

Prevalence of Non-Alcoholic Fatty Liver Disease and Its Association with Severity in Patients with Irritable Bowel Syndrome

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ABSTRACT

Background: In Egypt, irritable bowel syndrome (IBS) and non-alcoholic fatty liver disease (NAFLD) are both common conditions. There has been increased interest in the apparent co-incidence of NAFLD in individuals with IBS as we gain a better understanding of their overlapping risk factors and pathophysiology.

The aim: to ascertain the prevalence of NAFLD among IBS patients, as well as the relationship between NAFLD and IBS severity.

Patients and methods: A cross-sectional study was conducted on 150 IBS patients who were older than 18 years old at the Hepatology, Gastroenterology, Infectious Diseases Outpatient Clinic and Clinical Pathology Department of Al-Ahrar Zagazig Teaching Hospital. All patients underwent a history taking, general clinical examination, and clinical assessment, imaging studies and laboratory analysis.

Results: There were 70.7% people who had NAFLD. 30.2% of patients had severe NAFLD, 19.8% had mild NAFLD, and 50% of patients had intermediate NAFLD.

Conclusion: IBS patients have a significant prevalence of NAFLD. In the study participants, moderate/severe NAFLD was a predictor of moderate/severe IBS.

Keywords: NAFLD, IBS.

INTRODUCTION

A condition of the gut-brain connection known as irritable bowel syndrome (IBS) causes recurring stomach pain linked to faeces and a change in bowel habits. Individuals who meet the Rome IV IBS diagnostic criteria, which include a disturbed bowel habit (constipation, diarrhoea, or a combination of the two), frequent stomach pain, and abdominal bloating or distension for at least 6 months prior to diagnosis, are deemed to have the condition ⁽¹⁾. In a recent comprehensive review and meta-analysis, IBS prevalence was found to be 9.2% globally, with significant regional variation ⁽²⁾.

Depending on how it affects one's way of life, IBS can range in severity. There are no research demonstrating a connection between NAFLD and IBS, despite several studies linking obesity and IBS ⁽³⁾.

As a clinicopathological syndrome, the severity of non-alcoholic fatty liver disease (NAFLD) can range from benign steatosis to non-alcoholic steatohepatitis (NASH) with cirrhosis and associated consequences developing later in some of these people. NAFLD is becoming more prevalent in the western population, and studies have revealed that it is particularly prevalent in the US (around 30%), where it has replaced cirrhosis as the most prevalent chronic liver disease ⁽⁴⁾.

When there is excessive fat buildup in hepatocytes without any known nonalcoholic fatty liver disease is caused by factors such as alcohol consumption, and it can occur with or without necroinflammation and its

consequences. Obesity and insulin resistance are both problems key components in the pathophysiology of NAFLD ⁽⁵⁾.

The goal of research has been to better understand the pathophysiology of NAFLD, which is known to be caused by a combination of genetic, nutritional, and immunoregulatory variables. It is typically associated with obesity and is regarded as the primary outward manifestation of metabolic syndrome ⁽⁶⁾. However, liver steatosis can also occur in people who are normal weight or underweight or in people who have a normal metabolic profile ⁽⁷⁾, indicating that there may be additional factors besides obesity and insulin resistance that contribute to the aetiology of NAFLD.

According to some studies, irritable bowel syndrome (IBS) patients are more likely to have NAFLD, and several explanations for this association have been proposed, including the co-existence of metabolic syndrome, small bowel surgery, malnutrition, the effects of medications, intestinal inflammation, and dysbiosis ⁽⁸⁾.

PATIENTS AND METHODS

Hospital-based cross-sectional research was carried out at the Hepatology, Gastroenterology and Infectious Diseases Outpatient Clinic and Clinical Pathology Department on 150 IBS patients who were older than 18 years old.

Exclusion criteria: Individuals under the age of 18 and women who were pregnant were not included in the study. Those who displayed serious symptoms such

gastrointestinal tract bleeding, anaemia, weight loss, or abdominal tumours were also excluded from the trial. Individuals who consumed any amount of alcohol, those on systemic corticosteroids, and those with Hepatitis C and/or B virus infections were also excluded from the study.

All patients underwent an informed written consent, history taking and general clinical examination. For the study population, clinical evaluations, imaging analyses, and laboratory investigations were carried out. Following equation was used Body mass index (BMI) was calculated: BMI is calculated by dividing weight (in kilograms) by height (in meters²). Overweight was defined as a body mass index of 25 kg/m² to 30 kg/m², and obesity was defined as having a BMI greater than 30 kg/m². Laboratory tests including fasting serum glucose assessments, lipid profiles (fasting serum levels of total cholesterol, low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C), and triglycerides), and liver chemistry panel are all included. Also, abdominal ultrasonography was done. According to one or more of the following definitions, dyslipidemia was defined as more than 200 mg/dL of total cholesterol, more than 130 mg/dL of LDL-cholesterol, less than 27 mg/dL of HDL-cholesterol, and 165 mg/dL or more of triglycerides.

