http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v8i7.36

IGM Publication Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Original Research Article

Investigating the Biochemical Parameters Derangement and Physical Examination Findings in Patients with Non-Alcoholic Fatty Liver Disease

Authors
Dr Atul Shende[1], Dr Vinay Warkade[2], Dr Nischal Modak[3*]
[1]DM Gastroenterology and Hepatology, Associate Professor, Department of Medicine, MGM Medical College and MY Hospital, Indore, MP, India
[2]MD Medicine, Former Resident, Department of Medicine, MGM Medical College and MY Hospital, Indore, MP, India
[3]Post Graduate Resident, Department of Medicine, MGM Medical College and MY Hospital, Indore, MP, India
[*]Corresponding Author
Dr Nischal Modak
PG Resident, Department of Medicine, MGM Medical College and MY Hospital, Indore, MP, India, 452001

Abstract
Background: *Fatty liver disease in the absence of alcohol abuse is now emerging as a major health burden in the world. Alteration in various biochemical parameters and obesity directly or indirectly affect NAFLD and may worsen its outcome thus the current study was planned.*
Methods: *This prospective observational study was conducted in 65 patients with ultrasonographic finding of fatty liver disease were selected either on OPD or IPD of Department of Medicine, MY Hospital, Indore.*
Results: *A total 65 patients were included. In our study most of the patients (33%) were of the age group 41-50 years. 45 patients are obese constituting 69% of total cases. Cholesterol has a negative correlation with waist hip ratio which is statistically significant (p=0.003) and has positive correlation with triglycerides which is statistically significant (p=0.000). Various biochemical parameters of the patients were compared across the gender where it was found that variable like triglycerides, ALT, AST, HOMA-IR, and adiponectin were approximately same across the gender without any significance but cholesterol values across the gender was significant (p=0.000).*
Conclusions: *HOMA-IR and adiponectin levels have no significant correlation with studied biochemical parameters, high BMI, and high waist circumference patients. Further studies in large number of cases are advised to include or exclude these findings.*
Keywords: *Adiponectin, Cholesterol, HOMA IR, triglycerides.*

Introduction

Fatty liver disease in the absence of alcohol abuse is now emerging as a major health burden in the world. It represents the hepatic manifestation of the metabolic syndrome, a variably defined aggregate of disorders related to obesity, insulin resistance, diabetes mellitus type 2, hypertension, and hyperlipdemia. In non alcoholic fatty liver

disease (NAFLD), there is excessive fat deposition in the form of triglycerides (TG) in liver (more than 5% of hepatocytes histologically).[1] There is no clear cut-off for how many fat vacuoles visible in the light microscope that can be regarded as normal. It has been suggested that <5% of hepatocytes involved should be considered normal.[2] A sub-group of the patients have liver cell injury and inflammation in addition to excessive fat, that condition is designated as Non alcoholic steatohepatitis (NASH).

Various biochemical parameters have specific role in metabolism which can lead to fat deposition in liver and may act as biomarkers for NAFLD and NASH. These parameters are various component of lipid profile (HDL, LDL, and Cholesterol), adiponectin, AST, ALT, glucose, HOMA-IR etc. With all these biochemical parameters, physical findings like obesity, high waist circumference can lead to NAFLD and may worsen outcome of these patients. So, with this background this study of the biochemical parameters derangement and physical examination findings in patients with NAFLD was planned.

Materials and Methods

The present study was conducted in the Department of Medicine on 65 patients with ultrasonographic finding of fatty liver disease with no history of alcohol, from February 2015 to September 2015. Total 65 patients with ultrasonographic finding of fatty liver disease were selected either on OPD or on IPD of Department of Medicine, M.Y. Hospital, Indore.

Place of Study

Department of Medicine, M.G.M. Medical College & M.Y. Hospital, Indore (M.P.).

Study Design

Prospective, non-randomized, non-interventional, observational study.

Study Population

The study includes the patients who are of non-alcoholic fatty liver disease as assessed on ultrasonography.

