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Clinical profile of non-alcoholic fatty liver disease in type 2 diabetic patients

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Abstract

NAFLD may progress through three different stages, from hepatic steatosis to steatohepatitis and finally to cirrhosis. Hepatic steatosis represents simple increase in accumulation of fat in liver, without evidence of inflammation or liver damage. Inflammation and liver damage is however present in steatohepatitis. NAFLD was defined as any degree of fatty liver in the absence of alcohol intake. NAFLD, if present, was classified based on standard ultrasonographic criteria as: Grade 1 (mild steatosis): slightly increased liver echogenicity with normal vessels and absent posterior attenuation. Prevalence of high Waist circumference, which is important marker of central obesity, according to ATP III guidelines for male waist circumference is(≥102 cms) & for female is (≥88 cms) consider as central obesity. In our study,14(58.33%)males patients had waist circumference is ≥102cms &25(96.15%)females patients had waist circumference is ≥88cms. Mean waist cicumference in male were 102.58cms & in female were 96.5cms.

Keywords: Non-alcoholic fatty liver disease, type 2 diabetes, waist circumference

Introduction

Non-alcoholic fatty liver disease (NAFLD) represents a spectrum of medical conditions in which there is increased infiltration of fat, predominantly triglycerides, inside hepatocytes[1].

NAFLD is defined when there is macro vesicular steatosis inside liver cells exceeding 5% of liver weight, in the absence of significant ethanol consumption or other specific causes of liver diseases.Although NAFLD may occur in people with normal body weight, it is strongly associated with obesity. The prevalence among obese people (body mass index more than 30kg/m^2) in the United States has been reported as 80-90%. Body mass index (BMI) of more than 35kg/m^2 and an intraperitoneal fat area of more than 158 cm are strong predictors of NAFLD. Besides of obesity, hyperlipidemia and type 2 diabetes mellitus (DM) is associated with NAFLD[2].

Increased fat accumulation in liver or fatty liver disease can also be secondary to a number of causes, including excessive alcohol consumption, drugs (especially chemotherapeutic agent's e.g.methotrexate, tamoxifen), hepatic toxins (e.g. arsenic, carbon tetrachloride), chronic viral hepatitis (e.g. hepatitis B and hepatitis C viral infection) and congenital storage diseases (e.g. Wilson disease, hemochromatosis)[3].

NAFLD may progress through three different stages, from hepatic steatosis to steatohepatitis and finally to cirrhosis. Hepatic steatosis represents simple increase in accumulation of fat in liver, without evidence of inflammation or liver damage. Inflammation and liver damage is however present in steatohepatitis. Both hepatic steatosis and steatohepatitis are potentially reversible with timely intervention. Cirrhosis represents irreversible liver damage with fibrosis. NAFLD-related cirrhosis may also result in liver cancer or hepatocellular carcinoma, although it is less common than in cirrhosis secondary to excessive alcohol consumption and

chronic viral hepatitis[4].

Methodology

The present study was carried out in department of medicine of our institute.

Study population

Study design-retospective clinical study.

Inclusion criteria

- Age: 35-75 years.
- Diabetes Mellitus diagnosed as per WHO criteria.

WHOcriteria for diagnosis of diabetes mellitus are

1. Symptoms of Diabetes plus Random Blood Sugar > 200 mg/dl[a].
2. Fasting Blood Sugar > 126 mg/dl[b].
3. Two hour plasma glucose >200 mg/dl an oral glucose tolerance test[c].

a) Random is defined as without regard to time since the last meal.
b) Fasting is defined as no calorie intake for at least 8 hours.
c) The test should be performed using a glucose load containing the equivalent of 75g anhydrous glucose dissolved in water, not recommended for routine use.

- Type 2 diabetes
- Diabetic patients either on oral treatment or insulin therapy.

Exclusion criteria

Age < 35 or >75 years.

Known hepatic disease, HBs antigen or Anti-HCV positivity, Historyof ingestion of hepatotoxic drug(s).

History of significant alcohol consumption. Significant alcohol consumption define by Ongoing or recent alcohol consumption > 21 drinks on average per week in men and > 14 drinks on average per week in women.

NAFLD was defined as any degree of fatty liver in the absence of alcohol intake. NAFLD, if present, was classified based on standard ultrasonographic criteria as: Grade 1 (mild steatosis): slightly increased liver echogenicity with normal vessels and absent posterior attenuation.

Grade 2 (moderate steatosis): moderately increased liver echogenicity with partial dimming of vessels and early posterior attenuation.

