

# Association of non-alcoholic fatty liver with obesity - A Retrospective study

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## **Abstract**

### **Aim**

To find the association of fatty liver in obese patient.

### **Objective**

To assess the relationship between body mass index and non-alcoholic fatty liver disease

### **Introduction**

Non-alcoholic fatty liver disease (NAFLD) is the most common cause of abnormal liver functions. The spectrum of NAFLD ranges from simple steatosis to non-alcoholic steatohepatitis (NASH), which can progress to end-stage liver disease. Obesity is a common nutritional problem often associated with diabetes, insulin resistance, and fatty liver. Major improvements in the biochemical and histological features of liver disease have been observed following weight loss after bariatric surgery in obese patients.

### **Materials and methods**

The retrospective study was conducted in saveetha medical college, Chennai. Case sheets of 40 obese patients were collected. A Performa was created with all the essential details such as name, age, sex, hospital number, final diagnosis, height, weight, BMI, FBS, LFT (TB, DB, SGOT, SGPT, ALP, TP, ALB), RFT, blood urea, lipid profile, USG -abdomen, THS, T3, T4, uric acid. The data was filled in excel sheet and the statistical data was analysed and results were tabulated.

### **Result**

Data from 40 obese patients were recorded out of which 12 were male and 28 were female out of which 12 patients had NAFLD. Mean height of the patient with NAFLD is  $154.7 \pm 13.03$  and without NAFLD it is  $154.5 \pm 17.74$ , mean height of patient with NAFLD is  $85.67 \pm 4.5$  and without NAFLD is  $72.2 \pm 18.1$ , mean BMI of patient with NAFLD is  $36.3 \pm 5.63$  and without NAFLD is  $29.8 \pm 5.4$ , mean total bilirubin of patient with NAFLD is  $0.52 \pm 0.23$  and without NAFLD is  $0.65 \pm 0.1$ , mean direct bilirubin of the patient with NAFLD is  $0.46 \pm 0.43$  and without NAFLD is  $0.5 \pm 0.6$ , mean SGOT of patient with NAFLD is  $28 \pm 5.7$  and without NAFLD is  $31.5 \pm 15.9$ , mean SGPT of the patient with NAFLD is  $25.1 \pm 8$  and without NAFLD is  $26 \pm 10.4$ , mean alkaline phosphate of patient with NAFLD is  $80.4 \pm 10.74$  and without NAFLD is  $67.2 \pm 16.48$ , mean total protein of patient with NAFLD is  $5.59 \pm 0.6$  and without NAFLD is  $6.64 \pm 0.72$ , mean albumin of patient with NAFLD is  $3.17 \pm 0.74$  and without NAFLD is  $3.17 \pm 0.83$ , mean blood urea in patient with NAFLD is  $28.05 \pm 5.32$  and without NAFLD is  $30.67 \pm 16.61$ , mean serum creatinine of patient with NAFLD is  $0.97 \pm 0.3$  and without NAFLD is  $1.38 \pm 0.82$ .

## Conclusion

Recent studies have proved that obesity is one of the emerging major causes of fatty liver leading to cirrhosis. Hence emphasising on weight reduction measures to prevent NAFLD. This study shows 70% of obese patient have fatty liver and controlling obesity can prevent fatty liver.

## Introduction

Liver is an important organ, it performs various metabolic activities, it also has the capacity to transform, store and release nutrients [1]. Obesity is one of the dangerous health hazards .Obesity has emerged as a global epidemic with a spectrum of psycho-social and medical consequences. It affects all most all the organs, cardiovascular and endocrine systems are affected more than others. Non alcoholic fatty liver (NAFL) is defined as the presence of hepatocellular injury in the form of ballooning of the hepatocytes. Non alcoholic fatty liver disease (NAFLD) resembling alcohol-induced injury but occurs in patients who do not use alcohol. Non alcoholic fatty liver disease (NAFLD) is the most common cause of abnormal liver functions. When fat begins to accumulate outside these regular depots, within the liver and other organs, it is named ectopic fat when it is not due to alcohol abuse then the condition is termed non alcoholic fatty liver disease (NAFLD) (1) .There is a growing concern for non alcoholic fatty liver disease (NAFLD) in clinical hepatology [1] .The spectrum of NAFLD ranges from simple steatosis to non alcoholic steatohepatitis (NASH), which can progress to end-stage liver disease. Obesity is a common nutritional problem often associated with diabetes, insulin resistance, and fatty liver. Major improvements in the biochemical and histological features of liver disease have been observed following weight loss after bariatric surgery in obese patients [2-7]. On the basis that obesity is a principal factor in the pathogenesis of NAFLD, it would be. Expected that weight loss should be therapeutic the effect of weight loss on NAFLD remains unclear. Several small studies have examined the effect of diet induced weight loss on NAFLD and have demonstrated an improvement in liver enzyme levels and steatosis [8-15].

