

Original Research Article

Impact of transition in socio-economic status on sonographically detected non-alcoholic fatty liver disease: a study based on modified Kuppuswamy classification in an urban population

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ABSTRACT

Background: The transition in the socioeconomic status is associated with physical and mental challenges. The lifestyle modification is one of the key implicatory for this change. Non-alcoholic fatty liver is an ever-growing health concern. This study evaluates the socioeconomic categories based on Kuppuswamy classification and other correlated in sonographically detected Non-alcoholic fatty liver disease (NAFLD).

Methods: This cross-sectional study was conducted on 300 sonographically detected NAFLD patients in the age group of 18-60 years. Detailed history, including the demographic profile, socio-economic status (Modified Kuppuswamy scale was followed for calculating the Socio-economic status of the family), occupation, dietary habits (vegetarian or non-vegetarian, exposure to junk food), drinking water supply, etc. Detailed assessment of the morphological parameters including the anthropometric measurements, height, BMI was also assessed.

Results: The study finds 62 (41%) females and 88 (59%) males with NAFLD and 51-60 age group with maximum prevalence. Diabetes (63%), Soft drink consumption and obesity are important risk factors. New observation of our study is that amongst various Kuppuswami sociodemographic scales, the maximum patients belonging to Upper middle class and upper lower class presented with fatty liver.

Conclusions: There is higher prevalence of NAFLD amongst males, diabetics, obese, soft drinks, tea and coffee consumers. Authors also find a unique correlate based on socio-demographic class of Kuppuswami scale. People belonging to upper middle class and upper lower class suffer from NAFLD more commonly than other sociodemographic classes.

Keywords: Fatty liver, Non-alcoholic fatty liver disease, Sociodemographic, Ultrasonography

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is rapidly growing public health problem. Researchers have tried to define NAFLD in multiple ways. The general consensus seems to be on the use of term NAFLD to describe a condition of fat accumulation in the liver in absence or consumption of less than 20 g of alcohol per day.¹

NAFLD has potential to cause end stage liver disease due to fatty infiltration in hepatocytes.² This has raised an alarm bell for all the epidemiologists and clinicians as this can prove to be fatal for the patients under question.

As per an estimate the prevalence of NAFLD varies between 2.8 to 24% of the general population.³ Various imaging studies, estimate the prevalence of NAFLD in

the adult population ranges 14-31%.⁴ Indian scenario is not very different. The prevalence study in rural areas of Haryana, India found the prevalence of NAFLD to be staggering 30.7%.^{5,6} With such high burden of NAFLD in this country, screening in select cohorts becomes a necessity.

Various international studies have linked NAFLD with obesity, sedentary lifestyle, high fat intake, soft drink intake, fried food, tea, etc. However, Indian data on these aspects is conspicuously lacking. The available Indian literature selectively is based on select class of population, like diabetics, etc. NAFLD is no more a benign condition as it clusters along with all the parameters of metabolic syndrome.^{7,8} This study attempts to evaluate various socio-demographic correlates of NAFLD in Indian urban population and attempts to identify and establish selective at-risk cohorts for detection of early NAFLD changes.

METHODS

This was an observational and analytical study carried out in the department of radiodiagnosis in urban settings of a medical college.

Operational definition

Fatty liver was diagnosed on the basis of ultrasonography as an increase in hepatic echogenicity taking renal echogenicity as a reference. The presence of increased echogenicity and lack of differentiation in periportal intensity and the vascular wall due to great hyper-echogenicity of the parenchyma aid in establishing fatty liver.

Sample size required for 18+ years of age group NAFLD in our catchment area was calculated based on the assumption that lowest prevalence of NAFLD in our district is about 12% with an absolute precision of 5%, CI of 80% and design effect as 1.

$$\text{Sample size formula; } n = \frac{\text{DEFF} \times N \times p \times q}{[(d^2/Z^2) 1 - \alpha/2 \times (N-1) + p \times q]}$$

A total of 150 adults were enrolled for this study. The sample was selected as first 5 patients aged between 18-60 years diagnosed with fatty liver on given study day. If enough patients could not be gathered on a given day, sample collection was extended to next day.

Inclusion criteria

- All patients with non-alcoholic fatty liver attending radiology OPD during study period in the defined age group.