The following criteria were used to diagnose NAFLD: (1) Ultrasonographic abnormalities, such as hepatomegaly, blurred vascular borders, and hyperechogenicity of the liver parenchyma, (2) There was no history of alcohol use, no exposure to steatogenic drugs, and no signs of viral hepatitis B or C. A single, skilled radiologist performed abdominal ultrasonography. Hepatic steatosis was graded using the following criteria: Mild grade occurs when the echogenicity simply increases, grade II when the echogenic liver obscures the echogenic walls of the portal vein branches and grade III when the echogenic liver obscures the diaphragmatic contour⁽⁹⁾.

Ethical approval:

The study was approved by the Ethics Board of Zagazig University and an informed written consent was taken from each participant or their parents in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

RESULTS

The mean age was 57 ± 7.1 years, 53.3% were male, constipation was the most common predominant type (49.3%) followed by alternating bowel habits (30.7%), then diarrhea (20%). Majority of patients had mild IBS (45.3%), moderate (40%) and only 14.7% had sever IBS.

The mean BMI was 32 ± 4.1, most of patients were obese (75.3%). 60% of patients had dyslipidemia, 30% had hypertension and 19.3% had DM. the prevalence of NAFLD was 70.7% (**Table 1**).

Table (1): Baseline data and NAFLD incidence of population with IBS (n = 150)

Age/years	57 ± 7.1
Age (< 45 years)	50 (33.3%)
Age (≥ 45 years)	100 (66.7)
Gender	
Male	80 (53.3%)
Female	70 (46.7%)
Type of IBS	
Constipation predominant	74 (49.3%)
Diarrhea predominant	30 (20%)
Alternating bowel habits	46 (30.7%)
Grade of IBS	
Mild	68 (45.3)
Moderate	60 (40%)
Severe	22 (14.7%)
BMI (kg/m²)	
Mean ± SD	32 ± 4.1
Normal	25 (16.7%)
Overweight	12 (8%)
Obesity	113 (75.3%)
Comorbidities	
No comorbidities	20 (13.3%)
DM	29 (19.3%)
Hypertension	45 (30%)
Dyslipidemia	90 (60%)
NAFLD	106 (70.7%)

IBS: Irritable Bowel Syndrome, BMI: Body Mass Index, DM: Diabetes Mellitus, NAFLD: Nonalcoholic Fatty Liver Disease.

The mean of FBG was 109 ± 10.6, the mean of cholesterol, triglycerides, HDL and LDL were 245 ± 31.7, 189 ± 12.6, 41.4 ± 5.6 and 173±19.2 respectively (table 2).

Table (2): Severity of disease among the NAFLD patients (N=106).

Laboratory investigation	Mean ± SD
FBG (mg/dl)	109 ± 10.6
Cholesterol (mg/dl)	245 ± 31.7
Triglycerides (mg/dl)	189 ± 12.6
HDL (mg/dl)	41.4 ± 5.6
LDL (mg/dl)	173±19.2

Half of patients had moderate NAFLD, 30.2% had severe NAFLD and 19.8% had mild NAFLD (**Table 3**).

Table (3): Severity of disease among the NAFLD patients (N=106).

NAFLD	106 (100%)
Mild	21 (19.8%)
Moderate	53 (50%)
Severe	32 (30.2%)

There was significant difference between both groups regarding age more than 45, male, overweight/obesity, DM and moderate/severe NAFLD that were higher in moderate/severe IBS than mild IBS (**Table 4**).

Table (4): Factors associated with mild and moderate/severe IBS among the studied cases (n=150)

	Mild IBS (n = 68)	Moderate/severe IBS (n = 82)	P-Value
Age (≥ 45 years)	39 (57.4%)	61 (74.4)	0.02*
Gender (male)	30 (44.1%)	50 (61%)	0.03*
Overweight/Obesity	52 (76.5)	73 (89%)	0.04*
Hypertension	20 (29.4%)	25 (30.5%)	0.88
DM	7 (10.3%)	22 (26.8%)	0.01*
Dyslipidemia	39 (57.4%)	46 (56.1%)	0.87
NAFLD	46 (67.6%)	60 (73.2%)	0.45
Moderate/severe NAFLD	20 (29.4%)	65 (79.3%)	<0.0001*

IBS: Irritable Bowel Syndrome, DM: Diabetes Mellitus, NAFLD: Nonalcoholic Fatty Liver Disease.

