

# Prevalence of Nonalcoholic Fatty Liver Disease in a Tertiary Care Teaching Hospital: A Cross Sectional Study in Province 4 of Nepal

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## ABSTRACT

### Background

Nonalcoholic fatty liver disease (NAFLD) is collection of lipids in hepatic tissues excluding other hepatic diseases and chronic alcohol intake. It may advance to nonalcoholic steatohepatitis or cirrhosis. Ultrasonography has high sensitivity and specificity for detecting nonalcoholic fatty liver disease.

### Objective

Lack of sufficient information in this region on sonological prevalence of nonalcoholic fatty liver disease, lead us to design the survey and may also serve as reference for further researches.

### Method

This is a cross sectional study with 600 participants, conducted at Gandaki Medical College Teaching Hospital, Province 4 of Nepal, from September to October 2017. Ethical approval is taken from the Institutional review board. The study group includes the participants referred for abdominal sonography from outpatient department.

### Result

In present survey, 367 (61.2%) are female and 233 (38.8%) are male participants. The mean age is 41.6 years and median age is 38 years. The prevalence of nonalcoholic fatty liver in our observation is 229 cases (38.2%) of which, 102 cases (44.5%) are male and 127 cases (55.4%) are female participants. Normal liver was seen in 61.8%, Grade one fatty liver was discovered in 24.8%, Grade one in 12.6% and Grade three in 0.6%. The mean liver size in those with fatty liver was 14.1 cm.

### Conclusion

Province 4 of Nepal is not exempt from the growing epidemic of nonalcoholic fatty liver disease with prevalence of 38.2%. The study shows that with higher grades of fatty liver, the size of liver is also increased and the mean age of the participants involved is also in the higher side of the spectrum.

## KEY WORDS

*Fatty liver, Nonalcoholic, Prevalence, Ultrasonography*

## INTRODUCTION

The prevalence of nonalcoholic fatty liver disease (NAFLD) is 49.4% in Kathmandu.<sup>1</sup> NAFLD is collection of lipids in hepatic tissues (5-10%) excluding other hepatic diseases and chronic alcohol intake (20 to 30 grams/day).<sup>2,3</sup> NAFLD may advance from simple steatosis, nonalcoholic steatohepatitis (NASH-10 to 20%) to cirrhosis (3 to 5%), and with appropriate interference, can be reversible.<sup>4</sup>

NAFLD is related to modern life styles, rendering individuals susceptible to obesity, diabetes, cardiovascular disease and metabolic syndromes.<sup>5</sup> Newer researches argue that NAFLD/NASH can also affect non obese Asians; "Asian-paradox". Thus, high BMI or obese by European criteria, may not advocate the liability of evolving NAFLD.<sup>6-8</sup>

Ultrasonography (USG) is simple, reproducible examination for detecting NAFLD, with high sensitivity (60-90%) and specificity (88-95%).<sup>9,10</sup> Lack of sufficient information on USG prevalence of NAFLD, lead us to design the survey on prevalence of NAFLD in this region and may also serves as reference for future researches.

## METHODS

This was a cross sectional study done in Gandaki Medical College Teaching Hospital, Pokhara, province 4 of Nepal for a period of 2 months from 1<sup>st</sup> September to 31<sup>st</sup> October, 2017. Ethical approval was taken from the institutional review board. The sample size estimation was done for the population in province 4 where confidence level was taken as 95% with error value of 5%. A sample size of 384 participants was obtained. However, in the present study 600 participants were procured. Machines used to perform ultrasonogram were GE Healthcare Logiq P6 and Logiq C5 Premium.

The study group includes the patients who had come in an outpatient department (OPD) for check up and referred for abdominal sonography. A convex 3.75 MHz transducer is used to perform the abdominal USG. Fatty infiltration of liver is graded from 0 - 3 as follows.<sup>10</sup>

Grade 0 - Normal

Grade 1 - Mildly increased echogenicity with normal visualization of diaphragm and intrahepatic vessels.

Grade 2 - Moderately increased in echogenicity with impaired visualization of intrahepatic vessels and diaphragm.

Grade 3 - Severely increase echogenicity with non visualization of intrahepatic vessels and diaphragm.

The exclusion criteria includes -

- Inpatients / admitted patients.
- Chronic alcohol abuse.
- Patients with hepatobiliary diseases.

