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The Frequency of Nonalcoholic Fatty Liver Disease (NAFLD) in Type 2 Diabetes Mellitus

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Abstract: The most frequent source of impaired liver function tests in adults is Nonalcoholic Fatty Liver Disease (NAFLD). Type 2 Diabetes Mellitus (DM) and Non-Alcoholic Liver Fatty Disease (NAFLD) are usually seen together. It was considered a manifestation of metabolic syndrome. NAFLD's symptoms vary from basic steatose (NAFL), Non-Alcoholic Steatohepatitis (NASH) and cirrhosis. The prevalence of NAFLD among T2DM patients is 70%. This was a hospital based study. The study lacks histological evidence for NAFLD in the cases included and enhanced imaging modality such as MRI spectroscopy was not included in the treatment of NAFLD in this research. NAFLD is particularly prevalent in person with type 2 diabetes and is correlated with high CVD prevalence.

INTRODUCTION

In Western and Asian countries, changes throughout dietary patterns and behaviors have indicated an rise in the incidence of obesity and associated diseases which has to a large extent resulted in increase in the incidence of NAFLD. Because of considerable prevalence of nonalcoholic fatty liver disease worldwide the condition has become an important health concern. There are two clinical manifestations of NAFLD, i.e., nonalcoholic steatohepatitis (NASH) and nonalcoholic fatty liver (NAFL). NAFL appears to be stable, although, NASH may lead to cirrhosis and occasionally to hepatocellular carcinoma (Angela, 2002).

NAFLD is no longer regarded as a primary liver disease but a part of metabolic syndrome. NAFLD occurs worldwide with maximum prevalence up to 50%. NAFLD is an significant etiology for the prevalence of chronic liver disease in India with a prevalence of between 9 and 32% and most commonly in individuals with obesity and diabetes mellitus (Angela, 2002; Harrison and Neuschwander-Tetri, 2004; Hashimoto *et al*., 2015).

Aim and objectives

Aim: To evaluate, the incidence of nonalcoholic fatty liver disease in subjects with type 2 diabetes mellitus.

Objectives: To study the involvement of non-alcoholic fatty liver disorder in type 2 diabetes mellitus. To evaluate the physiological effect of Nonalcoholic Fatty Liver Disease (NAFLD) on type 2 diabetes mellitus.

Literature review: Non-Alcoholic Fatty Liver Disease (NAFLD) was first identified in the 1950s when fatty liver was described in a community of obese patients. In 1980, Ludwig, etc., described 20 obese, overweight, non-alcoholic patients who had identical liver biopsy for patients with alcoholic liver disease and the term nonalcoholic steatohepatitis was introduced. The term non-alcoholic fatty liver was first used in 1985 (Angela, 2002).

Over the precedent 10 years, it has become noticeable that, the NAFLD is frequent reason for elevated liver enzymes revealed in the U.S. population. Approximately 20% of them have abnormal liver enzymes linked with

NAFLD and about 3% may have nonalcoholic steatohepatitis (NASH). The overall prevalence of NAFLD in the U.S. and Europe is around 20%. This amplified prevalence relates to the obesity and associated disease. In U.S., NASH is thought to occur in approximately 3% of population with fibrosis and occurrence of NASH is >40% of obese patients. The NAFLD includes hepatic steatosis (HS) which can progression to NASH with subsequent fibrosis and cirrhosis (Harrison and Neuschwander-Tetri, 2004).

The worldwide prevalence of NAFLD is estimated about 20%. There is increasing identification of NAFLD with Cardiovascular Disease (CVD). The epidemiologic studies have shown NAFLD related to more prevalence of CVD independent of usual risk factors. NAFLD is linked with risk of CVD events in subjects with type 2 DM which is independent of obesity. The CVD is the most probable cause of death among NAFLD individuals (Chalasani *et al*., 2012).

In contrast to the incidence data (scanty), the privileged numbers of publications have described the frequency of NAFLD in community based studies (Chalasani *et al*., 2012).

Prashanth *et al*. (2009) quoted (n = 204) 62.6% steatohepatitis and 37.3% fibrosis. NASH was prevalent in subjects with metabolic syndrome (MeTS) with rigorous fibrosis

Kalra *et al*. (2013) studied 100 patients with type 2 DM and found 26% prevalence of NAFLD and found that NAFLD was more common in the fourth decade. Jali *et al*. (2015) in their study from rural sector, Maharashtra of 302 individuals, based on USG findings the prevalence of NAFLD was 28.1%.

MATERIALS AND METHODS

It was a hospital-based, retrospective, researcher, systematic and non-traditional research performed on subjects with type 2 diabetes mellitus. Study done over period of eighteen months (October, 2014 to March, 2016). Consecutively, fulfilling inclusion criteria of both male and female subjects with age more than eighteen years having type 2 DM were enrolled. All subjects admitted to the medical wards during the study period were selected after getting informed and written consent.

RESULTS AND DISCUSSION

A number of 170 participants of both sexes were included in this cross-sectional retrospective study. Overall, 106 (62.35%) were male and 64 (37.64%) were female. There was significant statistical difference of proportion of gender in cohort of type 2 diabetes mellitus (X2 = 20.75; DF:1; ‘p’<0.0001) (Table 1).