On multivariate analysis of the previously determined factors, moderate/severe NAFLD (OR 3.1, 95% CI 1.6-65.8, p 0.009) was significantly, independently associated with moderate/severe IBS (**Table 5**).

Table (5): Predictors of moderate/severe IBS among the study population (n = 100)

	OR	95% CI	P
Moderate/severe NAFLD (grade II)	3.1	1.6-65.8	0.009

IBS: irritable bowel syndrome, OR: odds ratio, CI: confidence interval, NAFLD: nonalcoholic fatty liver disease.

DISCUSSION

Our findings showed that the median age was 57.71 years, that males made 53.3% of the population, that constipation was the most prevalent type (49.3%), followed by alternating bowel habits (30.7%), and diarrhoea (20%) was the least common form. Just 14.7%

of individuals had severe IBS, the majority of patients (45.3%) had mild or moderate IBS. The vast majority of patients (75.3%) were obese, with an average BMI of 32.3 ± 4.1. 40% of patients had hypertension, 30% had dyslipidemia, and 19.3% had diabetes mellitus. There were 70.7% of people who had NAFLD. **Hasanain et al.** (10) demonstrated that the mean age was 47 ± 12 years, which is consistent with our findings. They were virtually evenly distributed by gender (51% of the patients were female). High BMI (89%) was the most prevalent metabolic condition. 74% of the study population had NAFLD, which was detected via abdominal ultrasonography, the most common grade was moderate (33%) and 57% had moderate/severe NAFLD. All members of the study population had normal levels of alanine and aspartate aminotransferases. **Sourianarayanan et al.** (11) showed that 76 of these 928 individuals had imaging evidence of NAFLD, resulting in 8.2% prevalence of NAFLD in IBS.

Likhitsup et al. (12) revealed that 80 patients with an average age of 42 years were enrolled, the majority were men (55%) and an average BMI of 26 kg/m². The prevalence of NAFLD in these patients was 54%, which is significantly higher than the prevalence in the general US population, assuming a prevalence of 1% of 30%, after abdominal ultrasonography revealed hepatic steatosis in 43 patients (P<0.001). IBS patients with hepatic steatosis males were more likely (67% vs. 41%; P=0.02) and had heavier bodies (84 ± 20 vs. 69 ± 18 kg; P=0.001) and BMI (30 ± 6 vs. 24 ± 4 kg/m²; P=0.001).

Yen et al. (13) revealed that the patients were mostly male and had an average age of 43.54 years (71.6%). The average BMI stood at 22.41 kg/m². **Lin et al.** (14) showed that the median patient age ranged from 34 to 47 years old, with 1531 men (or 53%) and 1449 women. 2028 individuals had ulcerative colitis, and 3673 patients had Crohn's disease (64%), 1716 of the 7640 individuals with IBS in 27 studies, or 32% of the total, had NAFLD. Depending on how IBS patients were diagnosed, NAFLD prevalence varied.

According to the current study, 30.2% of patients had severe NAFLD, 19.8% had mild NAFLD, and 50% of patients had intermediate NAFLD. Regarding age greater than 45% were male gender, overweight/obesity, diabetes, and moderate/severe NAFLD, which was higher in moderate/severe IBS than mild IBS, There was a significant difference between those with mild IBS and those with moderate to severe IBS.

In agreement with our study, **Hasanain et al.** (10) demonstrated that moderate/severe IBS was substantially correlated with DM and moderate/severe NAFLD.

In the current study, based on a multivariate analysis of the previously mentioned identified covariates, there was a significant, independent relationship between moderate/severe NAFLD and moderate/severe IBS (OR

3.1, 95% CI 1.6-65.8, p 0.009). In agreement with our study, **Hasanain et al.** ⁽¹⁰⁾ indicated that moderate/severe NAFLD was substantially, independently linked based on multivariate analysis of previously identified variables, with moderate/severe IBS. **Likhitsup et al.** ⁽¹²⁾ demonstrated that the final model for the multivariate logistic regression contained age, sex, weight, BMI, waist circumference, the presence of diabetes mellitus, and transaminase levels. A 1.6 times greater chance of developing NAFLD was linked to an increase in CDAI score (severity score of IBS).

CONCLUSION

Finally, we discovered a high prevalence of NAFLD among IBS patients. Moderate/severe NAFLD was a predictor of moderate/severe IBS in our study patients. Further research involving non-IBS subjects is required to investigate NAFLD's role in the development of IBS.

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