- Patients with chronic illnesses.
- Patients on medications with potential to affect the liver.
- The data was collected and statistical analysis was performed using SPSS version 17 software package.

## RESULTS

A total of 600 participants were included in our study of which 367 (61.2%) were female and 233 (38.8%) male participants. The mean age was 41.6 years with standard deviation of 16.5 and median age of 38 years. Normal liver was seen in 371 (61.8%) cases. Grade 1 fatty liver is noticed in 149 (24.8%) cases, Grade 2 in 76 (12.7%) cases and Grade 3 in 4 (0.7%) cases (Table 1).

**Table 1. Number of cases with fatty liver grading.**

| Fatty liver | Number of cases | Percentage (%) |
|-------------|-----------------|----------------|
| Normal      | 371             | 61.8           |
| Grade 1     | 149             | 24.8           |
| Grade 2     | 76              | 12.7           |
| Grade 3     | 4               | 0.7            |
| Total       | 600             | 100            |

Normal liver, Grade 1 and Grade 2 fatty liver were more prevalent in females but there were equal number of cases in Grade 3 fatty liver. Out of 149 cases in Grade 1 fatty liver, there were 84 (56.45%) females while males were 65 (43.6%). Out of 76 cases in Grade 2 fatty liver, there were 41 (53.9%) females and 35 (46.1%) males. In Grade 3 fatty liver, there were 2 cases each of male and female (Table 2). The mean age in normal liver, Grade 1, Grade 2 and Grade 3 fatty livers was 38.8 years, 46.1 years, 46.1 years and 54 years respectively. In our study we observed that gradual transition from normal to fatty liver correlated with increase in the mean age of the patients. Fatty liver was seen more above 40 years of age and was more prevalent in women for Grade 1 to Grade 2 fatty livers. But for grade 3 fatty livers the prevalence was same for both sexes.

**Table 2. Fatty liver cases compared with sex and age.**

| Fatty liver grade | Cases | Female      | Male        | Mean age | Std. Deviation (SD) |
|-------------------|-------|-------------|-------------|----------|---------------------|
| Normal            | 371   | 240 (64.7%) | 131 (35.3%) | 38.8     | 17                  |
| Grade 1           | 149   | 84 (56.45)  | 65 (43.6%)  | 46.1     | 15.8                |
| Grade 2           | 76    | 41 (53.9%)  | 35 (46.1%)  | 45       | 11.9                |
| Grade 3           | 4     | 2 (50%)     | 2 (50%)     | 54       | 19.3                |

The prevalence of nonalcoholic fatty liver is 229 cases (38.2%) of which, 102 cases (44.5%) were male and 127 cases (55.4%) were female participants. Of all 233 male participants 102 (43.77%) and amongst 367 female participants 127 (36.60%) were found to be affected of nonalcoholic fatty liver.

**Table 3.** Mean liver size compared with different fatty liver grade.

| Fatty liver grade | Mean Liver Size (cm) | Std. Deviation (SD) |
|-------------------|----------------------|---------------------|
| Normal            | 12.8                 | 0.9                 |
| Grade 1           | 13.6                 | 1.1                 |
| Grade 2           | 14.7                 | 1.3                 |
| Grade 3           | 14.2                 | 1.1                 |
| Over all          | 13.2                 | 1.2                 |

Our study showed, the mean size of the liver in normal cases was 12.8 cm. The mean size of the liver in Grade 1 fatty liver is 13.6 cm with a standard deviation of 1.1, in Grade 2 fatty liver was 14.7 cm with a standard deviation of 1.3 and in grade 3 fatty liver is 14.2 cm with a standard deviation of 1.1 (Table 3). The mean size gradually increased from the normal liver to grade 2 fatty liver but showed slight decrease of 0.5 cm in grade 3 fatty liver. The overall mean size of the liver is 13.2 cm with a standard deviation of 1.2.

## DISCUSSION

The prevalence of nonalcoholic fatty liver is 229 cases (38.2%) of which, 102 cases (44.5%) were male and 127 cases (55.4%) were female participants with the mean age of 41.6 years. The mean liver size in those with fatty liver was 14.1 cm in the present study.

