ORIGINAL RESEARCH ARTICLE

Metabolic Parameter and Insulin Resistance in Non Alcoholic Fatty Liver Disease Patient Attending Tertiary Care Hospital Coastal Andhra Pradesh

P.V.V. Satyanarayana[1], M. Deepak Phanindra[2], Anand Acharya[3]

[1]Associate Professor, Department of General Medicine Konaseema Institute of Medical Science, Amalapuram, Andhra Pradesh, [2]Assistant Professor, Department of General Medicine Konaseema Institute of Medical Science, Amalapuram, Andhra Pradesh, [3]Professor of Pharmacology Konaseema Institute of Medical Science Amalapuram, Andhra Pradesh, India

Corresponding author: Dr. M. Deepak Phanindra, Assistant Professor, Department of General Medicine Konaseema Institute of Medical Science Amalapuram, Andhra Pradesh, India

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A B S T R A C T

Introduction: It has been reported that there are various metabolic abnormalities, obesity and type-2 DM associated with NAFLD in western world but there are very few study on metabolic parameters and insulin resistance associated with NAFLD in India. So this study was designed with an aim to determine the presence of component of metabolic syndrome and insulin resistance in non alcoholic fatty liver disease.

Material and methods: 150 patients were included in this study based on inclusion and exclusion criteria. Detail history of the patients were noted that includes drug history, patients were examined for evidence of clinical manifestation of chronic liver disease body mass index and all other metabolic parameters of all patients were measured.

Result: The mean of fasting insulin concentration was 9.156±1.6 uIU/ml in group A and5.94±1.364 uIU/ml in group B. The P value was 0.0026. The mean value of HOMA-IR was 2.18±0.26 in group A and 1.3836 ±0.44 in group B. This difference is statically significant as P value is 0.0001.

Conclusion: To conclude most of the patient with NAFLD were obese but some having normal body weight also. Patients with NAFLD have higher FPG, dyslipidemia, fasting insulin concentration and HOMA-IR even though they are not diabetic. So insulin resistance, obesity, lipotoxicity and environmental factor are of major concern in development of non alcoholic fatty liver disease.

Keyword: NAFLD, Insulin Resistance, Dyslipidemia

INTRODUCTION

It has been reported that non alcoholic fatty liver disease is most common liver disease and its prevalence ranges from 20% to 30% in western world.[1] The frequency of this disease varies with ethnicity.[2] The prevalence of non alcoholic fatty liver disease is also high in Indian sub continent here it ranges from 4% to 29%, which similar to western world.[3,4] Non alcoholic fatty liver is defined as abnormality of the liver in the absence of alcohol consumption and presence of ≥5% hepatic steatosis in the absence of competing liver disease.[5] Lonardo A et la in his review has concluded that non alcoholic fatty liver disease is considered to be both consequences and cause of metabolic syndrome. It's link with metabolic syndrome is more complex.[6] Pathogenesis of NAFLD is complex it starts with hepatic triglyceride accumulation or steatosis, insulin resistance, proceed to steatohepatitis / inflammation, increased level of hepatic expression of inflammatory cytokines, decreased level of adeponektin, oxidative stress, mitochondrial and endoplasmic reticulum dysfunction, followed by fibrosis, genetic predisposition also play a role. J.K. Dowman et al.[7] It has been reported that there are various metabolic abnormalities, obesity and type-2 DM associated with NAFLD in western world but there are very few study on metabolic parameters and insulin resistance associated with NAFLD in India.[8] So this prospective was designed with an aim to determine the presence of component of metabolic syndrome and insulin resistance in non alcoholic fatty liver disease.

MATERIAL AND METHODS

This was a prospective observational and quantitative study, conducted in the department of general medicine Konaseema Institute of Medical Sciences from Jan 2018 to August 2019.

Selection of the patients: Based on exclusion and inclusion criteria, patients who underwent ultrasonography of abdomen for liver function test abnormality, or any other indication were enrolled for this study.

