

## **The Study of prevalence of Non-alcoholic fatty liver disease in type-2 diabetes mellitus and risk factors at tertiary care center.**

**AUTHOR : Dr N V A BENHUR ( Associate professor, General medicine, RMC, Kakinada )**

**CORRESPONDING AUTHOR -1 : Dr D MARKENDEYULU ( Associate professor, General Medicine, RMC, Kakinada )**

**CORRESPONDING AUTHOR - 2: Dr N HEMA SIREESHA ( Senior Resident, General Medicine )**

---

Date of Submission: 20-12-2020

Date of Acceptance: 03-01-2021

---

### **I. Back Ground :**

Non-Alcoholic fatty liver disease includes a spectrum of hepatic changes from steatosis alone to NASH which also encompasses the findings of steatonecrosis, Mallory bodies and fibrosis. It is particularly associated with Type-2 Diabetes, Obesity and Dyslipidemia.

The overall prevalence of NAFLD is 15 to 40% in Western countries and 9 to 40% in Asian countries.

The present study was conducted with an aim to study the prevalence of Non-Alcoholic Fatty Liver Disease in Type-2 Diabetes.

### **II. Materials And Methods :**

A CROSS SECTIONAL Study was conducted at tertiary care teaching hospital

(Rangaraya Medical College ) of Andhra Pradesh from January, 2019 to December, 2019. One Hundred out-patients of Type-2 Diabetes Mellitus - newly diagnosed or on follow-up, were included in the study.

All patients aged between 30 to 80yrs were included in the study. Patients with daily alcohol consumption of more than 20gm/day ( two 30ml drinks ), Chronic Viral Hepatitis, Co-existing Chronic Liver Disease, patients who were taking drugs - Amiodarone, Corticosteroids, Tamoxifen, Methotrexate, H/o Jejunio-ileal Bypass or extensive small bowel resection were excluded from the study.

After obtaining a written informed consent and ethical clearance, patients were subjected to clinical examination and investigated for FBS, PPBS, HBA1C, Aspartate Aminotransferase(AST), Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP), Total Bilirubin, Total Cholesterol, High Density Lipoprotein (HDL) cholesterol, Low Density Lipoprotein (LDL) and Triglycerides (TGL) were measured. Serological markers of viral (HbSAg and HCV) and Auto-Immune Hepatitis were estimated and Ultrasound to detect fatty changes in the liver.

### **STATISTICAL ANALYSIS:**

All the statistical work was performed by the statistical package for social sciences (SPSS) software. The frequency of NAFLD was shown as percentages. To estimate the differences between patients with and without NAFLD, the X<sup>2</sup> was applied. A p value of less than 0.05 was set as significant.

### **III. Results :**

The data was analysed and results were tabulated.

The following results were observed.

In the present study majority of the patients were in age group of 40-49, followed by 50-59yrs of age. Least were found in the 70-79yrs age group.

Out of 100 patients 51 were female and 49 were males, equally distributed.

In the present study, 3 were newly diagnosed, 50 patients were known to be diabetic for less than 5 years duration and 47 were diabetic for 5 and more than 5 years duration.

**TABLE-1  
DISTRIBUTION AS PER DURATION OF DIABETES**

| DURATION        | NUMBER |
|-----------------|--------|
| NEWLY DIAGNOSED | 3      |
| < 5YRS          | 50     |
| > 5YRS          | 47     |

**PREVALENCE :**

In the Present study the prevalence of NAFLD was found to be 35% i.e., 35 patients out of 100 were found to have fatty liver. ( Table - 2 )

**TABLE – 2: DISTRIBUTION OF NAFLD**

|               |    |
|---------------|----|
| with NAFLD    | 35 |
| without NAFLD | 65 |

In the present study out of 51 female, 15 had NAFLD - 29 % and 36 without NAFLD - 71% ; 20 of 49 Males ( 41% ) had NAFLD and 29 were (59% ) were without NAFLD. Males had higher prevalence of NAFLD when compared to females but it is not statistically significant ( P = 0.479 )

**Prevalence of NAFLD in different age groups :**

In the presence study , the prevalence of NAFLD was higher in the 50-59 age group ( 37% ) followed by 40- 49 age group - 27.9%. In other age groups, prevalence was low when compared to previous two groups. (Table - 3 )

