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A Cross Sectional Comparative Study of Non Alcoholic Fatty Liver Disease in Rural and Urban Population with Type 2 Diabetes Mellitus

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Abstract:
Introduction: *Non-alcoholic fatty liver disease (NAFLD) is a chronic liver disease that might affect up to one-third of the adult population in industrialised countries. NAFLD incorporates histologically and clinically different non-alcoholic entities; fatty liver (NAFL, steatosis hepatis) and steatohepatitis (NASH-characterised by hepatocyte ballooning and lobular inflammation ± fibrosis) might progress to cirrhosis and rarely to hepatocellular cancer.*
Materials and Methods:
This cross-sectional study was performed from November 2016 to may 2018 in the Department of General Medicine, Maheswara Medical College, Hyderabad. Study population included outdoor patients as well as hospitalized consecutive 100 patients (50 Urban and 50 Rural) in the medicine department with type 2 diabetes diagnosed according to the American Diabetes Association (ADA) 2011 criteria.
Results: *A total of 100 patients were enrolled during the study. The prevalence of NAFLD was higher in urban patients (58.75%) than the rural patients (31.25%). Males were affected more than the female patients in both the groups. Urban population, patients exhibited higher weight, waist circumference, hip circumference, BMI and had earlier age of presentation of NAFLD than the rural population.Both the groups showed high prevalence of metabolic syndrome.*
Conclusion: *In our study revealed higher prevalence of NAFLD in urban population as compared to the rural population with males affected more than the female patients. Although the risk factors for NAFLD were similar in both the study groups, better anthropometric parameters (lower weigh), waist circumference, hip circumference and BMI had a role in reduced prevalence of NAFLD in rural as compared to Urban population patients.*
Key words: *Non-alcoholic fatty liver disease, urban, rural, BMI.*

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I. Introduction

Diabetes mellitus (DM) is one of the major public health and economic burdens among chronic non-communicable diseases worldwide (1). The cost incurred by developed nations like US in the management of DM is passing 100 billion dollars annually (2). It is further complicated when it is associated with Non-Alcoholic Fatty Liver Disease (NAFLD). NAFLD is "insulin resistance

and hepatic fat accumulation in the absence of other identifiable causes of fat accumulation" (3,

4). The exact identification of NAFLD co-existing with DM is not yet successful making the control programs complex (5). Althouh it has remained unnoticed for many years, NAFLD is the first leading cause of liver diseases like cirrhosis (6,7).

Patients developing cirrhosis from NAFLD are at approximately 75% risk of acquiring liver cancer(8). The great challenge is that most of the patients do not manifest any overt signs and symptoms (8,9), and severe NAFLD can progress to liver failure (10).

The worldwide prevalence of NAFLD is 20% in the general population and 70% amongst people

with type 2 diabetes (11). More than a quarter of adults in developed nations are losing either their lives or jobs due to this disease (12). Even though there are International Diabetes Federation (IDF) reports regarding

the projected prevalence of type 2 DM to reach 1 million in Ethiopia, the number of patients developing fatty liver disease already acquiring DM is given less attention by health professionals (13).

Type 2 DM and obesity were associated with NAFLD to affect the liver throughout the world

(8). The findings of some researches also try to speculate the cardiovascular disease (CVD) risk of having NAFLD among type 2 diabetic patients with NAFLD as compared to type 2 diabetic

patients without NAFLD. These associations could help clinicians to identify people with NAFLD who need more intensive therapy to decrease their risk of future CVD events (14-16).

Many scientific data are available across the industrialized nations identifying the cause and risk factors for NAFLD among type 2 diabetic patients (6,17-19). However, the effect of NAFLD on the African population is completely ignored. Thus, it is widely feared that it may cause harsh public health and economic consequences in this part of the world (11). Therefore, The objective of this research to know the prevalence of NAFLD in urban and rural population in our district and to compare demographic profile, anthropometric measurements and lipid profile in the study group.