Exclusion criteria	Inclusion criteria
Age more than 35 years	Diabetes mellitus
Both sex	Any disease of liver infective or autoimmune
NAFLD diagnosed by USG	Steatogenic drug, Alcoholic

Sample size: Based on prevalence of NAFLD and confidence interval of 95%, sample size was calculated to 149, so 150 patients were included for this study.[9]

Ethics: Before start of the study permission of institutional ethics committee was obtained. Informed consent was obtained from all patients enrolled in this study.

Methods: 150 patients were included in this study based on inclusion and exclusion criteria. Detail history of the patients were noted that includes drug history, patients were examined for evidence of clinical manifestation of chronic liver disease body mass index of all patients were measured waist circumference was calculated. Various biochemical parameters like fasting plasma glucose and post prandial plasma glucose was measured by glucose oxidise peroxidise method.For total cholesterol, we used Liebermann-Burchard reaction colorimetric method; triglyceride was estimated by method of Neri and Fringe. HDL concentration was estimated by precipitation method. LDL concentration was calculated by WHO formula, LDL- cholesterol= total cholesterol– TG/5 – HDL (mg/dL). Plasma insulin was determined by using enzyme-linked immunosorbent assay. HOMA-IR was calculated by using this formula (FPI X FPG)/22.5.[10] Value more than 1.64 was considered insulin resistance.

Study designs: Patients selected as per exclusion and inclusion criteria were kept in Group A, in Group B 150 apparently healthy patients without NAFLD and diabetes mellitus were taken as control.

STATISTICAL ANALYSIS

Data was collected on Microsoft excel sheet and analysis was done by using mean, proportion chi square test and unpaired t-test was used, P-value less than 0.05 was taken significant.

RESULT

As per exclusion and inclusion criteria, 150 patients diagnosed to be NAFLD were included in this study, kept in group A and another 150 apparently healthy patients were selected as control and kept in group B.

As per table-1 mean age of the patients in group A was 45.525±9.041 yrs and in centro group B it was 42.675±7.86yrs. The P-value was 0.70 which is more than 0.05 not significant statistically. Regarding comparison of sex ratio between two groups in group A M:F was 110:40 and in group B it was 108:42. The P value 0.89629 which was not significant statistically.Out of 150 patients in group A 16 were having normal body weight, 44 were overweight and 80 were obese but in group B, 32 having normal body weight, 64 were overweight and 54 were obese. So there is significant difference between two groups with respect to body mass index as P value was 0.001. Mean of waist circumference was 94.62±6.421 cm in group A and 86.374+3.74 cm in group B.This difference was significant statistically.

From table-2 it is clear that mean of FPG was 91.42±6.424 mg/dl in group A and 76.324±4.376 mg/dl in group B. FPG was significant towards higher side in group A. The P value was 0.00214.

The mean of post prandial plasma glucose was 126.337±8.426 mg/dl in group A and 112.734±7.77 mg/dl in group B. The P-value was 0.001 which is highly significant. The mean of

Variables		Group A (Mean±SD)	Group B (Mean±SD)	P value
Age		45.525±9.041	42.675± 7.86	0.707
Sex	M	110	108	.89629
	F	40	42	
BMI(kg/m2	Normal (18.5 to 22.9)	16	32	0.001032
	Over weight (23.0 to 24.9)	44	64	
	Obese (25 and above)	80	54	
Waist circumference		94.62±6.421	86.374±3.74	0.0262

Table-1: Demography of the patients (group A) and control (group B)

Variables	Group A(Mean±SD)	Group B(Mean±SD)	P value
FPG(mg/dl)	91.42± 6.424	76.324±4.376	0.002
PPPG(mg/dl)	126.337±8.426	112.734±7.7	0.0001
TChol(mg/dl)	218.64±26.34	162.67±24.336	0.0001
LDL(mg/dl)	148.90±30.46	116.98±22.32	0.001
HDL(mg/dl)	36.42±6.376	39.47±9.32	0.124
Tg(mg/dl)	162.89±29.48	116.42±20.96	0.001
Fasting insulin conc(uIU/ml)	9.156±1.6	5.94±1.364	0.0026
HOMA-IR	2.18±.26	1.3836±0.44	0.0001
AST	68.26±18.42	28.84±12.42	0.001
ALT	59.22±14.22	24.12±14.62	0.001