Table 1: Gender distribution of study population

Variables	Total	Percentage
Males	106	62.35
Females	64	37.64
Total	170	100.00

Mean and standard deviation for demographic profile: The mean and SD for age with normal USG was 59.15(±13.9), grade-1 fatty livers 55.21(±8.29), grade-2 fatty liver 59.9(±14.5) and grade-3 fatty liver 57(±13.83). The mean and SD for BMI and normal USG was 26.17(±3.48), grade-1 fatty liver 29.66(±3.4), grade-2 fatty liver 29.06(±2.79) and grade-3 fatty liver 28.69(±2.47).

Mean and standard deviation for diabetes mellitus profile: The mean and SD for duration of diabetes and normal USG was 7.09(±6.99), grade-1 fatty liver 11.78(±2.25), grade-2 fatty liver 12.6(±3.23) and grade-3 fatty liver was 12.41(±2.14).

The mean and SD for BSL (F) and normal USG was 166.49 (±71.94), grade-1 fatty liver 180.47(±75.25), grade-2 fatty liver 165.68(±55.29) and grade-3 fatty liver 190.45 (±71.82).

The mean and SD for BSL (PP) and normal USG was 228.79(±84.64), grade-1 fatty liver 226.15(±91.39), grade-2 fatty liver 239.17(±58.62) and grade-3 fatty liver 275.45(±97.95).

The mean and SD for HbA1c and normal USG was 7.95(±1.47), grade-1 fatty liver 7.98(±1.24), grade-2 fatty liver was 8.36(±1.7), grade-3 fatty liver was 9.31(±1.8).

Mean and standard deviation for lipid profile: The mean and SD for total cholesterol and normal USG was 150.7 (±42.95), grade-1 fatty liver was 153.47(±38.74), grade-2 fatty liver was 158.88(±35.3), grade-3 fatty liver was 190.91(±57.49).

The mean and SD for HDL and normal USG was 40.08(±17.68), grade-1 fatty liver was 35.1(±12.35), grade-2 fatty liver was 41.66(±15.8), grade-3 fatty liver was 45.2(±14.29).

The mean and SD for triglyceride and normal USG was 105.74(±44.54), grade-1 fatty liver was 159.21(±100.03), grade-2 fatty liver was 118.58(±48.91) and grade-3 fatty liver was 95(±32.85) (Table 2).

Nonalcoholic fatty liver disease was a different hepatic condition that was firmly connected with insulin obstruction and type 2 diabetes mellitus. The NAFLD is progressively observed to be related with metabolic disorder and is estimated as a hazard factor for Coronary Artery Disease (CAD). There are restricted numbers of studies on NAFLD in diabetes. The relationship between diabetes and NAFLD was complex and was not clear. NAFLD is a distinct hepatic condition characterized by

Table 2: Comparison of mean and standard deviation

Variables	Normal USG (n = 76)	Grade-1 fatty liver (n = 19)	Grade-2 fatty liver (n = 51)	Grade-3 fattyliver (n = 24)
Age	59.15	55.21	59.9	57
	(±13.9)	(±8.29)	(±14.5)	(±13.83)
Duration of	7.09	11.78	12.6	12.41
DM	(±6.99)	(±2.25)	(±3.23)	(±2.14)
BMI	26.17	29.66	29.06	28.69
	(±3.48)	(±3.4)	(±2.79)	(±2.47)
BSL(F)	166.49	180.47	165.68	190.45
	(±71.94)	(±75.25)	(±55.29)	(±71.82)
BSL(PP)	228.79	226.15	239.17	275.45
	(±84.64)	(±91.39)	(±58.62)	(±97.95)
HbA1c	7.95	7.98	8.36	9.31
	(±1.47)	(±1.24)	(±1.7)	(±1.8)
Total CHO	150.7	153.47	158.88	190.91
	(±42.95)	(±38.74)	(±35.3)	(±57.49)
HDL	40.08	35.1	41.66	45.2
	(±17.68)	(±12.35)	(±15.8)	(±14.29)
Triglyceride	105.74	159.21	118.58	95
	(±44.54)	(±100.3)	(48.91)	(±32.85)

abnormal fat infiltration in liver cells mainly by triglycerides which exceed 5% of liver weight which histologically resembles alcohol induced liver damage. NAFLD is the hepatic manifestation of metabolic syndrome which is widely recognized as a significant contributor to the burden of chronic liver disease worldwide (Stefan and Haring, 2011).

Kalra *et al*. (2013) stated that the relation of cluster of abnormalities like hypertension, obesity, period of diabetes with NAFLD such conclusions are comparable with the study. Lavekar, etc., study from Maharashtra (India) studied 410 individuals out of which 302 individuals were considered for analysis.

CONCLUSION

This study was performed to study the frequency of NAFLD with detected by ultrasonography with differing degrees of intensity and to assess the connection between NAFLD and T2DM. Patients of type 2 diabetes mellitus should be undergo non-invasive and comprehensive examinations such as abdominal ultrasonography to determine the existence of NAFLD. The main significance of the current study is that, relative to the general population, the diabetics are at a greater risk of contracting NAFLD and its associated complications.

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