II. Materials And Methods

This cross-sectional study was performed from November 2016 to may 2018 in the Department of General Medicine, Maheswara Medical College, Hyderabad. Study population included outdoor patients as well as hospitalized consecutive 100 patients (50 Urban and 50 Rural) in the medicine department with type 2 diabetes diagnosed according to the American Diabetes Association (ADA) 2011 criteria. Patients with history of chronic liver disease of any aetiology, space occupying lesion of liver, alcohol consumption >20 g/day and drugs intake like Tamoxifen, Corticosteroids, Amiodarone, Oestrogen were excluded from the study. The study group was divided into rural population (Group I) and urban population (Group II). A detailed historyre garding the demographic details, physical activity, diet and personal habits were obtained from the patients. After assessment of anthropometric parameters, these patients were subjected to laboratory investigations and ultrasonography (Ultrasound machine LOGIQ 5 Pro of GE with 3.5 MHz convex and 11 MHz linear probe).

Subjects were considered as cases if they have fatty liver according to the standard criteria accepted by the American Gastroenterology Association. NAFLD Grade I-Minimal diffuse increase in the fine echoes. Liver appears bright compared to the cortex of the kidney and normal visualization of diaphragm and intrahepatic vessel borders, NAFLD Grade II-Moderate diffuse increase in the fine echoes. Slightly impaired visualization of the intrahepatic vessels and diaphragm, NAFLD Grade III-Marked increase in the fine echoes. Poor or no visualization of intrahepatic vessels and diaphragm and poor penetration of the posteriorsegment of the right lobe of the liver.[6] Metabolic syndrome in the study group was detected according to International Diabetes Federation (IDF)Criteria.

III. Statistical Analysis

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical analysis software. The values were represented in Number (%) and Mean±SD. T-test was used to compare continuous variable. The Chi-square test was used to compare categorical variables. A result was deemed statistically significant when $p<0.05$.

IV. Results

	Total number of subjects	**Group A(n=50) Rural Area**		**Group B(n=50) Urban Area**	
		Number	**Percentage**	**Number**	**Percentage**
Non-NAFLD	63	35	70	28	56
NAFLD	37	15	30	22	44

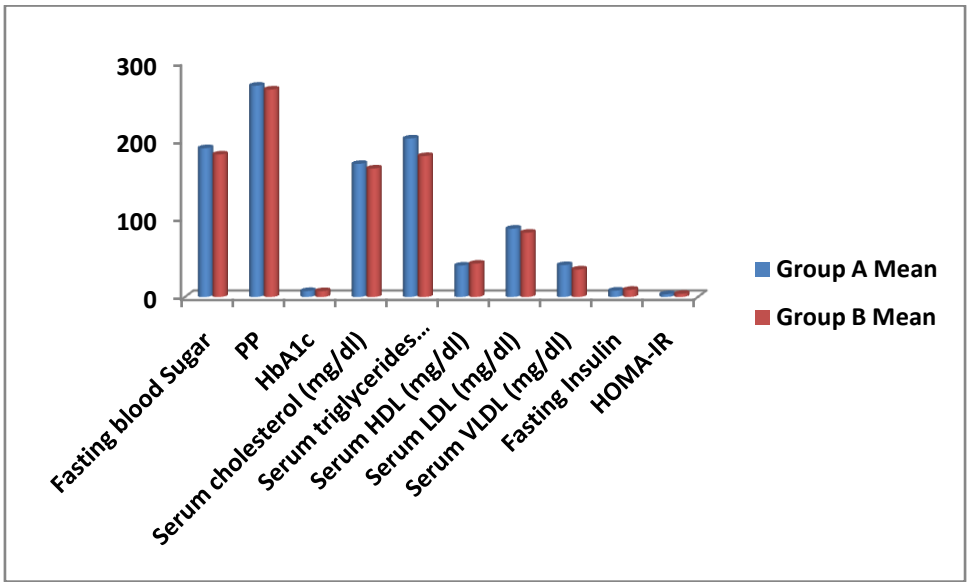
Table 1: Group Wise Distribution of Study Population