Sample Size and Sampling Technique

Total 65 patients with non-alcoholic fatty liver disease presenting to the Department of Medicine, M.G.M. Medical College & M.Y. Hospital, and Indore (M.P.) during the study period, willing to provide their voluntary written informed consent were included in the study. The convenient sampling technique was used.

Inclusion Criteria

1. All cases of Fatty liver disease assessed on imaging.
2. Patients of either gender.
3. All cases of NAFLD with ongoing alcohol consumption of not taking >21 drinks/week (10 gms/drinks) in males and >14 drinks/week in females for over two years.
4. Patients and/or his/her legally acceptable representative willing to provide written voluntary informed consent for participation in the present study.

Exclusion Criteria

1. Those having history of alcohol abuse more than baseline.
2. Those on steatogenic drugs for more than six month.
3. Those who cannot be followed during the study period.
4. Prisoners and orphans.
5. Patients and/or his/her legally acceptable representative not willing to provide written voluntary informed consent for participation in the present study.

Methodology

After identifying the suitable candidate for the study, the patient and/or his/her legally acceptables were explained in detail about the study, its risks/benefits, costs involved, about the study procedures, etc. in detail. After getting their verbal approval for participation, a voluntary written informed consent was obtained from patient and/or his/her legally acceptable representative.

After obtaining the consent, the patients having fatty liver disease, but no history of alcohol consumption were asked to undergo following blood investigations viz. RBS, serum cholesterol, serum triglycerides, fasting insulin level, SGOT, SGPT and then their anthropometric measurements like head circumference, neck circumference, arm circumference, height, weight, waist to hip ratio were measured and recorded. After that he was asked to come for follow up. At follow-up, the patient was asked to undergo a sample for adiponectin level and at the same time we also performed FIBROSCAN test on those patients.

After collection of blood sample it was centrifuged and serum was separated and kept in freezer at the temperature 2-8^{0}C after that with HUMAN ADIPONECTIN ELISA Assay Max kit assay was performed as per protocol, and we obtained OD value for that. The OD value we obtained was plotted against the graph and finally we got the result in terms of adiponectin concentration.

Data Collection Method

The data has been collected on a customized proforma designed specifically for the study purpose.

Statistical Analysis

For the present study, statistical analysis required was done by the statistician accordingly the appropriate tests like Mann Whitney 'U' test and Spearman's rho coefficient correlation test were applied. For analysis, statistical software SPSS latest Version 20.0 was used. A P value of < 0.05 will be considered as statistically significant.

Results

In this study our observations and results are as follows:

As shown in table 1, total 65 patients were included. In our study most of the patients were of the age group 41-50 years i.e. 33% of total patients and minimum no. of patients were of the age group 71-80 years with 2 % of total patients. With this table it is observed that maximum patients are of middle age from age 31-60 years comprising 76% of patients. Twenty two (34%) patients were males and 43(66%) patients were females of total patients. Total 45 patients were obese constituting 69% of total cases. We found that in both categories of gender maximum number of the patients have waist hip ratio more than the cut off values.

Table 1: Basic characteristics of this study

Characteristics			No. cases	Percentage
Age group	20-30		6	9%
	31-40		16	25%
	41-50		21	33%
	51-60		12	18%
	61-70		8	12%
	71-80		2	3%
	Total		65	100%
Gender	Male		22	34%
	Female		43	66%
BMI	<18.5		0	0%
	18.5 -22.9		5	8%
	23-24.9		15	23%
	25-29.9		23	35%
	>30		22	34%
Waist circumference	Male	≤90	1	5%
		≥90	21	95%
	Female	≤80	0	0%
		≥80	43	100%

As shown in table 2, out of 65 patients, 19 patients had hypercholesterolemia i.e. 29% patients had elevated cholesterol level and remaining 46 patients i.e. 71% were having normal cholesterol level. A total 42 patients had higher triglyceride level i.e. 65% patients had elevated triglyceride level and remaining 23 patients i.e. 35% were having normal triglyceride level. A total 32 patients had higher ALT level i.e. 49% patients had elevated ALT level and remaining 33 patients i.e. 51% were having normal AST level. Only 17 patients had higher AST level i.e. 29% patients had elevated AST level and remaining 48 patients i.e. 74% were having normal AST level. A total 29 patients had the HOMA-IR value less than the cut off value i.e. 45% patients had HOMA-IR less than 2.25 and remaining 36 patients i.e. 55% were having HOMA-IR more than 2.25 the sensitivity for the cut off value for HOMA-IR is 72.7% and specificity is 49.1%. A total 18% of the patients have adiponectin level less than its normal value while 53 patients i.e. 82% have adiponectin with in the normal range.

