**International Journal of Medicine Research**
**ISSN: 2455-7404; Impact Factor: RJIF 5.42**
**Received: 08-02-2019; Accepted: 13-03-2019**
**www.medicinesjournal.com**
**Volume 4; Issue 2; April 2019; Page No. 112-114**

# Non alcoholic fatty liver disease: A silent indicator of severity in acute pancreatitis

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**Abstract**
Acute pancreatitis (AP) is one of the most common diseases of the gastrointestinal tract. The most common cause of AP is gallstones and alcohol. Other causes include medications, infectious agents and metabolic causes. Recent studies have identified obesity as an etiological factor and a marker of poor prognosis in AP. Nonalcoholic fatty liver disease (NAFLD) is a condition characterized by deposition of lipids in the hepatocytes. Obesity, particularly metabolic obesity, is associated with an increased incidence and severity of AP. NAFLD is a marker of metabolic obesity, which can be easily diagnosed, with the help of initial abdominal ultrasound (AUS) routinely performed in all patients with AP upon admission to assess a biliary aetiology. Many recent studies have identified obesity as a marker of poor prognosis in AP. Results from meta-analysis show that obesity (defined as BMI>30) was associated with significantly higher incidence of systemic and local complication and higher rate of mortality from AP. Several independent studies have also confirmed this observation.

**Keywords:** AP, NAFLD, AUS, BMI, MAC, BISAP, LOS

## Introduction
Visceral obesity, which is a component of metabolic syndrome, has been recognized to have a stronger correlation with poor outcomes in patients with AP [1-7]. NAFLD is an objective marker of visceral obesity. Other objective markers of visceral obesity that have been studied in the past as prognostic markers for AP include waist circumference and visceral adipose tissue assessment on CT abdomen. Abdominal Ultrasound (AUS), performed on admission in all patients with AP in order to evaluate a biliary aetiology, in addition helps to diagnose NAFLD.

## Aim of the study
- The aim of this study is to identify the clinical utility of detecting NAFLD by AUS in determining the severity of patients with AP.

## Materials and methods
- 40 non-alcoholic patients with Acute Pancreatitis were divided into two groups (Group A includes patients with NAFLD and Group B includes patients with no fatty liver disease with 20 patients in each group) after evaluating all patients with AUS at the time of admission. The diagnosis of NAFLD was based solely on imaging findings.
- Severity of AP was analysed using the Bed Side Index of Severity (BISAP) score and Modified Atlanta Classification (MAC) [10, 11].
- Frequency of ICU admission, mean length of stay (LOS) and in both the groups were also evaluated.
- The data was analysed using the student's T-test, chi-square test and multivariate regression analysis.

## Results
- The mean age of patients in group B was 53.4 years and the mean age in group A was 50.50 years.
- The difference between the ages was not statistically significant (p value=0.0938).
- The proportion of male patients in group B was 32.5% and in group A was 38.3%. The difference again was not statistically significant.

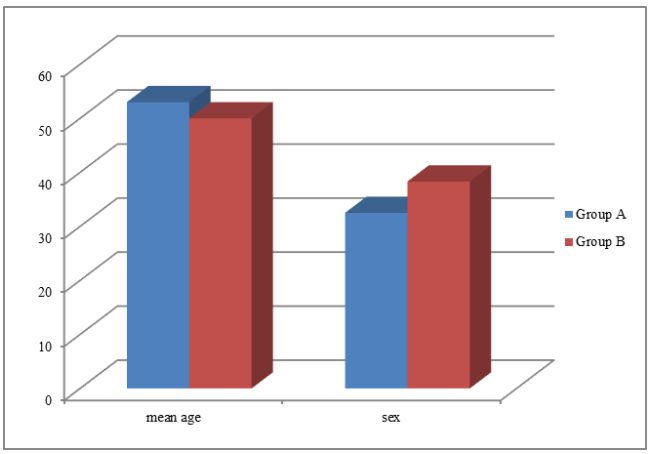


**Fig 1**

- Patients in group A, as expected, had a higher mean BMI and higher prevalence of hypertension, hyperlipidemia and diabetes.
- The mean BMI in group B as 28.07 and the mean BMI in the group B was 30.22, the difference between the two groups being statistically significant (p=0.0001).