Variables	**Group A(Rural NAFLD)**		**Group B(Urban NAFLD)**	
	Mean	**SD**	**Mean**	**SD**
Weight (kg)	63.56	7.84	70.66	6.64
Height (cm)	167.89	6.88	164.54	5.45
Waist Circumference (cm)	86.23	6.54	85.23	3.79
Hip Circumference (cm	88.67	7.43	90.45	3.88
Waist Hip Ratio	0.96	0.04	0.87	0.03
BMI	23.54	2.96	25.8	2.45

Table 2: Comparison of anthropometric variables in study population

Parameters	Group A		Group B	
	Mean	SD	Mean	SD
Fasting blood Sugar	190.13	40.23	182.12	40.24
PP	270.01	60.34	265.12	65.20
HbA1c	7.56	0.79	7.50	0.76
Serum cholesterol (mg/dl)	170.12	50.12	164.21	35.24
Serum triglycerides (mg/dl)	202.56	112.34	180.12	75.32
Serum HDL (mg/dl)	40.14	8.18	42.6	9.12
Serum LDL (mg/dl)	87.32	36.54	82.13	26.44
Serum VLDL (mg/dl)	40.76	20.22	35.12	12.65
Fasting Insulin	8.12	2.12	9.13	4.02
HOMA-IR	3.54	1.2	4.01	1.37

Table 3: Comparison of Haematological/Biochemical Parameters in Study Population



Graph 1: Comparison of Haematological/Biochemical Parameters in Study Population

V. Discussion

Our study revealed higher prevalence of NAFLD in the urban group (58.75%) than the rural population group (31.25%). Mean age of the rural NAFLD group was significantly higher than urban NAFLD group, thus indicating a probable delaying of NAFLD onset in rural as compared to urban diabetic patients. Although, NAFLD was detected more in males in comparison to females in both groups, no significant association between gender and NAFLD prevalence could be seen. One of the reasons for higher prevalence of males in rural group could be the gender-biased difference in health seeking behaviour in a male dominated society like ours.

We observed that NAFLD patients in the urban population exhibited higher weight, waist circumference, hip circumference and BMI than the rural population. The relationship between anthropometric parameters and NAFLD is well established; however, variable impact of different anthropometric parameters has been shown in different studies. Anthropometric parameters such as BMI and waist/hip ratio have been seen to be associated with causation of NAFLD and its outcome.

The dependence of NAFLD on anthropometric measurements is much pronounced in type

2 diabetes mellitus patients where many workers have found NAFLD to be a universal finding among obese patients.[5]The present study also revealed that the prevalence of metabolic syndrome was significantly higher in urban as compared to rural group and in both the groups, metabolic syndrome was significantly associated with NAFLD. This fact re-emphasized and confirmed that instead of a single risk factor a combination of several variables have a synergistic effect on the occurrence of NAFLD. This finding is in agreement with the observations of previous studies to the extent that NAFLD is often considered to be the hepatic component of metabolic syndrome. This single parameter in itself is capable of explaining the difference in prevalence of NAFLD between rural and urban areas and could explain the multifactorial relationship of NAFLD and also lack of empiricity for univariate relationship. Although, the majority of NAFLD patients in

our study was non-vegetarian,there is varied opinion regarding the effect of diet on the prevalence of NAFLD. Choi et al were of the view that a vegetarian diet does not protect against NAFLD.[24] However, a number of other studies were of the view that diet might have a role in the prevalence and treatment of NAFLD. All these studies indicate that the relationship between diet and NAFLD is not empirical. The findings of the present study also supported the viewpoint that impact of diet on the prevalence of NAFLD might vary from one environment to another environment. The finding also highlighted that the risk factors for NAFLD are also dependent on the overall demographic profile and environmental settings.

VI. Conclusion

In our study revealed higher prevalence of NAFLD in urban population as compared to the rural population with males affected more than the female patients. Although the risk factors for NAFLD were similar in both the study groups, better anthropometric parameters (lower weigh), waist circumference, hip circumference and BMI had a role in reduced prevalence of NAFLD in rural as compared to Urban population patients.

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