A R T I C L E   I N F O

A B S T R A C T

There is an association between hypertension, non-alcoholic fatty liver, and diabetes mellitus. Diabetic patients commonly have fatty liver and heart problems. Objective: To evaluate the adverse effects of diabetes on the liver, and to determine the association between diabetes and metabolic associated fatty liver disease using Computed Tomography. Methods: It was a cross-sectional study conducted on 50 diabetic patients using convenient sampling method. The research was carried out in CT Department of Radiology of Tertiary care hospital in Gujranwala, Pakistan. Males and females between the ages of 30-80 who had undergone abdominal CT scans were included in this study. A written consent form was also signed by patients. This study was conducted over 4 months from December 2021 to March 2022. Data were entered and analyzed using SPSS version 20.0. Results: The current study revealed that male diabetic patients have more chances to have non-alcoholic fatty liver disease 33(66%) than females 17(34%). The diabetic patients of in senior age group (50-60) years were most commonly affected by 27(54%) with metabolic-associated fatty liver disease. According to findings diabetic patients frequently had fatty liver disease 22(44%) and fatty liver disease along with cardiovascular disease was 11(22%). Some other findings with less occurrence of non-alcoholic fatty liver disease were hypertension and hyperlipidemia 7(14%). Conclusion: In conclusion, diabetic patients are more common to be related with fatty liver disease. There was strong connection between diabetes mellitus and fatty liver disease. Elderly patients are more commonly affected.

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Evaluation of Liver Changes in Type-2 Diabetes Mellitus Patients using Computed Tomography

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I N T R O D U C T I O N

Diabetes mellitus is defined as disturbances in carbohydrates, lipids, and protein metabolism because of abnormalities in production of insulin or action of insulin in addition to chronic hyperglycemia. Almost 90% to 95% are affected by Type-2 diabetes mellitus [1]. Previous research has linked diabetes to an increased threat of chronic liver disease and metabolic associated liver disease [2]. In 2015, there were an estimated 400 million confirmed cases of diabetes worldwide. The number of confirmed Type-2 diabetes mellitus cases is hope for to reach 640 million by 2040 [3]. In individuals with metabolic associated fatty liver disease, diabetes mellitus type-2 raises the danger of liver-related mortality rate by 22 times. On the other hand, fatty liver disease can increase the chances of death in diabetes patients. A community-based study of Type-2 diabetic patients found that those with metabolic associated liver disease had higher risk of mortality than those without any metabolic diseases [4]. However, 30%-60% of Type-2 diabetes patients have metabolic liver disease [5]. Endangerment for liver diseases in patients of diabetes are age, gender, dyslipidemia, metabolic disorders and increased weight [6]. A strong correlation between diabetes and non-alcoholic metabolic liver disease indicates that 80 to 90% of diabetes patients will...
acquire metabolic fatty liver disease [7]. Diabetes is a persistent metabolic disease distinguished by high sugar in blood, insulin resistance and insufficiency [5]. Main symptoms include excessive thirst, excessive urination, and loss of weight. Further indicators to look out for are unbalanced diet, fatigue, and unhealed sores [8]. Now a days, the risk of diabetes mellitus has increased 30–40% due to sedantry lifestyle [9]. Diabetes appears to be associated with liver damage. Homeostasis of carbohydrates relies heavily on the liver [10]. Hepatocellular glycogen accumulation causes hepatomegaly and abnormal liver enzymes in patients with poorly managed diabetes [11]. High cholesterol, seizures, nephrotic syndrome, and insufficient blood flow in the limbs, which can lead to amputations, are all deep rooted effects of impaired glucose tolerance [12]. Type-2 hypoglycemia can be avoided by feeding well, staying active, and sustaining healthy weight [13]. When blood glucose levels aren’t under control, metformin is frequently prescribed. Insulin shots may be required for a large number of patients [14]. Men are more probably to develop nonalcoholic fatty liver disease among diabetes patients [15]. Imaging tests have been used to help in diagnosis, risk stratification, disease progression, and therapy response [16]. Although the US is arguably the most extensively used as an imaging tool for diagnosing hepatic changes, it has a poor sensitivity for diagnosing severe hepatic encephalopathy and does not offer accurate quantitative data as well as technician dependence [17]. US may not be an acceptable method for detecting the pathology in patients with metabolic liver disease [18]. There may also computed tomography which provides more accurate examination along with Hounsfield unit measurements of liver [19]. For detecting steatosis, non-contrast CT scanning appear more successful than contrast enhanced computed tomography [20]. Evaluation of hepatic attenuation independently, normalization of liver attenuation by splenic attenuation, expressing discrepancy in spleen and liver attenuation, and giving proportion of findings are only a few of the methods for determining the correct CT readings [21]. The spleen attenuates roughly 8–10 HUs in normal persons, which is less than the [22]. A liver attenuation of < 40 HUs on CT. Hepatosteatosis is found to be significantly predicted by CT [23]. Spleen attenuation ratios in CT are beneficial for identifying >30 percent steatosis. This approach has a sensitivity of 73%-100% and a specificity of 100% [24]. As a result, assessment of liver fat on CT is a relevant modality for individuals suffering from metabolic syndrome, such as those with diabetes mellitus [25]. This study showed that diabetes mellitus is strongly linked to metabolic associated liver diseases. This study will evaluate the impact of diabetes on liver on computed tomography. Obesity and a sedentary lifestyle are two variables that extend the chance of diabetes. To avoid diabetes-related disorders such as non-alcoholic hepatic disease maintain a healthy lifestyle consisting of nutritious food, activity, and body weight.