Grade 3 (severe steatosis): diffusely increased liver echogenicity with absence of visible vessels and heavy posterior attenuation.

The study group was divided into 2 subgroups:

- **Group A:**Patients with USG evidence of fatty changes in the liver.
- **Group B:**Patients without any USG evidence of fatty changes in the liver.

Results

Table 1: Age & sex wise distribution

Age	Male	Female	Total	Percent
40-50	6	10	16	32%
51-60	5	11	16	32%
61-70	10	3	13	26%
>70	3	2	5	10%
Total	24	26	50	100%

50 adult patients with type 2 diabetes fulfilling our inclusion criteria and who visited the

hospital from 2015 to 2017 were studied. Out of total 50 patients,26 (52%)were females, & 24 (48%) were males, shows female predominance.
Mean age of patient was 56.6 yrs. The commonest age group with diabetes in our study was 51-60 years age group in diabetic female and61-70 years in diabetic males.

Table 2: Sex distribution of patients

Sex	Patients	Percent
Male	24	48%
Female	26	52%
Total	50	100%

Out of 50 type 2 diabetic patients, 24 (48%) were male & 26 (52%) were female. sex ratio in our study 0.92:1.

Table 3: Duration of diabetes

Duration of diabetes	Male	Female	Total
<5Yr	0	0	0(0%)
5yr-10yr	8	11	19(38%)
11yr-15yr	13	12	25(50%)
>15yr	3	3	6(12%)

Out of total 50 diabetic patients with nonalcoholic fatty liver disease (NAFLD), maximum no of patients 25 (50%) had duration of diabetes in between 11yrs to 15yrs, while 19 (38%) patients had duration of diabetes 5yrs to 10yrs, 6 (12%) patients had duration of diabetes >15 yrs. Non-of them having duration of diabetes <5 yrs.

Table 4: Comparison of duration of diabetes between Group A & Group B

Duration of diabetes	Group A (n=50)		Group B (n=30)	
	Male	Female	Male	Female
<5Yr	0	0	9	8
5yr-10yr	7	11	7	2
11yr-15yr	10	15	1	2
>15yr	4	3	1	0

Mean duration of diabetes in Group A was (12.62 ± 0.71 yrs), compare with Group B was (6.63 ± 0.77yrs), which was statistically highly significant with ($p< 0.0001$). This indicate that person

with long duration of diabetes, are more prone to develop fatty liver, because they are exposed to insulin resistance for longer duration.

Table 5:BMI Distribution in Diabetic Patients

BMI(kg/m^2)		Male	Female	Total
15-19.99	Underweight	0	0	0(0%)
20-24.99	Normal	3	4	7(14%)
25-29.99	Overweight	18	19	37(74%)
30-34.99	Obese	2	3	5(10%)
>35	Morbid obesity	1	0	1(2%)

43(86%) out of 50 patients had BMI > 25 kg/m^2 and out of these only 5(10%) were obese

with a BMI of > 30 kg/m^2& 1(2%) was morbid obese with BMI of 39.54 kg/m^2. A total of 7(14%)Patients had a normal BMI. There were no patients in the malnourished group. The mean BMI of the cohort was 27.48 kg/m^2.
In the present study, 48 out of 50 patients (96%) had a BMI > 23 kg/m^2.

Table 6: Comparison of BMI between group A & group B

BMI(kg/m^2)		Group A (n=50)		Group B (n=30)	
		Male	Female	Male	Female
15-19.99	Underweight	0	0	1	0
20-24.99	Normal	2	5	10	15
25-29.99	Overweight	16	21	2	2
30-34.99	Obese	2	3	0	0
>35	Morbid obesity	1	0	0	0

Mean BMI of Group A patients was 27.48 kg/m^{2,} which was compared to mean BMI of group B was 23.53 kg/m^2. Mean BMI was statistically significantly higher ($p<0.0001$) than control group.

Table 7: Waist circumference

Waist circumference	Total no patient	Average waist circumference (WC)
male (≥102 cm) (n=24)	14(58.33%)	102.58cm
female (≥88 cm) (n=26)	25(96.15%)	96.5cm

Prevalence of high Waist circumference, which is important marker of central obesity, according to ATP III guidelines for male waist circumference is(≥102 cms) & for female is (≥88 cms) consider as central obesity. In our study,14(58.33%)males patients had waist circumference is ≥102cms & 25(96.15%)females patients had waist circumference is ≥88cms. Mean waist circumference in male were 102.58cms & in female were 96.5cms.