## Materials and methods

The retrospective study was conducted in saveetha medical college, Chennai. Case sheets of 40 obese patients were collected .A pro-forma was created with all the essential details such as name ,age , sex, hospital number ,final diagnosis , height , weight ,BMI , FBS ,LFT (TB, DB ,SGOT ,SGPT ,ALP , TP ,ALB ) , RFT ,blood urea ,lipid profile , USG –abdomen ,THS, T3 ,T4 , uric acid .The data was filled in excel sheet and the statistical data was analysed and results were tabulated [9,16-18] .

## Pro-forma

Association of fatty liver and obesity –pro-forma

Name:

Age:

Sex:

Hospital number:

Final diagnosis:

Height:

Weight:

Body Mass Index:

- Mild
- Moderate
- Sever

Fasting blood sugar:

Postprandial:

Liver Function Test:

TB: DB: SGOT: SGPT: ALP: TP: ALB:

Renal Function Test:

Blood urea:

Lipid profile:

USG: - abdomen

- gall stones

Thyroid: - TSH

-T3

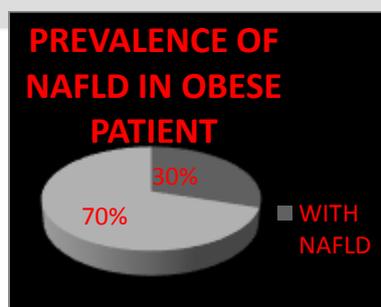
- T4

## Results

Data from 40 obese patient were recorded out of which is 12 were male and 28 were female out of which 12 patient had NAFLD .Mean height of the patient with NAFLD IS  $154.7 \pm 13.03$  and without NAFLD it is  $154.5 \pm 17.74$ , mean height of patient with NAFLD is  $85.67 \pm 4.5$  and without NAFLD is  $72.2 \pm 18.1$ , mean BMI of patient with NAFLD is  $36.3 \pm 5.63$  and without NAFLD is  $29.8 \pm 5.4$ , mean total bilirubin of patient with NAFLD is  $0.52 \pm 0.23$  and without NAFLD is  $0.65 \pm 0.1$ , mean direct bilirubin of the patient with NAFLD is  $0.46 \pm 0.43$  and without NAFLD is  $0.5 \pm 0.6$ , mean SGOT of patient with NAFLD is  $28 \pm 5.7$  and without NAFLD is  $31.5 \pm 15.9$ , mean SGPT of the patient with NAFLD is  $25.1 \pm 8$  and without NAFLD is  $26 \pm 10.4$ , mean alkaline phosphate of patient with NAFLD is  $80.4 \pm 10.74$  and without NAFLD is  $67.2 \pm 16.48$ , mean total protein of patient with NAFLD is  $5.59 \pm 0.6$  and without NAFLD is  $6.64 \pm 0.72$ , mean albumin of patient with NAFLD is  $3.17 \pm 0.74$  and without NAFLD is  $3.17 \pm 0.83$ , mean blood urea in patient with NAFLD is  $28.05 \pm 5.32$  and without NAFLD  $30.67 \pm 16.61$ , mean serum creatine of patient with NAFLD is  $0.97 \pm 0.3$  and without NAFLD is  $1.38 \pm 0.82$ .