**TABLE - 3 Age Distribution of NAFLD**

| AGE DISTRIBUTION | TOTAL | NO.OF.PATIENTS with NAFLD |
|------------------|-------|---------------------------|
| 30-39            | 9     | 1 (2.9%)                  |
| 40-49            | 43    | 12 (34.2%)                |
| 50-59            | 35    | 13 (37.1%)                |
| 60-69            | 12    | 9 (25.8%)                 |
| 70-79            | 1     | 0 ( 0% )                  |
|                  | 100   | 35                        |

**NAFLD Distribution according to duration of Diabetes :**

In the present study, majority (57 % ) of NAFLD patients were with duration of diabetes for 5 yrs or more, followed by those with Diabetes less than 5 yrs (37 % ) and lowest in newly diagnosed patients (5.7%)  $\chi^2= 1.97$   $P>0.05$  ( P=0.37) not significant. (Table - 4 )

**TABLE - 4 DISTRIBUTION OF NAFLD AS PER DURATION OF DIABETES**

| DURATION        | TOTAL | PATIENTS WITH NAFLD |
|-----------------|-------|---------------------|
| NEWLY DIAGNOSED | 3     | 2 (5.7%)            |
| < 5YRS          | 50    | 13 (37.2%)          |
|                 |       |                     |

*The Study of prevalence of Non-alcoholic fatty liver disease in type-2 diabetes mellitus ..*

|              |            |            |
|--------------|------------|------------|
| > 5YRS       | 47         | 20 (57.1%) |
| <b>TOTAL</b> | <b>100</b> | <b>35</b>  |

In the present study, 3 out of 26 at risk (BMI 23-24.9) overweight patients had NAFLD where as 21 out of 46 obese Type-1 (BMI: 25-25.9) patients had NAFLD and 11 out of 22 obese Type-2 ( BMI>30 ) patients had NAFLD.

Prevalence of NAFLD was higher in obese Type-2 (50%) followed by obese Type-1 (46%)

$\chi^2=5.38\%$  dif=2 P>0.05 ( Table - 5 )

Not statistically significant due to the small number of study groups.

**TABLE - 5 DISTRIBUTION OF NAFLD AS PER OVER WEIGHT CLASSIFICATION :**

| OVER WEIGHT CLASSIFICATION | TOTAL NO. OF PATIENTS | PATIENTS WITH NAFLD | PATIENTS WITHOUT NAFLD |
|----------------------------|-----------------------|---------------------|------------------------|
| AT RISK                    | 26                    | 3(12%)              | 23(88%)                |
| OBESE TYPE-1               | 46                    | 21(46%)             | 25(54%)                |
| OBESE TYPE-2               | 22                    | 11(50%)             | 11 (50%)               |
| NORMAL WEIGHT              | 6                     | 0                   | 0                      |
| <b>TOTAL</b>               | <b>100</b>            |                     |                        |

In the present study, 82 patients out of 100 had poor glycaemic control in which 33 patients had NAFLD (40%) and 49 without NAFLD (60%) whereas only 2 out of 18 with good glycaemic control had NAFLD. Patients with poor glycaemic control had higher prevalence (40%) of NAFLD than patients with good glycaemic control.

The difference was not statistically significant  $\chi^2=3.08$ , dif=1, P>0.05 (CP=0.07) ( Table - 6 )

**TABLE-6**

| CONTROL OF DIABETES    | TOTAL PATIENTS | PATIENTS WITH NAFLD | PATIENTS WITHOUT NAFLD |
|------------------------|----------------|---------------------|------------------------|
| POOR GLYCAEMIC CONTROL | 82             | 33 (40%)            | 49 (60%)               |
| GOOD GLYCAEMIC CONTROL | 18             | 2 (11%)             | 16 (87%)               |

In the present study, 34 out of 75 patients with dyslipidaemia had NAFLD where as only 1 out of 25 with normal lipid profile had NAFLD. Patients with dyslipidemia had higher prevalence (45%) of NAFLD than patients with normal lipid profile (4%). The difference was statistically significant

$\chi^2=8.17$ ; dif=1; P=0.004 ( Table - 7 )