Exclusion criteria

- History of alcohol intake

- Patients below 18 years of age and above 60 years of age
- Patients refusing consent for the study.

Detailed data was collected in carefully designed case record form for each of the subjects. Relevant history, including the demographic profile, socio-economic (modified Kuppuswamy scale was followed for calculating the socio-economic status of the family), occupation, dietary habits (vegetarian or non-vegetarian, exposure to junk food), drinking water supply, etc. was collected. Detailed assessment of the morphological parameters including the anthropometric measurements, height, BMI was also assessed.

Ultrasound scan of the adults

All patients underwent ultrasonography examination using GE Voluson Logiq S8 system with a low frequency convex transducer by a radiologist in strict compliance with the departmental protocol for ultrasound of abdomen. No extra charges were levied for ultrasonography investigation for the study participants.

Ethical consideration

Due approval from the institutional ethics committee was obtained prior to commencement of the study. All patients were presented with informed consent form before proceeding with the detailed questionnaire.

Statistical analysis

The data obtained was tabulated and the various parameters obtained from the clinical, epidemiological and ultrasound findings were analyzed, qualitatively and quantitatively using correlation coefficient (R) method.

RESULTS

The incidence of NAFLD was found to be more in males as compared to females; 59% males (n=88) and 41% females (n=62). Age group of 51-60 has maximum incidence of NAFLD (32%, n=48) closely followed by age group 51-60 (30%, n=45). Figure 1 shows the age distribution in details. There is strong association with type II diabetes mellitus with 63% (n=95) patients being diabetics. Obesity also showed strong association with 57% patients being overweight (n=57%).

Soft drink intake was confirmed by 73% (n=110) and tea intake was in 66% (n=99). Amongst personal habits (Figure 2), disturbed bowel habits were present in 136, disturbed appetite in 127, disturbed sleep in 131 and non-vegetarian food intake in 114 of the participants. Out of these individuals, 118 had grade I fatty liver, 27 had grade II fatty liver and 15 had grade III fatty liver.

On modified Kuppuswami scale, 55 belonged to upper lower class, 51 belonged to upper middle class, 33

belonged to lower middle class, 8 belonged to lower class and only 3 were from upper class (Figure 3).

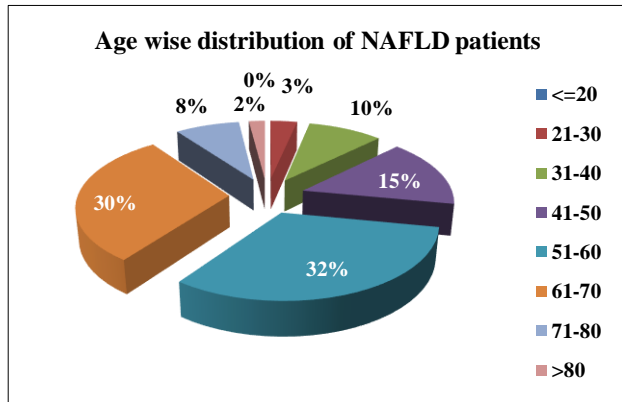


Figure 1: Age distribution of the NAFLD patients. NAFLD is more prevalent in age group of 40-60 years.

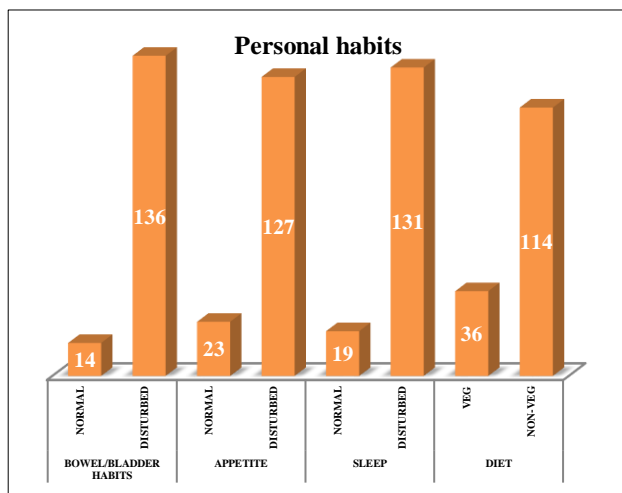


Figure 2: Distribution based on personal habits of patients including bowel bladder, appetite, sleep pattern and diet.

