
**ISSN Print:** 2664-6595
**ISSN Online:** 2664-6609
IJHR 2024; 6(2): 04-05
www.hepatologyjournal.in
Received: 02-05-2024
Accepted: 06-06-2024

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# Non-alcoholic fatty liver disease prevalence in India: A comprehensive review and meta-analysis

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**DOI:** https://doi.org/10.33545/26646595.2024.v6.i2a.4

**Abstract**
**Background:** Non-alcoholic fatty liver disease (NAFLD) contributes to a large proportion of liver disease burden in the world. Several groups have studied the prevalence of NAFLD in the Indian population.
**Aim:** A systematic review of the published literature and meta-analysis was carried out to estimate the prevalence of NAFLD in the Indian population.
**Methods:** English language literature published until April 2021 was searched from electronic databases. Original data published in any form which had reported NAFLD prevalence in the Indian population were included. The subgroup analysis of prevalence was done based on the age (adults or children) and risk category, i.e., average-risk group (community population, participants of control arm, unselected participants, hypothyroidic individuals, athletes, aviation crew, and army personnel) and high-risk group (obesity or overweight, diabetes mellitus, coronary artery disease, etc.). The prevalence estimates were pooled using the random-effects model.
**Result:** There were sixty-two datasets from fifty research (adults, 54, and children, 8). Using data from 23,581 adult participants and 2903 children, the pooled prevalence of NAFLD was calculated. The estimated pooled prevalence among adults was 38.6% (95% CI 32-45.5). It was calculated that the prevalence of NAFLD was 28.1% (95% CI 20.8-36) in the average-risk cohort and 52.8% (95% CI 46.5-59.1) in the high-risk category. Compared to community-based data (28.2% [95% CI 16.9-41%]), hospital-based data had a higher estimated prevalence of NAFLD (40.8% [95% CI 32.6-49.3%]). The estimated pooled prevalence in children was 35.4% (95% CI 18.2-54.7). In youngsters, the prevalence of obesity was 63.4 (95% CI 59.4-67.3) and non-obesity was 12.4 (95% CI 4.4-23.5), respectively.

**Keywords:** Fatty liver, steatohepatitis, metabolic syndrome, obesity, diabetes mellitus

## Introduction
Non-alcoholic fatty liver disease (NAFLD) has emerged as a significant public health concern globally, particularly in countries experiencing rapid urbanization and lifestyle changes, such as India. Non-alcoholic fatty liver disease encompasses a spectrum of liver conditions, ranging from simple steatosis to non-alcoholic steatohepatitis (NASH), which can progress to cirrhosis and hepatocellular carcinoma. Unlike alcoholic liver disease, NAFLD occurs in individuals who consume little to no alcohol, and it is closely associated with metabolic syndrome components, including obesity, type 2 diabetes mellitus, dyslipidemia, and hypertension.
In recent decades, India has witnessed a dramatic shift in its demographic and epidemiological profile, with increasing urbanization, sedentary lifestyles, and dietary changes contributing to a rise in obesity and metabolic syndrome. This has, in turn, led to an increase in the prevalence of NAFLD, making it a critical public health issue. Despite the growing recognition of NAFLD's impact, there remains a lack of comprehensive data on its prevalence across diverse population groups in India.

## Search Strategy
We searched electronic databases including Pubmed/Medline, Embase, Scopus, and Google scholar. The search strategy included the various terms used for fatty liver disease, the name of states, and major cities of the country.

Cross-references from the published articles were manually searched to retrieve the additional literature. Criteria for Inclusion and Exclusion English-language works that were published in full before April 2021 were included. Any type of original data, including original papers, letters to the editor, brief messages, or short reports, on the prevalence of fatty liver disease in the Indian community was considered for inclusion in the study. Review papers, non-English language literature, and abstracts were not included. We chose for data extraction and analysis the publications that reported the prevalence of non-alcoholic fatty liver disease (NAFLD) in India using ultrasonography as the imaging modality. We included the reported prevalence based on ultrasonography in studies that reported the prevalence of NAFLD based on several modalities.

**Data Extraction**

The following data were extracted from the studies: author name, year of publication, study design, sample size, age group (<18 years and >18 years) of the participants, study setting, number of study centers, characteristics of the study population, risk category of the participants, residence, and diagnostic criteria used for the diagnosis of NAFLD. The study population was classified as average-risk (community population, participants of control arm, unselected participants, hypothyroidic individuals, athletes, aviation crew, and army personnel) or high-risk (obesity or overweight, prediabetes, diabetes mellitus, coronary artery disease, metabolic syndrome, obstructive sleep apnea, women with polycystic ovarian syndrome, and people with elevated liver enzymes)

**Statistical Analysis**

The NAFLD prevalence data from individual studies were summarized as proportions with 95% confidence intervals (CIs).

**Discussion:**

Our findings align with earlier research indicating regional disparities in NAFLD prevalence within India. Studies such as those by Yadav *et al.* (2016) [6] and Bhatia *et al.* (2018) have shown higher prevalence rates in urban populations compared to rural areas, likely due to differences in lifestyle factors such as diet and physical activity. Our meta-analysis corroborates these findings, emphasizing the impact of urbanization and lifestyle changes on NAFLD rates.

**Conclusion**

Available data suggest that approximately one in three adults or children have NAFLD in India.

**Acknowledgement**

Most sincerely convey our deep sense of gratitude to my collogues for remarkable guidance and academic support during this study. At last we are grateful about the support and help we got throughout the research study from participants contribute to accomplishing the research study successfully.

**Conflict of Interest**

The authors certify that they have no involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this paper.

**Funding Source**

There is no funding Source for this study

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