STUDY OF NON-ALCOHOLIC STEATOSIS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS IN A TERTIARY HOSPITAL

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ABSTRACT

BACKGROUND

Fatty liver disease or non-alcoholic steatosis affects a growing number of the adult diabetic population in developed countries. The main aim of this study was to understand the correlation of fatty liver disease in diabetics with its relation to dyslipidaemia, glycated haemoglobin (HbA1c) and increased BMI.

MATERIALS AND METHODS

This is a retrospective cross-sectional study carried out in a tertiary hospital in Karad, Maharashtra, India, to evaluate the incidence of non-alcoholic steatosis (Fatty liver) in non-alcoholic Type 2 Diabetes Mellitus patients. Diagnosis of fatty liver was made on the basis of ultrasonography. This screening included a total of 100 randomly chosen diabetic patients. Of these 60 were male and 40 were female.

RESULTS

The study subjects' BMI, lipid profile, HbA1c and USG was done to evaluate the co-relation between fatty liver, dyslipidaemia and increased BMI. There was a high incidence of dyslipidaemia, increased BMI and poor glycaemic control was noted in the subjects who had fatty liver. In this study, the females were known to have a higher incidence of fatty liver in comparison to males (56.5% females and 43.47% males).

CONCLUSION

This study concluded that there was a significant co-relation of fatty liver with diabetes mellitus type 2. There was also an increased incidence of fatty liver in diabetics with dyslipidaemia or poor glycaemic control or increased BMI. This screening process also suggests that the diabetic patients who were shown to have fatty liver had other co-morbidities, which could be a risk factor for progression of the disease.

KEYWORDS

Non-Alcoholic Fatty Liver (NAFL), Non-Alcoholic Steatosis, Diabetes Mellitus, Dyslipidaemia, HbA1c, BMI.

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BACKGROUND

Fatty liver disease or non-alcoholic steatosis is a chronic liver disease that affects a growing number of the adult population in developed countries. Fatty liver includes two different entities, i.e. Non-Alcoholic Fatty Liver Disease (NAFL or Steatosis) and Non-Alcoholic Steatohepatitis (NASH). NASH is characterised by ballooning and enlargement of the hepatocytes and lobular inflammation with or without fibrosis). This later could progress to cirrhosis and also rarely to Hepatocellular Carcinoma (HCC).[1] Incidence of fatty liver disease in type 2 Diabetes Mellitus (T2DM) is significantly rising. Its incidence is increasing likely due to occurrence of obesity and insulin resistance and metabolic syndrome in Type 2 Diabetes Mellitus. Fatty liver also can occur in type 1 Diabetes Mellitus. It should be differentiated from the more common glycogen hepatopathy, which can also be a cause for hepatomegaly and deranged liver functions in Diabetes Mellitus. Weight reduction by diet and exercise can be effective in preventing and treating fatty liver in obese diabetic patients. Bariatric surgery also has shown to reverse non-alcoholic steatosis in Type 2 Diabetes Mellitus. There is not much evidence to suggest that certain drugs used in Type 2 Diabetes Mellitus such as thiazolidinediones, glucagon-like peptide-1 (GLP-1) analogs and dipeptidyl peptidase-4 (DPP-4) inhibitors and also statins may have a role in preventing or treating or reducing the risk of non-alcoholic steatosis in patients with diabetes.[2] The accumulation of triacylglycerols in the hepatocytes of the liver is mostly from the plasma non-esterified fatty acids, which are supplied largely by the adipose tissue. Some of the non-alcoholic fatty liver disease susceptible gene variants are associated with progressive liver disease, insulin resistance, Type 2 Diabetes Mellitus and may also have a high risk for hepatocellular carcinoma.[3]

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MATERIAL AND METHODS

Design of the Study

Retrospective cross-sectional descriptive study.

Duration of the Study

The study was carried out on patients with diabetes mellitus type 2 over a period of 6 months.

Source of the Data

History, physical examination, laboratory investigations were obtained from the medical records department.