**TABLE -7 DISTRIBUTION OF NAFLD AS PER LIPID PROFILE**

| LIPID PROFILE         | TOTAL NO. OF PATIENTS | PATIENTS WITH NAFLD | PATIENTS WITHOUT NAFLD |
|-----------------------|-----------------------|---------------------|------------------------|
| WITHOUT DYSLIPIDAEMIA | 25                    | 1 (4%)              | 24 (96%)               |
| WITH DYSLIPIDAEMIA    | 75                    | 34 (45%)            | 41 (55%)               |
| <b>TOTAL</b>          | <b>100</b>            | <b>35</b>           | <b>65</b>              |

22 out of 43 patients with Metabolic Syndrome had NAFLD where as 13 out of 57 without Metabolic Syndrome had NAFLD. Patients with Metabolic Syndrome had higher prevalence (51%) of NAFLD than with patients without Metabolic Syndrome (4%)

The difference is statistically significant  $x^2=4.09$ ;  $df=1$ ;  $P<0.05$  (P.007)

**TABLE - 8 DISTRIBUTION OF NAFLD IN METABOLIC SYNDROME**

| METABOLIC SYNDROME         | TOTAL NO.OF.PATIENTS | PATIENTS WITH NAFLD | PATIENTS WITHOUT NAFLD |
|----------------------------|----------------------|---------------------|------------------------|
| WITH METABOLIC SYNDROME    | 43                   | 22 ( 51% )          | 21 ( 49% )             |
| WITHOUT METABOLIC SYNDROME | 57                   | 13 ( 23% )          | 44 ( 77% )             |
| TOTAL                      | 100                  | 35                  | 65                     |

#### IV. Discussion:

The present study was a cross sectional study done to observe the prevalence of NAFLD in Type-2 Diabetes. The study was done in patients with age between 30-79yrs with mean age 50.5yrs which was comparable to studies conducted by Targher et al (2), Meraf et al(3), Kahas et al (1), Sharen TKU et al (4).

Prevalence of NAFLD was higher in males than in females in the present study which was not statistically significant ( $P=0.47$ ). Similar findings were seen in study done by Targher et al (2) 2007.

In the present study means of FBS, PPBS and HBA1C of NAFLD patients was higher than that of non-NAFLD patients which were statistically significant. Similar findings were seen in Sharavanan TKV et al (4) 2015.

In the present study, the mean duration of diabetes in patients with NAFLD is 6.23yrs and is higher when compared to those without NAFLD is 4.15years which is statistically not significant ( $P>0.05$ ) because of the small study group. But increased prevalence of NAFLD with increased duration of diabetes was seen in studies of Targher et al (2) 2007, Sharavan TKV et al (4) 2015 and Krishnan MS et al (6) 2016.

NAFLD was strongly associated with Type-2 Diabetes and glucose intolerance, with or without obesity. Type-2 diabetes has been described in 20% to 75% of patients with NASH and increased risk of NASH more than two fold compared with that for non diabetes (14) Patients with NASH often have one or more components of Metabolic Syndrome ( 6 ) Obesity, Hypertension, Dyslipidemia, Insulin Resistance or overt Diabetes.

In the present study ,the mean of BMIs' of patients with NAFLD is higher than patients without NAFLD which was comparable to studies of Targher et al (2) 2007, Mever et al (3) 2009 , Basaveshwar Mhetre et al (5 ) 2016 and Krishnan MS et al (6) 2016.

In the present study , dyslipidemia was more prevalent in patients with NAFLD when compared to patients without NAFLD. The mean of Total Cholesterol, LDL and Triglycerides were higher in patients with NAFLD than without NAFLD. Similar findings were seen in study conducted by Sharavanan TKV et al (4) 2015.

The mean of aminotransferases of patients with NAFLD was higher than that of patients without NAFLD which was statistically significant. Similar findings were seen in study conducted by Targher et al (2) 2007.

#### V. Conclusion:

The present study demonstrates a strong association of Type-2 Diabetes with NAFLD.

Overweight, Dyslipidemia, Metabolic Syndrome were major risk factors for development of NAFLD.

