

Correlation of non-alcoholic fatty pancreas with non-alcoholic fatty liver disease by transabdominal ultrasound examination

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Abstract

Background: Nowadays, fat infiltration in the pancreas is a common finding during the routine abdominal ultrasound examination. It is also often noted that fatty infiltration in pancreas is a finding along with the fatty infiltration in the liver. So, an association between non-alcoholic fatty pancreas (NAFP) and non-alcoholic fatty liver disease (NAFLD) is plausible which is noted mainly in the urban population and the developing countries. Many studies have been done on this subject. It is also noted in many previous studies, several metabolic factors which play a role in the relation to fatty pancreas are also related to the fatty liver disease. Today, the clinical consequences of non-alcoholic fatty pancreas have brought it to attention of many clinicians, especially those involved in gastroenterology. Our study aimed to identify the possible association between the non-alcoholic fatty pancreas with non-alcoholic fatty liver disease. **Materials and method:** In this retrospective study 1220 cases were taken from Jan 2018 to Jan 2019. The age group was between 20 to 60 years. This study was undertaken in JJ diagnostic centre, Bhubaneswar, Odisha, India. We had used the GE LOGIQ P5 ultrasound machine with 3.5 MHz curvilinear probe in our diagnostic clinic for this study. The scans were done by two experienced radiologists. **Results:** Through our study it is observed that there is a positive correlation between prevalence of NAFP and NAFLD. Fatty Pancreas is a common finding during abdominal ultrasound examination. **Conclusion:** though our study has detected increased prevalence of fatty pancreas in the normal population and association with fatty liver. Further studies are required to find out how the metabolic abnormalities are related with non-alcoholic fatty pancreas.

Keywords: NAFP (Non-alcoholic fatty pancreas) NAFLD (Non-alcoholic fatty liver disease, Abdominal Ultrasound, Metabolic Diseases).

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Introduction

Fatty accumulation in the visceral organs of human body may be due to high fat intake. Non-alcoholic fatty pancreas can be due to many factors, out of which obesity may be a principal cause in absence of alcoholic consumption.

Various terms have been used to describe intrapancreatic fat. These are non-alcoholic fatty pancreatic disease, lipomatous atrophy of pancreas, pancreatic adiposity, fatty replacement of pancreas, pancreatic steatosis and fatty infiltration of the pancreas[1].

Fatty pancreas otherwise known as pancreatic steatosis was first described by Ogilvie in 1978[2]. In this study they have observed 17% of the obese patients were having fatty pan

creas and only 7% were having fatty pancreas in slim patients. Also, Olsen et al found an increase in amount of fat deposition in pancreas which was in direct relationship with age. Stamm in his research found an increase in fat content in pancreas with higher age[3]. Van Geenen et al in their studies noted that insulin resistance plays an important role in fatty deposits of pancreas.

This subsequently leads to peripheral steatosis and influx of fatty acids into the hepatic parenchyma and causes non-alcoholic fatty liver disease.

Many literatures have supported the association between non-alcoholic fatty pancreas with non-alcoholic fatty liver disease. In

both diseases there is correlation of metabolic syndrome[4]. Embryologically, pancreas and liver bud from the same embryonic endoderm. This may be an explanation for the correlation between the NAFPD and NAFLD[5]. Many authors have noted in their papers that NAFLD is present in nearly 70% of patients with NAFLD. Several risk factors are well known to play the role in deposition of fat in pancreas as well as liver viz hypertension, male gender, hypertriglyceridemia, and central obesity[6,7]. Dite P et al in their study noted that there are various mechanisms and risk factors leading to accumulation of fat in pancreas like older age, high body mass index, dyslipidemia, or metabolic syndrome with metabolic dysfunction[8]. Taking note of the various studies in consideration, in our study we try to address the need for evaluating the correlation between non-alcohol fatty pancreas with non-alcoholic fatty liver disease.

Materials and methods

Total number of patients taken for our studies were 1220. This was a retrospective study which was done from Jan 2018 to Jan 2020 (Two years). Age group of these patients were 20 years to 60 years (both male or female). This study was taken in the JJ diagnostic centre which is based in the urban area (Bhubaneswar, the capital of Odisha). GE LOGIQ P5 machine with 3.5MHz curvilinear probe was used for this study. Two number of experienced Radiologist took this study by doing abdominal ultrasound Examination.

Inclusion criteria

- Patients age group 18 years to 60 years(Both male and female).
- No serious illness of the patient at the time of examination.
- Having routine laboratory tests of LFT, FBS and PPBS
- Patients having Fatty liver only.

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Exclusion criteria

- Alcoholic fatty liver disease
- No visualization of the pancreas on Abdominal Ultrasound.
- Patients with a history of renal disease
- History of alcohol consumption.
- History of pancreatic operation.
- Pancreas having other diseases.

Patients were examined clinically after consent. All the preparation as per the protocol of abdominal ultrasound examination was done prior to procedure. Patients were examined in the supine position. Pancreatic echogenicity was compared to the renal cortex echogenicity and liver echogenicity. If pancreas was not visualised, we tried to examine in right lateral decubitus position with waterbed in stomach.

The fatty pancreas is defined as an image of increased echogenicity of the pancreatic parenchyma when compared to renal and liver echogenicity[9].The pancreas was examined following liver, or both kidneys to evaluate out the echogenicity.A comparative hyperechoic pancreas as compared to renal cortex was given the diagnosis of fatty pancreas. After primary assessment, presence of

raised echogenicity of pancreas was compared with presence of hepatic steatosis. The ultrasound findings of the patient were studied against the laboratory parameters of liver function tests, lipid and gluco-insulinemic profile (RBS, HbA_{1c}). If laboratory data was not available, the patients were advised for the laboratory investigation as per requirement.