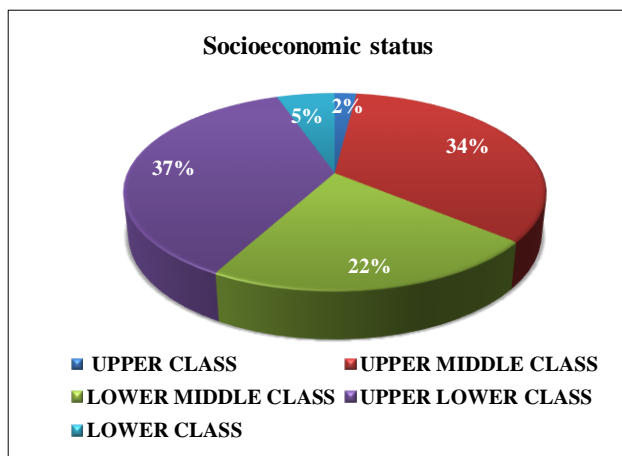


Figure 3: Distribution based on socio-economic class of the patient. Upper lower class and upper middle-class population has maximum prevalence.

DISCUSSION

As per this study NAFLD is present amongst 62 (41%) females and 88 (59%) males out of the total 150 NAFLD patients which confirms that the males are more commonly affected by the disease.⁹ The mean age of Indian NAFLD patients showing NAFLD has been shown to be between 35 and 50 years. However, in our study maximum number of patients were from the age group of 51-60 which is very well supported by the fact that the prevalence of NAFLD increases with age.¹⁰ Type 2 diabetes is one of the major risk factors associated with NAFLD. T2DM patients with NAFLD are at higher risk of developing cirrhosis compared to non-diabetic patients.^{11,12} Diabetes as a potential risk factor was very well indicated by our study in which 95 individuals out of 150 (63%) were diabetic, which is well supported by various researches⁶ which show that impaired blood glucose levels are seen in majority of cases. The prevalence of NAFLD amongst T2DM patients is described to be higher than in non-diabetic patients.¹³

The increase in soft drink consumption which is associated with increase in obesity, insulin resistance and metabolic syndrome causes can serious health.^{14,15} In this present study soft drink consumption was linked with 73% of NAFLD, which shows that there is a positive association between soft drink intake and occurrence of NAFLD. Another important risk factor along with diabetes and soft drink intake is 'obesity' (BMI > 23 kg/m² for Asians).^{16,17} Approx 57% of our study participants were obese, which also proves that insulin resistance, obesity leads to metabolic syndrome which affects the liver causing diseases like NAFLD.

Some of the studies conducted by Studies on the associated of tea intake with NAFLD suggested a strong correlation between them.¹⁸ In this study conducted on 150 NAFLD patients 66% consumed tea on daily basis which suggests a positive association between tea consumers and NAFLD.

Authors also found that patients who consume non-vegetarian food in their diet are more likely to have NAFLD as out of 150 patients in our study 114 were those who were non-vegetarian and had NAFLD.

Bowel/bladder habits were disturbed in 136 patients, appetite was disturbed in 127 patients and sleep patterns were disturbed in 114 patients. However no significant relation of these have been found with NAFLD. In this study 110 patients (73%) presented with complaint of pain in abdomen, 16% with jaundice, while the rest with other symptoms.

A unique observation of our study was that amongst various Kuppaswami sociodemographic scales, the maximum patients belonging to upper middle class and upper lower class presented with fatty liver. It remains to be seen while this particular group is more prone to

develop NAFLD. Possibly, this is due to transition phase in sociodemographic scale leading to crossover of lifestyle related issues.

CONCLUSION

This study establishes higher prevalence of NAFLD amongst males, higher diabetics, obese, soft drink, tea and coffee habitual. This study however, finds that in Indian population the prevalence is more in patients with age 51-60. A unique correlate based on socio-demographic class (Kuppuswami scale) suggests that upper middle class and upper lower class suffer from NAFLD more commonly than other sociodemographic classes. Whether this is due to the transition from one class to another or a lifestyle related issue due to transition from sociodemographic class or some other confounding factors is a matter for further research.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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