Method of Collection of Data

Total of 100 patient's records were accessed from the Medical Records Department in KIMS, Karad.

Inclusion Criteria

- All diagnosed cases of type 2 diabetes mellitus.

Exclusion Criteria

- Age below 18 years.
- Type 1 diabetes mellitus.
- Alcoholics.

Non-Alcoholic Fatty Liver or Steatosis was diagnosed on the basis of Ultrasonography.

The lipid profile for this study was analysed according to the ATP III classification. Low HDL < 40 mg/dL, High LDL > 190 mg/dL, High cholesterol > 200 mg/dL, High triglycerides > 200 mg/dL.

RESULTS

A total of 100 patients with type 2 diabetes mellitus were screened, of which 60 were males and 40 were females. The mean age was 60.71 years with age range of 30-87 years. Fatty liver was seen in 46% of the subjects that were screened; 57.5% of the females and 38.3% of the males that were screened had fatty liver. Among these subjects who had fatty liver, 54.3% were known to have dyslipidaemia. Of the screened population, 60.86% had poor glycaemic control along with fatty liver; 58.69% had fatty liver associated with increased BMI; 41.7% had fatty liver with only diabetes mellitus as their co-morbidity. Fatty liver associated with diabetes and hypertension was seen to be in 36.95% of the study population. Females were seen to have a higher predominance of fatty liver as compared to males.

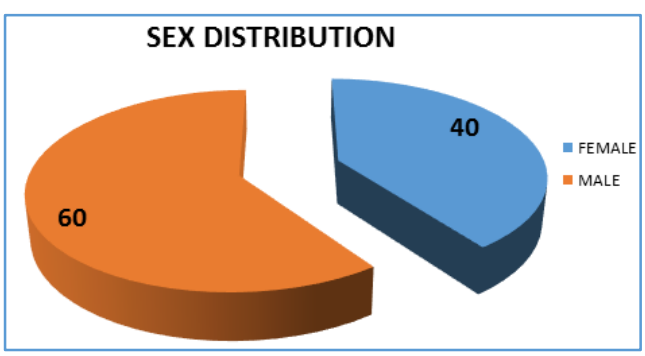

Figure 1. Sex Distribution among Study Population

No. of Cases	100
Male	60
Female	40
Mean age of year	60.7
Age range (year)	30-87

Table 1. Demographic Data of Patients with Diabetes Mellitus Screened for the Study