METH O DS

It was a cross-sectional study conducted on 50 diabetic patients using convenient sampling method. The research was carried out in CT department of radiology of tertiary care hospital in Gujranwala, Pakistan. Males and females between the ages of 30-80 who had undergone abdominal CT scans were included in this study. A written consent form was also signed by patients. This study was conducted over 4 months from December 2021 to March 2022. Data were entered and analyzed using SPSS version 20.0. Abdominal CT scan were performed using TOSHBA CT scan Machine.

R E S U L T S

Table 1 is showing 50 diabetic patients that includes 33(66%) males and female 7(34%). Males are more prone to develop liver diseases.

| Gender | Frequency | Percent |
|--------|-----------|---------|
| Female | 17        | 34.0    |
| Male   | 33        | 66.0    |
| Total  | 50        | 100.0   |

Table 1: Frequency distribution of gender of diabetic patients

Table 2 shows that diabetic patients of senior age group (50-60) years are most commonly affected 27(54%) with non-alcoholic fatty liver. Minimum frequency of patients is 7(14%) in the age group of (70-80).

| Age Groups | Frequency | Percent |
|------------|-----------|---------|
| 30-40 years| 16        | 32.0    |
| 50-60 years| 27        | 54.0    |
| 70-80 years| 7         | 14.0    |
| Total      | 50        | 100.0   |

Table 2: Frequency distribution of age group in diabetic patients

Table 3 shows the findings that the diabetic patients frequently had fatty liver 22(44%), fatty liver disease along with cardiovascular disease was 11(22%). Some other findings with low occurrence of metabolic fatty liver disease were hypertension and hyperlipidemia 7(14%). Only 2(2%) of patients are affected with renal failure, fatty liver, stroke, only 2(2%) affected with malignant abdominal mass. The patients affected with malignant liver disease, cirrhosis are 2(2%), 2(2%) affected with hypertension and dyslipidemia and only 2(2%) affected with obesity, hypertension and fatty liver. Diabetic patients most commonly have fatty liver disease and hypertension as compared to non-diabetic patients.
DISCUSSION

Total 50 patients were included in this investigation. Effects of diabetes mellitus type-2 on the liver using a CT scan. The participants in the study ranged in age from 30 to 80 years old. The patient's age and gender have an impact on diabetes. Diabetes increases the risk of long-term problems, which usually manifest themselves after a few years. Blood vessel damage is the most serious long-term impact. This study reveals that male diabetic patients are more commonly to have non-alcoholic fatty liver disease (33%) than females (17%). Elderly diabetic patients of age group of 50-60 years are most commonly affected by (27%). The current study found that diabetic patients most commonly have fatty liver disease and hypertension than non-diabetic patients. Osama et al., published 2020 was also mentioned that elderly people with type-2 diabetes mostly affected by fatty liver and hypertension than non-diabetic. Hyperglycemia levels damage major body organs over time. They were also mentioned that male diabetic patients more commonly affected with metabolic liver disease.[26]. In current research 22(44%) diabetic patients were affected with only fatty liver disease and 11(22%) patients affected with heart disease and fatty liver and 7(14%) affected with hypertension, fatty liver, and hyperlipidemia. This study proved that diabetic patients are more commonly to have metabolic hepatic disease. There was a strong correlation between diabetes mellitus type-2 and metabolic fatty liver disease. A previous study was done by Hegazy et al 2019 also prove that there is a strong relationship between diabetes and fatty liver disease by comparing Hounsfield units of the liver in non-diabetes mellitus patients and diabetic patients.[27]. Abayazed, 2019 also concluded no association between substantial Hyperlipidemia and enlargement of liver in diabetes patients.[28]. In current study also said that Hyperlipidemia was 7(14%) linked with diabetes mellitus and fatty liver. In the current study, it was proved that diabetic patients were mostly affected with only fatty liver 22(44%) and heart disease, fatty liver. 11(22%) Prevalence of these disorders increases in diabetic patients more than in other diseases. Osama et al., 2020 also mentioned that there is a strong association between type-2 diabetes and metabolic fatty liver disease and heart disease.[26].

CONCLUSION

In conclusion, diabetic people in their later years, particularly those between the ages of 50 and 60, are more probably than non-diabetic patients to have metabolic associated fatty liver disease and hypertension. In this study, men more likely to have fatty liver diabetes mellitus Type-2 than women. Metabolic fatty liver disease is commonly found in people with diabetes mellitus, and it's linked to a major organ damage and metabolic disorders. Fatty liver largely influences diabetes co-morbidities and outcomes when type 2 diabetes is present (hepatic and cardiovascular). This study proved that there is an ethnic correlation in between the fatty liver disorders and heart disorders in a sample of type-2 diabetic individuals in our investigation.

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