The prevalence of fatty liver disease was similar to the study done in Kathmandu, Nepal (49.4%) by Khadka et al.<sup>1</sup> However the prevalence was variable in different places around the world with less variations in urban or rural population. In Brazil, the prevalence of liver steatosis ranges from 18 -23%, Germany - 40%, Italy - 20%, USA - 73%, China - 17.2% and South Korea - 27.3%.<sup>12-16</sup> In another study by Cruz et al. in Aracaju Brazil, the prevalence is 29%.<sup>17</sup> A cohort study in urban, tertiary center of Bangladesh reported a prevalence of 41.2%.<sup>18</sup> In a rural community of Hariyana, India the prevalence is 30.7% while it is 32% in urban South Indian population.<sup>19,20</sup> In a study done by Dassanayake et al. in Srilanka, the prevalence is 3.6% in middle age, rural population size of 1985 cross-sectional stratified random sampling.<sup>21</sup>

Cruz et al. in their study showed the liver steatosis to be more in male population 33.4% compared to females 27.2%.<sup>17</sup> Similar to results published by Majumdar et al. with the prevalence of 33.3% in men and 31.1% in females.<sup>19</sup> In a study by Lankarani et al. the prevalence of NAFLD is also more in men (26.4%) than females (17.9%).<sup>2</sup> However, in study done by Khadka et al. in Nepal, the prevalence of NAFLD is more in females (28 cases - 57.1%) than males (21 cases - 42.9%) which was in accordance to our study.<sup>1</sup> It may be due to the fact that the involvement of female participants was more in our study.

In our study, we observe that prevalence of fatty liver is seen more above 40 years of age and is more prevalent in women for Grade 1 to Grade 2 fatty livers. But for grade 3 fatty livers the prevalence is same for both sexes. NAFLD prevalence increases with age, being <30% in those aged less than 40 years and >50% in those older than 60 years.<sup>22</sup> In study done by Khadka et al. the mean age was 44±11.9 years.<sup>23</sup> In study done by Cotrim et al. the mean age was 49.8 years while in Aracaju, Brazil the median age was 46 years.<sup>11,17</sup>

In study done by Cruz et al. the median size of liver was 15.0 cm in patient with fatty liver while it was 14 cm in patients with normal sonographic findings.<sup>17</sup> In our data, the mean size of normal liver was 13.2 cm while for different grades of fatty liver the mean size ranged from 13.6 to 14.7 cm and median size of 14.3 to 15 cm.

In a study done in USA, the ultrasound prevalence of NAFLD is 19% in the 12,454 adult participants.<sup>23</sup> It is more prevalent when CT -24%, proton MR spectroscopy (1H MRS)-31% and biopsy-37% is used as a modality.<sup>24-26</sup> Liver biopsy is considered as definitive for the investigation of NAFLD/NASH. But the difficulty is that it is invasive, expensive, and operator dependent as fatty changes in liver may not be uniformly spread and may give different character on histological evaluation.<sup>4</sup> CT is considered to have lower precision with high false positive results apart from the ionizing radiation delivered to the patient.<sup>27</sup> MRI particularly H1 MRS is the most impressive, non-invasive modality of examination, where steatosis as low as 3% of total liver weight can be determined.<sup>28,29</sup> But it is an expensive modality and not generally accessible. The other modality gaining popularity to evaluate liver steatosis is fibroscan elastography. But such modalities are either costly or unavailable to be used for screening purposes in our set up.

The limitations of our study were that it was confined to a single location of a city in Nepal. We could obtain the true prevalence if the study was carried out across the country including the rural areas as well, which is challenging due to the geographic diversity of Nepal. Furthermore, our data did not examine the impact of BMI on fatty changes in liver. The data can also be made more precise if we can make newer modalities accessible and available to all population as well.

As USG examination of abdomen is a simple, cheap and easily available modality, similar studies can be carried out in the entire population with larger sample size so true estimation of the NAFLD can be obtained. Alerting the general public with timely intervention, the progression of NAFLD to NASH, cirrhosis or other cardiovascular diseases and metabolic syndromes can be prevented.

## CONCLUSION

Western region of Nepal is not exempt from the growing epidemic of nonalcoholic fatty liver disease. This study shows the prevalence of nonalcoholic fatty liver disease

being 38.2% and more prevalent in females compared to males. The study also displays that with increasing grades of fatty liver, the mean age and liver size of the participants is higher.

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