Results

The total number of patients examined was 1220. Out of this pancreas was visualized during abdominal ultrasound examination was in 980 patients (80.32%) and non-visualization of pancreas in 240 (19.67%) Out of the visualized pancreas of 980 patients, the fatty pancreas was in 376 patients(38.36%) and the non-fatty pancreas was in 604 (61.63%). Out of 376 patients having fatty pancreas patients, 282 (75%) were found to have fatty liver and 94 patients (25%) were normal liver. Out of 604 patients where there was no evidence of fatty pancreas 316 patients were having fatty liver so it was observed from our study that 282 patients (75%) having both fatty liver or fatty pancreas.

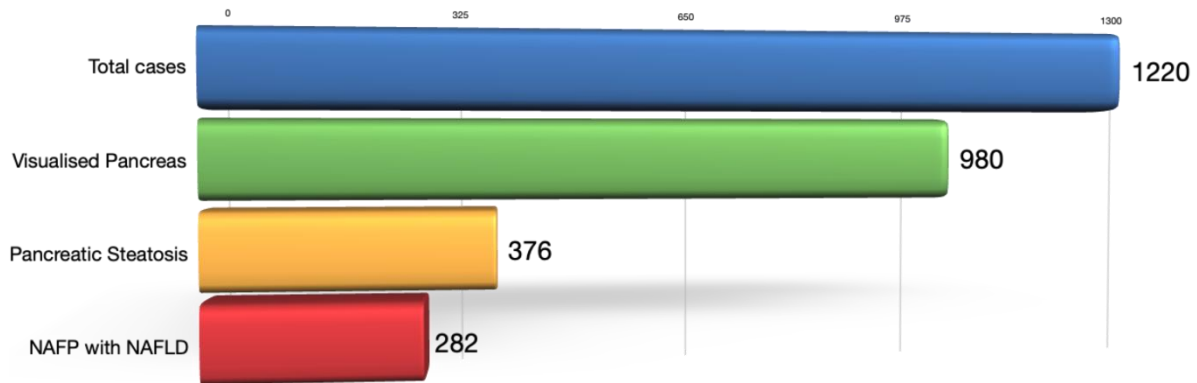


Fig 1:Depiction of cases

From our study, another finding was noted that in 240 patients having non visualization of the pancreas by abdominal ultrasound examination,178 patients were having a fatty liver.

It is also found in our study the males(68%) having more fatty pancreas than female(31.91%)

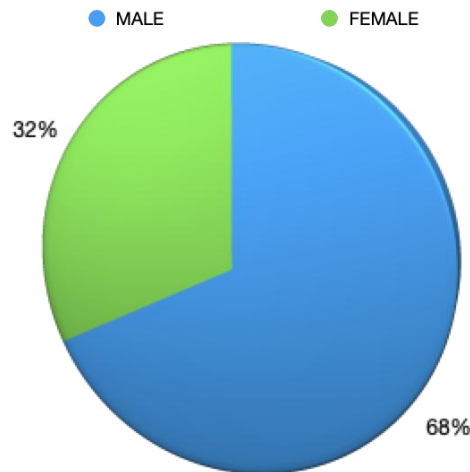


Fig 2:Percentage distribution

Age group relation was also present. Fatty pancreas found more in the age group of 40-60 years (advanced age) than the young age group. This finding is similar to many previous studies [10-12]. Out of 282 patients having both fatty pancreas and fatty liver 198 patients (70.21%) were in the age group of 40-60 years and 84 patients (29.78%) were in the younger age group.

Discussion

In our study detection of the fatty pancreas was 38.36%. In a study by Lesmana et al detection of the fatty pancreas was 35% [13]. In a study done in Korea, it was 67.9%. The study of Korea is on the higher side may be due to obese patients only, whereas our study was generalized.

Patients having both fatty liver and fatty pancreas was 76%. Out of 376 patients where fatty pancreas was diagnosed by abdominal ultrasound. So both fatty liver and fatty pancreas are significantly associated with metabolic risk factors.

Basically, two mechanisms lead to fatty deposition in the pancreas.

- (a) Death of acinar cells and their substitution by adipose tissue called "Fatty replacement"
- (b) Fat accumulation in form of fatty infiltration.

Many studies have shown that maternal obesity or postnatal obesogenic diet leads to the onset of NAFLD. Dite et al stated in their articles that obesity, arterial hypertension, hyperglycemia, changes in HDL, cholesterol, or Blood sugar (DM) plays a role in NAFLD [8]. From our study it is noted that Fatty pancreas is more detected in advanced age which is also described in many previous studies [14-16].

Conclusion

The transabdominal ultrasound may not be the best choice for diagnosing fatty pancreas and correlation with fatty liver in comparison to other modalities. Still it can be an accepted modality if done by an experienced radiologist for detection of the fatty pancreas and its correlation with fatty liver due to its easy availability and low cost investigation. No doubt it is observed from our study that there is a higher side of prevalence in urban population. Also, the maximum number of cases do have both fatty pancreas and fatty liver. In this modern era, lifestyle changes have changed dietary habits and livelihood. Therefore obesity or different metabolic disease have been a factor for fatty liver and fatty pancreas. Non-Alcoholic Fatty Pancreatic Disease (NAFLD) is nowadays a concern to the gastroenterologist and other clinicians. Therefore the diagnosis of the fatty pancreas by transabdominal ultrasound should be given priority by the side of fatty liver. By this, we can prevent the future bad prognosis of pancreatic disease.

In our opinion, further related research works and detailed studies are required to know the risk factors related to NAFLD which can be a threat to the life of human beings. It is because Intrapancreatic Fat (IPF) may have a role in causing or aggravating many diseases of the pancreas like metabolic, inflammatory fistula, neoplastic diseases.

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