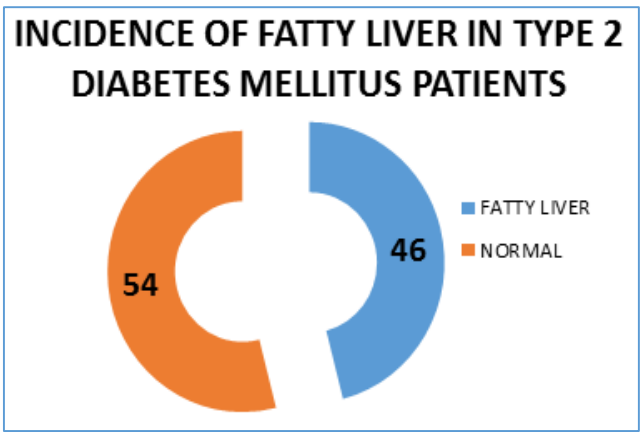

Figure 2. Incidence of Fatty Liver in Study Subjects

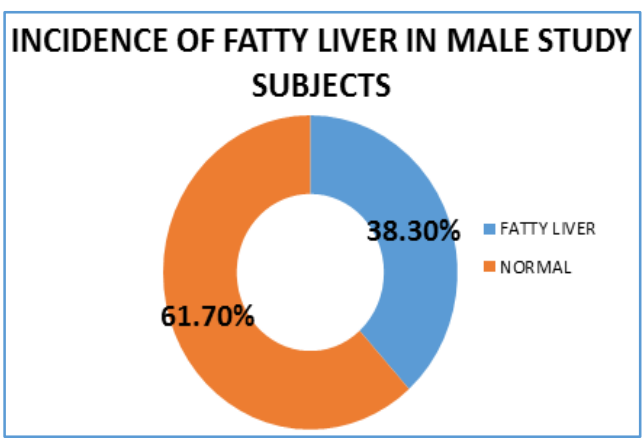

Figure 3. Incidence of Fatty Liver in Male Subjects

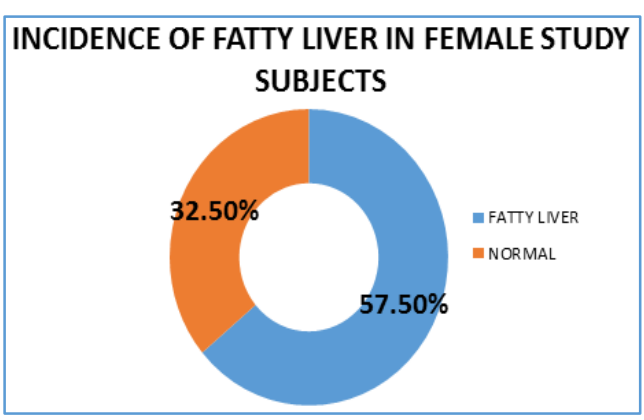

Figure 4. Incidence of Fatty Liver in Female Study Subjects

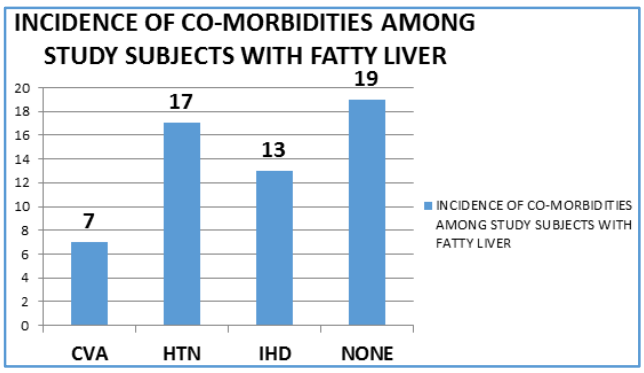

Figure 5. Incidence of Co-morbidities among Study Subjects with Fatty Liver

*IHD: Ischaemic Heart Disease, HTN: Hypertension, CVA: Cerebrovascular Accident

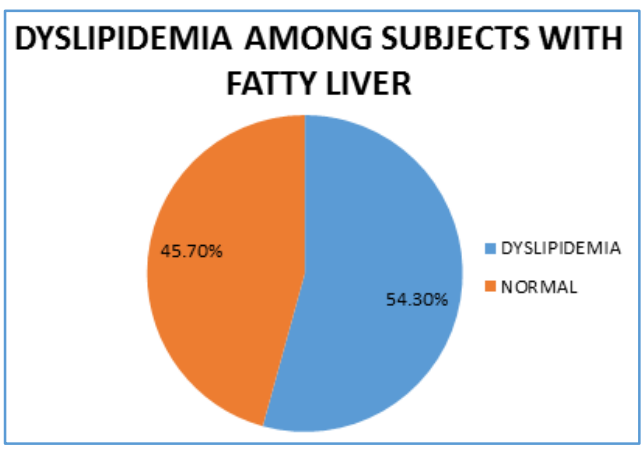

Figure 6. Study of Dyslipidaemia among Subjects with Fatty Liver

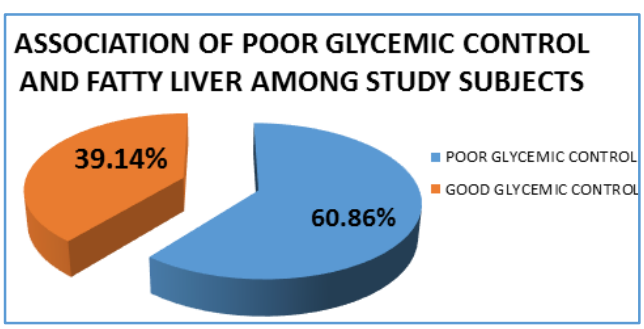

Figure 7. Showing Association of Poor Glycaemic Control with Fatty Liver in the Diabetic Study Subjects