Table 2: Laboratory parameters in our study

Laboratory Parameters		No. of cases	Percentage
Cholesterol	<200mg/dl	46	71%
	>200mg/dl	19	29%
Triglyceride	≤150mg/dl	23	35%
	≥150mg/dl	42	65%
ALT	<36	33	51%
	>36	32	49%
AST	<43	48	74%
	>43	17	26%
HOMA-IR	<2.25	29	45%
	>2.25	36	55%
Adiponectin	<2µG/DL	12	18%
	2-15µG/DL	53	82%
	>15 µG/DL	0	0%

As shown in table 3, cholesterol has a negative correlation with waist hip ratio which is statistically significant (p=0.003) and has positive correlation with triglycerides which is statistically significant (p=0.000).

Table 3: Correlation of cholesterol to the various parameters

S. No.	Pair	'r' value	P value	Significance
1	Cholesterol – BMI	0.228	0.067	NS
3	Cholesterol –waist hip ratio	-0.362	0.003	S
4	Cholesterol – Triglyceride	0.560	0.000	S
5	Cholesterol – ALT	-0.107	0.395	NS
6	Cholesterol – AST	-0.214	0.086	NS
8	Cholesterol – HOMA- IR	-0.173	0.167	NS
9	Cholesterol – Adiponectin	-0.191	0.128	NS

S: Significant, NS: Not Significant

As shown in table 4, triglyceride has a positive correlation with waist hip ratio which is statistically significant (p=0.000).

Table 4: Correlation of triglycerides to the various parameters

S.No.	Pair	'r' value	P value	Significance
1	Triglyceride – BMI	0.073	0.580	NS
3	Triglyceride – Waist hip ratio	-0.055	0.661	NS
4	Triglyceride – Cholesterol	0.560	0.000	S
5	Triglyceride – ALT	0.098	0.437	NS
6	Triglyceride – AST	-0.061	0.627	NS
8	Triglyceride – Homa- IR	0.042	0.738	NS
9	Triglyceride – Adiponectin	-0.147	0.243	NS

S: Significant, NS: Not Significant

As shown in table 5, HOMA-IR has no correlation with any of other parameters that is significant.

Table 5: Correlation of HOMA-IR to the various parameters

S. No.	Pair	'r' value	P value	Significance
1	Homa- IR – BMI	0.194	0.121	NS
3	Homa- IR – Waist hip ratio	0.069	0.584	NS
4	Homa- IR – Cholesterol	-0.173	0.167	NS
5	Homa- IR - Triglyceride	0.042	0.738	NS
6	Homa- IR – ALT	0.004	0.975	NS
7	Homa- IR- AST	-0.165	0.188	NS
9	Homa- IR – Adiponectin	0.134	0.287	NS

NS: Not Significant

As shown in table 6, adiponectin has no correlation with any other parameters which is statistically significant.

Table 6: Correlation of adiponectin to the various parameters

S.No.	Pair	'r' value	P value	Significance
1	Adiponectin – BMI	0.085	0.500	NS
3	Adiponectin – Waist hip ratio	0.068	0.590	NS
4	Adiponectin – Cholesterol	-0.191	0.128	NS
5	Adiponectin - Triglyceride	-0.147	0.243	NS
6	Adiponectin – ALT	0.011	0.928	NS
7	Adiponectin - AST	-0.041	0.743	NS
8	Adiponectin – Homa-IR	0.034	0.287	NS

NS: Not significant

Discussion

Total 65 patients with ultrasonography finding of fatty liver disease without the history of alcohol intake were selected either on OPD basis or on IPD basis of Department of medicine, MY Hospital, Indore. The patients were evaluated and asked for various anthropometric measurements, imaging and laboratory investigations were done, and whose details are recorded in approved proforma in details. All the parameters were recorded in standard format and parameters were compared with each independent parameter using appropriate statistics.