#### References

- [1]. Kalra S, Vithalani M, Gulati G, Kulkarni CM, Kadam Y, Pallivathukul J, Das B, Sahay R, Modi KD.
- [2]. Study of prevalence of nonalcoholic fatty liver disease(NAFLD) in type 2 diabetes patients in india (SPRINT).
- [3]. J Assoc Physicians India.2013 Jul;61(7):448-453.
- [4]. Targher G, Bertolini L, Padovani R, Rodella S, Tessari R, Zenari L, Day C, Arcaro G. Prevalence of nonalcoholic fatty liver disease and its association with cardiovascular disease among type 2 diabetic patients. Diabetes care, 2007 May 1;30(5):1212-8.
- [5]. Merat S, Yarahmadi S, Tahaghoghi S, Alizadeh Z, Sedighi N, Mansourmia N, Ghorbani A, Malekzadeh R. Prevalence of fatty liver disease among type 2 diabetes mellitus patients and its relation to insulin resistance. Middle East Journal of Digestive Diseases (MEJDD). 2009;1(2):74-9.
- [6]. T.K.V. Sharavanan, E. Premalatha. Prevalence of non-alcoholic fatty liver disease in type 2 diabetes mellitus patients in a rural health care hospital. Sch. J. App. Med. Sci., 2015; 3(5A):1834-1837
- [7]. Basaveshwar Mhetre, R M Honnutagi, M S Biradar, S S Patil, Darshan Biradarpatil, Avinash Jugati.
- [8]. Prevalence of non-alcoholic fatty liver disease in type 2 diabetes mellitus. International Journal of Biomedical and Advance Research 2016;7(2):97-101.
- [9]. Krishnan MS, Sudha R. A study of nonalcoholic fatty liver disease and fatty liver index in type 2 diabetes mellitus patients. J. Evid. Based Med. Healthc. 2016; 3(57), 3001-3006. DOI: 10. 18410 / jebmh / 2016 / 654.
- [10]. Manal F. Abdelmalek, Anna Mae Diehl. Nonalcoholic Fatty Liver Diseases and Nonalcoholic
- [11]. Steatohepatitis Harrison's Principles of Internal Medicine, Vol. 2, 19th edn., 2011; McGraw Hill, USA, page 2054-2057

- [12]. Liu CJ. Prevalence and risk factors for non-alcoholic fatty liver disease in Asian people who are not obese. *Journal of gastroenterology and hepatology*. 2012 Oct 1;27(10):1555-60.
- [13]. Fan JG, Saibara T, Chitturi S, Kim Bi, Sung JJ, Chutaputti A. What are the risk factors and settings for non-alcoholic fatty liver disease in Asia-Pacific?. *Journal of gastroenterology and hepatology*. 2007 Jun-1;22(6):794-800.
- [14]. Marchesini G, Bugianesi E, Forlani G, Cerrelli F, Lenzi M, Manini R, Natale S, Vanni E, Villanova N, Rizzetto M. Nonalcoholic fatty liver, steatohepatitis, and the metabolic syndrome. *Hepatology*. 2003 Apr 1;37(4):917-23.
- [15]. Williams KH, Shackel NA, Gorrell MD, McLennan SV, Twigg SM. Diabetes and nonalcoholic fatty liver disease: a pathogenic duo. *Endocrine reviews*. 2012 Dec 13;34(1):84-129.
- [17]. Ortiz-Lopez C, Lomonaco R, Orsak B, Finch J, Chang Z, Kochunov VG, Hardies J, Cusi K.
- [18]. Prevalence of prediabetes and diabetes and metabolic profile of patients with nonalcoholic fatty liver disease (NAFLD). *Diabetes care*. 2012 Apr 1;35(4):873-8.
- [19]. Jali MV, Kamar S, Jali SM, Hiremath MB. Prevalence of nonalcoholic fatty liver disease among type 2 diabetes mellitus patients- A cross sectional hospital based study. *Al Ameen J Med Sci*. 2015;8(1):50-4.
- [20]. Sleisenger and Fordtram's *Gastro-Intestinal and Liver Diseases* - 9th Edition.

XXXXXX, et. al. "Effect of Prone Position Ventilation on Acute Respiratory Distress Syndrome: A Systematic Review." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(01), 2021, pp. 01-05.