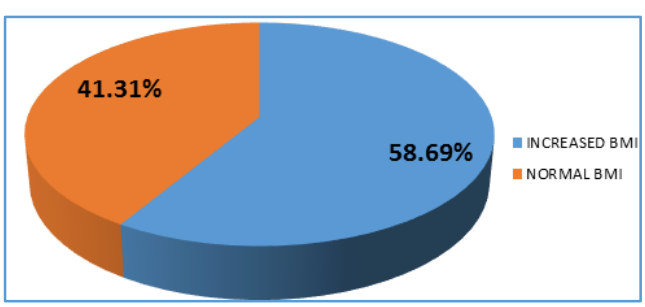

Figure 8. Correlation of Increased BMI with Fatty Liver in Screened Diabetics

DISCUSSION

In this study which was done in a tertiary hospital in Maharashtra, India, 100 patients who were on treatment for diabetes mellitus type 2 were screened for fatty liver disease by USG. The patients were also screened for increased BMI, dyslipidaemia and poor glycaemic control. The diabetic patients who were shown to have fatty liver disease also had a significant increase in BMI or had dyslipidaemia or had a poor glycaemic control. Thus we can concur that the incidence of fatty liver in diabetic patients has a significant relation with the above-mentioned parameters being a risk factor. Non-alcoholic fatty liver disease is on a significant rise in developing countries. Many studies suggest that fatty liver in diabetics could also be a risk factor for coronary artery disease.[3] In fatty liver disease, there is excess accumulation of lipids in the hepatocytes (mainly triglycerides). In some cases, steatosis may progress to Steatohepatitis and fibrosis of liver and also rarely hepatocellular carcinoma. Diabetes mellitus type 2 in most patients is characterised by the co-occurrence of insulin resistance and failure of beta cells to secrete insulin. This abnormality is known to result from a combination of genetic and environmental factors.[4] The most significant environmental factors are increased BMI and lack of activity, which contribute to the risk of obesity and insulin resistance. There is an increased prevalence of fatty liver disease in people with pre-diabetes as well as uncontrolled diabetes mellitus type 2.[5] Along with the association of impaired glucose metabolism, most patients with fatty liver disease have other clinical features which help in the diagnosis of metabolic syndrome. The cause of fatty liver is most likely due to insulin resistance along with obesity. Alterations in lipid metabolism, inflammation in adipose tissue and deposition of fat in ectopic sites leads to insulin resistance.[6] The main core of the study revolves around the correlation of fatty liver in diabetics with significance to increased BMI, dyslipidaemia and poor glycaemic control.[7]

Many studies suggest that there may not only be an increased risk for fatty liver secondary to diabetes, but there also is evidence suggesting that fatty liver in turn could be a risk factor for the development of diabetes mellitus type 2. Thus in the association between Diabetes Mellitus and Fatty Liver, it is important to consider not only the occurrence of fatty liver with diabetes but also the progression of fatty liver (steatosis) to Steatohepatitis.[8,9]

CONCLUSION

This study shows a significant relation of Diabetes Mellitus type 2 with non-alcoholic fatty liver disease. The findings are similar to the ones carried out in other countries. The incidence of fatty liver is high in patients with uncontrolled blood sugar levels, obesity, insulin resistance and dyslipidaemia. It is very important to educate the people in developing and developed countries to carry out a good healthy lifestyle, which consists of a good and well planned diet along with regular exercise. Early screening of diabetic patients should be done and prophylactic measures should be taken at the earliest to prevent complications. Lowering lipid state, maintaining a normal weight and achieving a normal range HbA1c may help in reducing risk of non-alcoholic fatty liver disease.

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