**Table 1: comparison of NAFLD patient with non NAFLD patient**

VARIABLES	WITH NAFLD		WITHOUT NAFLD	
	MEAN	SD	MEAN	SD
HEIGHT	154.7	13.03	154.5	17.74
WEIGHT	85.67	4.5	72.2	18.1
BMI	36.3	5.63	29.8	5.4
TB	0.52	0.23	0.65	0.10
DB	0.46	0.43	0.5	0.6
SGOT	28	5.7	31.5	15.9
SGPT	25.1	8	26	10.4
ALP	80.4	10.74	67.2	16.48
TP	5.59	0.60	6.64	0.72
ALB	3.17	0.74	3.17	0.83
BLOOD UREA	28.05	5.32	30.67	16.61
S.CREATINE	0.97	0.3	1.38	0.82



**Fig 1: prevalence of NAFLD in obese patient**

## Discussion

Data from 40 obese patient were recorded out of which is 12 were male and 28 were female out of which 12 patient had NAFLD .Mean height of the patient with NAFLD IS  $154.7 \pm 13.03$  and without NAFLD it is  $154.5 \pm 17.74$ , mean height of patient with NAFLD is  $85.67 \pm 4.5$  and without NAFLD is  $72.2 \pm 18.1$ , mean BMI of patient with NAFLD is  $36.3 \pm 5.63$  and without NAFLD is  $29.8 \pm 5.4$ , mean total bilirubin of patient with NAFLD is  $0.52 \pm 0.23$  and without NAFLD is  $0.65 \pm 0.1$ , mean direct bilirubin of the patient with NAFLD is  $0.46 \pm 0.43$  and without NAFLD is  $0.5 \pm 0.6$ , mean SGOT of patient with NAFLD is  $28 \pm 5.7$  and without NAFLD is  $31.5 \pm 15.9$ , mean SGPT of the patient with NAFLD is  $25.1 \pm 8$  and without NAFLD is  $26 \pm 10.4$ , mean alkaline phosphate

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Results were similar to the study done by Ronald J.H. Borra [1] which states that increased liver fat content with impaired myocardial metabolism supports the existence of a recently proposed "liver-vessel axis" which hypothesizes that similar biological precursors effect the development of both atherosclerosis and non-alcoholic fatty liver disease (NAFLD). Henrike Sell [2] stated that Chemerin concentrations are elevated in obese patients and it is also a marker of liver disease. Chemerin plasma concentrations decreased after bariatric surgery. John B. Dixon [3] stated that, there was a major improvement in the biochemical and histological features of liver disease associated with obesity and metabolic syndrome with weight loss after LAGB surgery. Giulio Marchesini [4] stated that, the increasing prevalence of obesity, coupled with diabetes, dyslipidemia, hypertension, and ultimately the metabolic syndrome puts a very large population at risk of forthcoming liver failure in the next decades. Prashant Mathur [5] stated that although much remains to be learned about paediatric NAFLD, it is already evident that children with NASH risk progressive liver damage. Hye-soon park, [6] stated that, Degree of hepatic improvement or deterioration did not correlate with the degree of weight reduction or increment, there were significant difference in liver function changes with weight changes between weight reduction groups and non weight reduction groups. Therefore liver function will improve by weight reduction if or their causes are ruled out [19, 20].

## Conclusion

Recent studies have proved that obesity is one of the emerging major causes of fatty liver leading to cirrhosis. This study shows 70% of obese patient have fatty liver and controlling obesity can prevent fatty liver.