Eung Ju Kim et al[3] did a study according to them high cholesterol and triglyceride levels are associated with NAFLD and atherosclerosis. in our study Out of 65 patients, only 19 patients had hypercholesterolemia i.e. 29% patients had elevated cholesterol level and remaining 46 patients i.e. 71% were having normal cholesterol level and 42 patients had higher triglyceride level i.e. 65% patients had elevated triglyceride level and remaining 23 patients i.e. 35% were having normal triglyceride level that means our study higher triglyceride level is more associated with NAFLD then cholesterol level.

Li et al[4] conducted a study to investigate the serum leptin and adiponectin levels in nonalcoholic fatty liver disease (NAFLD) patients, and their relationship with insulin resistance and concluded increased serum leptin level and decreased serum adiponectin level in NAFLD patients independently associated with HOMA-IR. But in our study we found that Out of 65 patients, 29 patients had the HOMA-IR value less than the cut off value i.e. 45% patients had HOMA-IR less than 2.25 and remaining 36 patients i.e., 55% were having HOMA-IR more then 2.25 for which the sensitivity for the cut off value for HOMA-IR is 72.7% and specificity is 49.1% . On studying adiponectin level only 12 patients i.e. 18% of the patients have adiponectin level less than its normal value while remaining 53 patients i.e. 82% have adiponectin level within the normal range and with spearman's correlation test we found that adiponectin has no correlation neither with adiponectin ('r' =0.034, p=0.287) nor with any other parameters which is statistically significant.

In our study various parameters of the patients were compared across the sexes where it was found that variable like age, and BMI were approximately same across the gender without any statistically significance with 'p values' of (0.388, and 0.059) respectively but waist hip ratio values was significant (P=0.000).

Various biochemical parameters of the patients were also compared across the gender where it was found variable like triglycerides, ALT, AST, HOMA-IR, and adiponectin were approximately same across the gender without any significance with 'p values' of (0.533, 0.342, 0.167, 0.070, and 0.862) respectively but cholesterol levels across the Gender was significant (P=0.000).

In our study we also studied individual parameter's correlation with other parameters and we found that waist hip ratio has a weak correlation with cholesterol which is statistically significant (p=0.003), cholesterol has a weak correlation with waist hip ratio which is statistically significant (p=0.003) and has good correlation with triglycerides which is statistically significant (p=0.000), triglyceride has a good correlation with waist hip ratio which is statistically significant (p=0.000), ALT has a moderate correlation with AST which is statistically significant (p=0.002), AST has a moderate correlation with ALT which is statistically significant (p=0.002), HOMA-IR has no correlation with any of other parameters that is significant.

Conclusions

HOMA-IR and adiponectin levels have no significant correlation with studied biochemical parameters, high BMI, and high waist circumference patients. Further studies in large number of cases are advised to include or exclude these findings.

Disclosure

Funding: No funding sources

Conflict of Interest: Not declared

Ethical Approval: The study was approved by the Institutional Ethics Committee

References

1. S S, J D. Diseases of the Liver and Biliary System. Oxford: Blackwell Science, 2002.
2. Adams L, Angulo P. Recent concepts in non-alcoholic fatty liver disease. Diabet Med 2005; 22:1129-33.
3. Kim EJ, Kim B-h, Seo HS et al. Cholesterol-Induced Non-Alcoholic Fatty Liver Disease and Atherosclerosis Aggravated by Systemic Inflammation. PLoS ONE. 2014; 9: 6.
4. Li YL, Yang M, Meng XD, He XH, Wang BY. The relationship of leptin and adiponectin with insulin resistance in nonalcoholic fatty liver disease. Zhonghua Gan Zang Bing Za Zhi. 2010: 18; 6; 459-62.