Table 8: Modes of treatment

On Treatment	Male	Female	Total
Insulin or Insulin/OHA	15	12	27(54%)
Oral hypoglycemic agents (OHA).	9	14	23(46%)

Out 50 diabetic patients with fatty liver, 27 (54%) patients are on Insulin or Insulin/OHA & 23(46%) are on Oral hypoglycemic agents (OHA).

Discussion

Mean age of patient in our study was 56.6 yrs, which was compared to 55.3 yrs in study done by S banerjee*et al*.[5]
To compare with various studies for sex distribution, above table showed, 0.92:1 in our study is comparable to Edinburgh study(n=939)[6] showed 0.92:1.
Mean duration of diabetes in patients with NAFLD in our study was comparable to Giovannitarghe*et al*. (n=2103) [6] was 12±3yrs.
Mean BMI of diabetic patients with NAFLD in our study was comparable to study doneby Akagarwal*et al*. (n=124) was 27.5±3.99.
Mean waist circumference in our study, diabetic patients with NAFLD was 99.44cms which was comparable to study done by Akagarwal*et al*. [7](n=124) was 98cms.
Research has shown that central obesity are at a greater risk for developing a number of health-related problems, the most prominent being hypertension or high blood pressure, type

II diabetes or non-insulin dependent diabetes, and hyperlipidemia.
Scientists believe that two characteristics of abdominal fat cells are probably responsible for the greater health risk associated with central obesity. Abdominal fat cells tend to be larger than those located in other regions of the body. Relatively large fat cells are associated withinsulin resistance (i.e., reduced tissue responsiveness to insulin), which means body cells will take up less glucose (sugar) from the blood, causing the blood sugar level to rise. In response to the elevated blood sugar level, the pancreas secretes more and more insulin (hyperinsulinemia). Hyperinsulinemia is key factor for metabolic syndrome.
To compare, total no of diabetic patients with NAFLD on insulin, with other studies,our study showed 27 (54%) patients were on insulin, which was nonsignificant. This may be because of small sample size.
In above all study $HBA1_C$ was more than 7.0, which was comparable to our study. This indicate that uncontrolled diabetes one of most important risk factor for NAFLD[8].

Conclusion

Prevalence of high Waist circumference, which is important marker of central obesity,according to ATP III guidelines for male (≥102 cm) & female (≥88 cm) was 14(58.33%) & 25(96.15%) respectively.Mean WC in male was 102.58cms & in female was 96.5cms. Comparison of waist circumference in diabetic patients with NAFLD & without NAFLD shows, (x^2=25.63 $p < 0.05$), which was statistically highly significant.This suggest, central obesity is key factor for development for insulin resistance associated with NAFLD.

References

1. Ludwig J, Viggiano T, McGill D, Oh B. Nonalcoholic steatohepatitis: Mayo Clinic experiences with a hitherto unnamed disease. Mayo Clin. Proc. 1980;55:434-8.
2. Westwater J, Fainer D. Liver impairment in the obese. Gastroenterology. 1958;34:686-93.
3. Thaler H. The fatty liver and its pathogenetic relation to liver cirrhosis. Virchows Arch Pathol. Anat. Physiol. Klin. Med. 1962;335:180-210.
4. Dr. AarushiKataria, Dr. Naveen Nandal and Dr. Ritika Malik, Shahnaz Husain -A Successful Indian Woman Entrepreneur, International Journal of Disaster Recovery and Business ContinuityVol.11, No. 2, (2020), pp. 88–93
5. Kumar, S. (2020). *Relevance of Buddhist Philosophy in Modern Management Theory*. *Psychology and Education*, Vol. 58, no.2, pp. 2104–2111.
6. Batman P, Scheuer P. Diabetic hepatitis preceding the onset of glucose intolerance.Histopathology. 1985;9:237-43.
7. Banerjee RR. Resistin: molecular history and prognosis. J MOL BED. 2003 Apr;81(4):218-26.
8. Targher G, Bertolini L, Poli F. Nonalcoholic failover disease and risk of future cardiovascular events among type 2 diabetic patients. Diabetes. 2005;54:3541-6.
9. Agarwal AK, Gupta PK, Singla S. Carotid intimal-medial thickness in type 2 diabetic patients and its correlation with coronary risk factors. J Assoc Physicians India.

   2008;56:581-6.
10. Prashanth M, Ganesh HK, Vima MV. Prevalence of non-alcoholic day liver disease in patients with type 2 diabetes mellitus. J AssocPhysicians India. 2009;57:205-10.