## References

1. Borra R. Nonalcoholic Fatty Liver Disease in Obesity and Type 2 Diabetes-Studies using 1H MRS and PET
2. Sell H, Divoux A, Poitou C, Basdevant A, Bouillot JL, Bedossa P, Tordjman J, Eckel J, Clement K. Chemerin correlates with markers for fatty liver in morbidly obese patients and strongly decreases after weight loss induced by bariatric surgery. *The Journal of Clinical Endocrinology Metabolism*. 2010 Jun 1;95(6):2892-6
3. Dixon JB, Bhathal PS, Hughes NR, O'Brien PE. Nonalcoholic fatty liver disease: improvement in liver histological analysis with weight loss. *Hepatology*. 2004 Jun 1;39(6):1647-54.
4. Marchesini G, Bugianesi E, Forlani G, Cerrelli F, Lenzi M, Manini R, Natale S, Vanni E, Villanova N, Melchionda N, Rizzetto M. Nonalcoholic fatty liver, steatohepatitis, and the metabolic syndrome. *Hepatology*. 2003 Apr 1;37(4):917-23
5. Mathur P, Das MK, Arora NK. Non-alcoholic fatty liver disease and childhood obesity. *The Indian Journal of Pediatrics*. 2007 Apr 1;74(4):401-8
6. Park HS, Kim MW, Shin ES. Effect of weight control on hepatic abnormalities in obese patients with fatty liver. *J Korean Med Sci*. 1995 Dec 1;10(6):414-21.
7. Merriman RB, Ferrell LD, Patti MG, Weston SR, Pabst MS, Aouizerat BE, Bass NM. Correlation of paired liver biopsies in morbidly obese patients with suspected nonalcoholic fatty liver disease. *Hepatology*. 2006 Oct 1;44(4):874-80
8. Chalasani N, Younossi Z, Lavine JE, Diehl AM, Brunt EM, Cusi K, Charlton M, Sanyal AJ. The diagnosis and management of non-alcoholic fatty liver disease: practice guideline by the American Gastroenterological Association, American Association for the Study of Liver Diseases, and American College of Gastroenterology. *Gastroenterology*. 2012 Jun 1;142(7):1592-609
9. Surapaneni KM, Saraswathi P, Shyama S, Subramaniam IV S. Type IV collagen: a non invasive bio marker to detect non-alcoholic steato hepatitis (NASH), among non-alcoholic fatty liver disease (NAFLD) patients. *J Clin Diagnos Res*. 2010;4:2483-8.
10. Fauzi NQ, Vishnupriya V, Gayathri R. Fatty Liver Disease-A Review. *Research Journal of Pharmacy and Technology*. 2016 Aug 1;9(8):1263.
11. Surapaneni KM, Saraswathi P, Jainu M. Non alcoholic steatohepatitis (NASH) experimental model induction in rats. *Int J Pharm Bio Sci*. 2012;3:1085-90.
12. Ueno T, Sugawara H, Sujaku K, Hashimoto O, Tsuji R, Tamaki S, Torimura T, Inuzuka S, Sata M, Tanikawa K. Therapeutic effects of restricted diet and exercise in obese patients with fatty liver. *Journal of hepatology*. 1997 Jul 1;27(1):103-7.
13. Adler M, Schaffner F. Fatty liver hepatitis and cirrhosis in obese patients. *The American journal of medicine*. 1979 Nov 1;67(5):811-6.
14. Vernon G, Baranova A, Younossi ZM. Systematic review: the epidemiology and natural history of non-alcoholic fatty liver disease and non-alcoholic steatohepatitis in adults. *Alimentary pharmacology & therapeutics*. 2011 Aug 1;34(3):274-85.
15. Kleiner DE, Brunt EM, Van Natta M, Behling C, Contos MJ, Cummings OW, Ferrell LD, Liu YC, Torbenson MS, Unalp-Arida A, Yeh M. Design and validation of a histological scoring system for nonalcoholic fatty liver disease. *Hepatology*. 2005 Jun;41(6):1313-21.
16. Matteoni CA, Younossi ZM, Gramlich T, Boparai N, Liu YC, McCullough AJ. Nonalcoholic fatty liver disease: a spectrum of clinical and pathological severity. *Gastroenterology*. 1999 Jun 1;116(6):1413-9.
17. Bellentani S, Scaglioni F, Marino M, Bedogni G. Epidemiology of non-alcoholic fatty liver disease. *Digestive diseases*. 2010;28(1):155-61
18. Wanless IR, Lentz JS. Fatty liver hepatitis (steatohepatitis) and obesity: an autopsy study with analysis of risk factors. *Hepatology*. 1990 Nov 1;12(5):1106-10.

19. Fabbrini E, Sullivan S, Klein S. Obesity and nonalcoholic fatty liver disease: biochemical, metabolic, and clinical implications. *Hepatology*. 2010 Feb 1;51(2):679-89.
20. Xu A, Wang Y, Keshaw H, Xu LY, Lam KS, Cooper GJ. The fat-derived hormone adiponectin alleviates alcoholic and nonalcoholic fatty liver diseases in mice. *The Journal of clinical investigation*. 2003 Jul 1;112(1):91-100