Table-2: Metabolic Parameters in both groups

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total cholesterol in group A was 218.64±26.34 mg/dl and in group B it was 162.67±24.336 mg/dl. These two value were statistically different as P value of 0.0001. In group A the mean of LDL concentration was 148.90±30.46 mg/dl and in group B it was 116.98±22.32 mg/dl, the P value was 0.001. The mean of HDL concentration was 36.42±6.376 mg/dl in group A and 39.429.32 mg/dl in group B which was not significant as P value was 0.124. Triglyceride concentration was 162.89±29.48 mg/dl in group A and 116.42±2096 mg/dl in group B, the P value was 0.001. The mean of fasting insulin concentration was 9.156±1.6 uIU/ml in group A and5.94±1.364 uIU/ml in group B. The P value was 0.0026. The mean value of HOMA-IR was 2.18±0.26 in group A and 1.3836 ±0.44 in group B. This difference is statically significant as P value is 0.0001. The mean of AST was 68.26±18.42 unit/litre in group A and 28.84±12.42 unit/litre in group B. The P value was 0.001. In group A the mean of ALT was 59.22±14.22 U/Lt and it group B it was 24.12±14.62 U/Lt, the P value was 0.001.

DISCUSSION

In present study we have evaluated the metabolic parameters and insulin resistance in 150 diagnosed cases of non alcoholic fatty liver diseases. In our study we have found that mean age of the patient was 45.525±9.041 yrs, Sangeetha Suresh et al has reported that majority of subject were between 41 to 50 yrs of age which support our study.[11] My observation also corroborates with the finding of Kalra S et al.[12] There is male predominance in our study, which is supported by the finding of Permpail BJ et al.[13] We have observed in our study that 53.4% patient with NAFLD were obese, 26.6% were overweight, but in control group only 36% were obese and 42% were overweight, so obesity is associated with NAFLD. We have also observed that increased waist circumference is also strongly associated with NAFLD. This finding corroborates with the observation of Perumpail BJ et al, Majumdar A et al and Farrel GL et al.[13,14,15]

Regarding various metabolic parameters, we have observed that fasting plasma glucose was significantly high in NAFLD patients than control (P=0.00214,0.001). This finding is supported by the work of NovaKovicT et al[16] and Pardhe B.D et al.[17] Total serum cholesterol was significantly higher (218.46±26.426 vs 162.67±24.336) in NAFLD group than the control group (P=0.0001). This finding is supported by the steedy of Agarwal AK et al[18] and D Mahling DV et al.[19] In our study HDL level was low in NAFLD group in comparison to control (36.42±6.376 mg/dl vs 39.97±9.32) which is supported by the work of Agrawal R et al.[20] We have observed that there is hypertriglyceridemia and LDL level was also high. Accumulation of triglyceride in hepatocytes is considered the main pathogenic trigger in the process of pathogenesis of NAFLD, various author has concluded that patients with NAFLD has disrupted lipid profile.[21,22] Result of our study goes along with that.

In our study fasting insulin concentration and HOMA-IR are significantly higher in NAFLD group. The study group has significantly higher fasting insulin concentration then control (9.15±1.6 vs 5.94±1.364) and HOMA IR value was (2.18±0.26 vs 1.38±0.44) also high. So patients with NAFLD have higher FPG,fasting insulin conc and HOMA-IR even though they are not diabetic. This finding corroborates with the finding of Salgado et al.[23]

We have observed that both AST and ALT were significantly higher in NAFLD group than control group. This finding corroborates with the finding of NovaKovic et al.[16]

CONCLUSION

To conclude most of the patient with NAFLD were obese but some having normal body weight also. Patients with NAFLD have higher FPG, dyslipidemia, fasting insulin concentration and HOMA-IR even though they are not diabetic. So insulin resistance, obesity, lipotoxicity and environmental factor are of major concern in development of non alcoholic fatty liver disease.

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