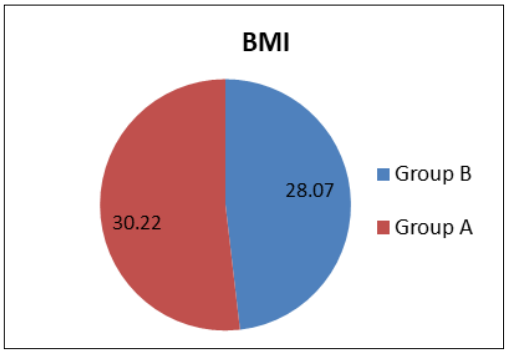


**Fig 2**

- The prevalence of hypertension in the Group B and group A was 36.5% and 51.3% respectively, the difference being statistically significant (p=0.001).
- The prevalence of Hyper lipidemia in group B was 24.1% and in group B was38.3%, the difference being significant with p value of <0.0001.
- The prevalence of Diabetes in group B and group A was23.4% and 31.6% with the difference being significant at p=0.034.
- Patients with NAFLD had a more severe disease compared to patients with no fatty liver disease as measured by several well-validated single prognostic markers and two scoring systems. The difference was statistically (p value less than 0.05) significant
- Serum amylase levels are significantly high in group A patients compared to group B patients.
- Mean serum amylse levels in group A is 296.53IU/dl, where as in group B it is found to be 183.21IU/dl

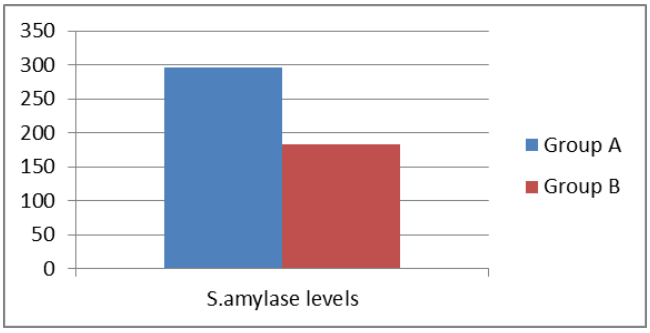


**Fig 4**

- The mean BISAP score in group B was 0.544 and in group A was 0.813. This difference was significant at P=0.0003.

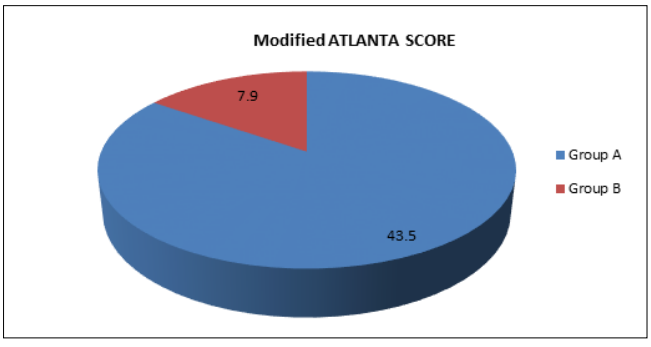


**Fig 5**

- The clinical outcomes also were significantly different in both the groups. The mean length of stay in the non-NAFLD group was 5.34 days where as the mean length of stay in the NAFLD group was 7.14 days with the difference being significant at p=0.04.
- The rate of ICU admission in the non-NAFLD group and the NAFLD group were 4.5% and 16.1% respectively, again significant statistically at p <0.001

