3
Hb	12.7±1.5	(12-16) g/dl
PLT X 10^3	277.9±89.3	150-450x1000/mm3
AST	25.9±9.2	(0-40) U/L
ALT	24.7±10.8	(0-40) U/L
Albumin	4.1±0.5	(3.5-5) g/dl
Bilirubin	0.8±0.3	(0.3-1.2) mg/dl
PT	13.2±0.9	(11-14) seconds
PC	88.2±7.3	(70%-100%)
INR	1.1±0.1	1
Cholesterol	181.4±41.9	(150-200) mg/dl
TGs	141.5±58.6	(40-160) mg/dl
LDL	100.1±38.7	Below 130 mg/dl
HDL	45.9±11.7	Above 40 mg/dl
HbA1c	5.1±1.2	Below (5.7%)
Creatinine	0.9±0.2	(0.4-1.3) mg/dl
hs-CRP	0.9±0.1	less than 3 mg/dl
A/C ratio	38.4±9.4	Less than 30 mg/g
Homa-IR (mean±SD) **Median (IQR)**	1.3±1.6 0.9(0.6-1.4)	(0.7 – 2)

This table showed the laboratory parameters as WBCs, hemoglobin, platelets, ALT, AST, albumin, bilirubin, prothrombin concentration, cholesterol, TG, LDL, highly-sensitive CRP, and albumin / creatinine ratio, Glycosylated hemoglobin, creatinine and INR.

It illustrated that mean hs-CRP for studied populations was (0.9±0.1), mean for Homa-IR was (1.3±1.6) and median was (0.9 (0.6-1.4)). While mean for AST was (25.9±9.2) and for ALT was (24.7±10.8).

Table (3) Comparison between non-MAFLD and MAFLD regarding the laboratory parameters:

		N	Mean	Std. Deviation	P-value
WBC	**Non MAFLD**	63	7.2349	1.96076	0.266
	MAFLD	137	6.9066	1.92286	
Hb	**Non MAFLD**	63	12.9000	1.74448	0.178
	MAFLD	137	12.5832	1.43545	
PLT	**Non MAFLD**	63	275.063	81.38813	0.760
	MAFLD	137	279.226	92.98521	
AST	**Non MAFLD**	63	24.3016	7.53836	0.108
	MAFLD	137	26.5620	9.87634	
ALT	**Non MAFLD**	63	24.9841	13.33016	0.816
	MAFLD	137	24.5985	9.50809	
Albumin	**Non MAFLD**	63	4.1238	0.54380	0.436
	MAFLD	137	4.0642	0.48046	
Bilirubin	**Non MAFLD**	63	0.8056	0.34338	0.294
	MAFLD	137	0.8595	0.33384	
PT	**Non MAFLD**	63	13.3254	1.12722	0.229
	MAFLD	137	13.1460	0.90016	
PC	**Non MAFLD**	63	88.5317	8.63595	0.681
	MAFLD	137	88.0679	6.77005	
INR	**Non MAFLD**	63	1.1333	0.14256	0.114
	MAFLD	137	1.1029	0.11754	
Cholesterol	**Non MAFLD**	63	178.301	44.74575	0.480
	MAFLD	137	182.824	40.72575	
TGs	**Non MAFLD**	63	119.285	39.77819	<0.001*
	MAFLD	137	151.766	63.11069	
LDL	**Non MAFLD**	63	99.5873	39.28171	0.896
	MAFLD	137	100.360	38.57439	
HDL	**Non MAFLD**	63	43.6190	10.61865	0.054
	MAFLD	137	47.0438	12.06043	
HbA1c	**Non MAFLD**	63	4.8238	1.26194	0.058
	MAFLD	137	5.1978	1.29708	
Creatinine	**Non MAFLD**	63	0.9095	0.24998	0.076
	MAFLD	137	0.9796	0.26098	

This table compares between MAFLD and non-MAFLD patients regarding clinical laboratory parameters. TGs was statistically significantly higher in MAFLD group (p-value <0.001).

There was no statistically significant difference between MAFLD and non-MAFLD groups regarding the other parameters.