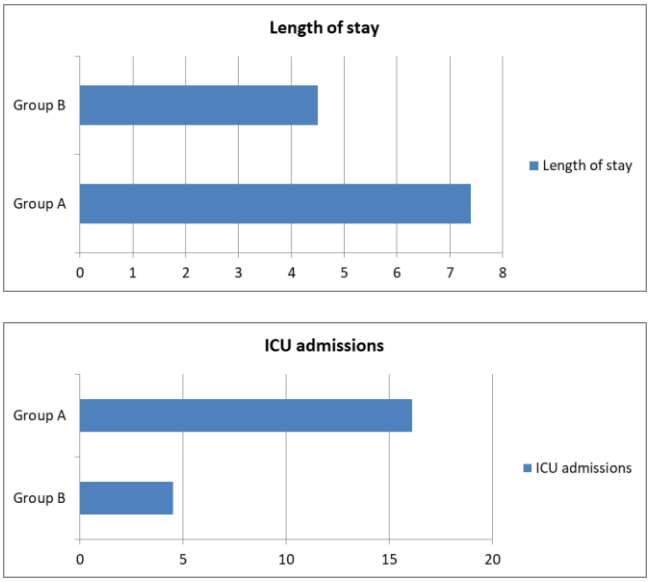


**Fig 6**

- The results of multivariate regression analysis determining the individual effects of age, sex, BMI, hypertension, Hyper lipidemia and diabetes on the BISAP score, mean albumin, hematocrit, length of stay, ICU admission.
- Increased BMI, by itself, was not associated with any difference in outcomes in patients with NAFLD and without NAFLD.
- Age, sex and individual components of metabolic syndrome did not influence the prognostic markers.
- P value less than 0.05 was considered significant

## Discussion

Our study shows that NAFLD is an additional marker of severity in patients with AP. As compared to patients with no fatty liver disease, patients with NAFLD had a more severe course of AP as measured by several well-validated single prognostic markers as well as scoring systems. The diagnosis of NAFLD is available easily at the time of presentation an initial AUS is performed in all patients with suspected AP. The association between obesity and AP has been looked at in a number of studies, which correlated an increased incidence and worsened severity of AP.

From a meta-analysis of 11 prospective studies with a pooled population of 8702 individuals, the pooled relative risk (RR) for developing AP in individuals with a normal BMI as compared to individuals with a BMI of greater than 25 was 1.43(95% CI 1.09-1,87, p Value <0.01).The pooled data of 3 studies involving 1029 individuals shows that the relative risk of developing AP in individuals with a waist circumference >105 cm as compared to individuals with a waist circumference <75 cm was 2.37 (95% CI) [12]. A

smaller number of recent studies have specifically assessed the role of visceral obesity in poor prognosis of AP [13-15]. Lipotoxicity is related to visceral adiposity and fatty liver than with generalized obesity The pathogenesis of increased severity with visceral obesity is postulated to be related to pro-inflammatory cytokines. Lipotoxic visceral fat is associated with metabolic syndrome and is known to secrete pro-inflammatory cytokines like TNF-α, Interleukin-6 and Leptin [16-18]. These cytokines, in turn, promote the complications of metabolic syndrome by a pro-inflammatory state [19].

AP is a cytokine mediated disease and many, if not all, systemic complications of AP are attributed to the pro-inflammatory cytokines. Patients with severe AP are noted to have increased visceral fat, higher serum cytokines (Interleukin 6, Monocyte chemo attractant protein -1) and adipokines (resistin and visfatin) [20] NAFLD is an objective marker of visceral obesity. Patients with severe AP are noted to have increased visceral fat, higher serum cytokines (Interleukin 6,Monocyte chemo attractant protein -1) and adipokines (resistin and visfatin) [20] AST, ALT levels poorly correlate with NAFLD, further they are abnormal in biliary AP. AUS on the other hand, is routinely performed in all patients to rule out a biliary aetiology for AP. On AUS, presence of fatty liver demonstrates a diffuse increase in echogenicity. The sensitivity and specificity of AUS for detecting hepatic fatty infiltration is 93% and 77% respectively as compared to histology as a gold standard [22]. Above all, AUS is inexpensive with no radiation risk.

## Conclusion

- Presence of NAFLD as diagnosed by early AUS can be used as an additional single marker of prognosis in AP.

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