5. Discussion:

The landscape of chronic liver disease in Egypt has drastically changed over the past few decades, with the decreasing prevalence of viral hepatitis and increasing prevalence of metabolic-associated fatty liver disease (MAFLD) (formerly known as nonalcoholic fatty liver disease [NAFLD]). MAFLD has risen in prevalence to alarming levels, placing an enormous burden on individuals and healthcare systems. Despite the magnitude of the problem, no regional guidelines have been developed to treat this disease[8]**.** Over the past five decades, the nutrition pattern of the Egyptian population has witnessed an overall increase in energy intake. Nutrition moved to a type of diet with increases in the intake of fast food, red meat, processed foods, and soft drinks, and decrease in the intake of fresh fruits and vegetables[9] **.** Egypt has one of the highest prevalence of MAFLD, affecting more than one-third of the population, compared to a global prevalence of about 25%[10] **.**

Unfortunately, the awareness of patients and physicians in Egypt about the magnitude of the problem and its risks is not sufficient[11] **.** Therefore, it is not surprising that MAFLD is seriously underdiagnosed in real world settings[12] **.** Most patients being diagnosed incidentally when cirrhosis has already developed[13]**.** The mean age of the studied populations was (52.1±12.3) years; males represented 103 patients (51.5%) while females represented 97 (48.5%) respectively. This is in agreement with the study by[14] who reported that mean age of studied populations was (51.8±0.38 years), males represented (54.9%). [15]conducted a similar study and the mean age was (53.8 ± 11.7 years). In comparison to a study conducted by[16] the mean age of the studied individuals was (43.65 ± 15.98) years.

This study showed that prevalence of MAFLD was higher in hypertensive population. As among studied population there were 137 patients (68.5%) diagnosed as MAFLD. This is in agreement with the study conducted

by[17] who reported that Hypertensive patients had a significantly higher prevalence of MAFLD than controls (59.3%). Similar study conducted by [18] reported that hypertension was associated with elevated odds ratio of MAFLD (OR: 1.49, 95% confidence interval [CI]: 1.26–1.76, $P < 0.0001$).

In our study there were 34 patients (24.8%) of MAFLD group were diabetic and this showed that T2DM was associated with prevalence of MAFLD. This is in agreement with the study by[19] who reported that T2DM was one of the strongest risk factor for development of MAFLD, Similar study conducted by [20] who reported that MAFLD was extremely common in patients with type 2 DM.

We evaluated that waist circumference was (104.8±13.3) cm and body mass index was (35.2±5.8) kg/m2 in MAFLD patients; this is in agreement with the study conducted by[21] who reported that more the length of waist circumference and higher body mass index were associated with higher prevalence of MAFLD. Similar study conducted by[22] reported that waist circumference and body mass index were strongly associated with MAFLD. We also found a significant increase in TGs level in MAFLD patients (p-value < 0.001). This is in agreement in the study by[23] who reported that excess TGs level in MAFLD patients. Similar study conducted by[24] reported that an increase in the level of molecular species of triglycerides was observed in patients with MAFLD. As regarding liver enzymes (ALT & AST) there was no significant difference in their levels between MAFLD and non-MAFLD patients which is similar to what reported by [25] as they found that many MAFLD patients have serum ALT and AST levels within the normal range, irrespective of disease activity.

6. Conclusion and Recommendations:

The present study shows that waist circumference was elevated in MAFLD patients.

MAFLD is associated with higher level of TGs.

This study recommends that:

-MAFLD patients should be evaluated for CVD and referred to a cardiologist, if needed.

-Consideration of other extra hepatic manifestations of MAFLD is recommended.

-Screening for MAFLD by ultrasonography is recommended in at

risk populations, including those with T2DM or metabolic dysfunction.

-Patients with MAFLD should be evaluated for the presence of other metabolic comorbidities, such as T2DM, hypertension, and dyslipidemia and be treated appropriately to reduce the risk of cardiovascular and kidney disease.

-Since prevalence of MAFLD in obese patients was high so weight loss is beneficial and recommended in patients with MAFLD.

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