

# The Association between Central Obesity and the Risk of Irritable Bowel Syndrome: A Case-control Study

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**Abstract Background:** Central obesity and Irritable Bowel Syndrome (IBS) are common medical conditions with similar etiologic mechanisms. There are limited studies to evaluate the association between obesity, especially central obesity; with IBS. Establishing such association is important in the management of IBS. **Objective:** To evaluate the association between central obesity and IBS in Iraqi patients using Waist-to-Height ratio (WtHR) as an index of central obesity. **Patients and Methods:** Central obesity defined by Waist-to-Height ratio  $> 0.5$ . Inclusion and exclusion criteria for diagnosing IBS were used. A case-control study was performed at AL-Nuaman Teaching Hospital in the period from January 2015 to December 2015, Comparing Waist-to-Height ratio (WtHR) between 75 patients (with IBS) and 130 controls (without IBS) to assess the association between central obesity and IBS. Chi-square test with 95% confidence was used to evaluate association between central obesity and IBS, and Odds ratio (OR) for central obesity was determined. **Results:** There is significant association between central obesity and IBS,  $\chi^2 (1) = 36.2, P < 0.001$ . The strength of association using phi coefficient is medium positive ( $\phi=42, p<0.001$ ). **Conclusion:** Central obesity is significantly associated with IBS and may be regarded as a risk factor for IBS.

OR	value
Odds Ratio for Central Obesity (Central Obesity / No-Central Obesity)	6.403
For cohort IBS = IBS	2.972
For cohort IBS = No-IBS	.464

**Keywords:** central obesity, IBS, Waist-to-Height ratio (WtHR), case-control study

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## 1. Introduction

Irritable bowel syndrome (IBS) is a common chronic functional gastrointestinal disorder with a prevalence of up to 45% [1]. Diagnosis of IBS depends on patients' presentation of recurrent abdominal pain and altered bowel frequency with the exclusion of any organic disease. There are many mechanisms have been implicated in the pathogenesis of IBS including diet, microbiota, inflammation, and psychosocial functioning [2,3,4].

Obesity is a common chronic endocrine disorder associated with many diseases including those related to GIT mainly GERD [5,6,7], but there are limited studies to prove association with IBS. Pathogenesis of obesity is multifactorial and includes also diet, microbiota, inflammation, and psychological factors [8]. The dysmetabolic syndrome as a result of an inflammatory activity is greater in patients with visceral obesity even with normal Body Mass Index (BMI) [9].

Waist-to-Height ratio (WtHR) [termed also as Index of Central Obesity (ICO)], with a value of more than 0.5 [10],

is strongly associated with visceral fattiness measured via DEXA [11], making it as the best index for central or abdominal obesity.

There are some researches to evaluate the association between visceral abdominal obesity and irritable bowel syndrome, but to my knowledge no study uses WtHR or ICO in defining central obesity. Moreover no survey was performed in Iraq to investigate the relationship between central obesity and having Irritable Bowel Syndrome. Therefore, the aim of this case-control study is to evaluate the association between Central Obesity and the risk of Irritable Bowel Syndrome.

## 2. Methods

### 2.1. Study Design

A Case-Control study was conducted in the outpatient department of internal medicine of AL-Nuaman Teaching Hospital in the period from January 2015 to December 2015. Any person with age more than 50 years was excluded from both case and control groups.

## 2.2. Inclusion Criteria

There are many criteria for diagnosing IBS, but Rome III Diagnostic Criteria are useful in clinical practice and can be used to make a positive clinical diagnosis with high sensitivity and specificity [12,13]. These criteria include abdominal pain for more than 6 months, which becomes recurrent at least 3 days per month in the last 3 months, with 2 or more of the following features must fulfill: (1) Pain is relieved by defecation; (2) Pain associated with a change in frequency of stool; and (3) Pain associated with a change in form of stool.

## 2.3. Exclusion Criteria

There are many features which make diagnosis of organic rather than IBS.

These include: (1) Fever, Weight loss or Jaundice; (2) Change in the color of stool; (3) Signs of anemia or Thyroid disease; (4) Abdominal mass or Organomegaly; (5) Signs of intestinal obstruction

## 2.4. Anthropometric Measurements

Waist Circumference (WC) and Height measured for patients and control groups. Then Waist-to-height ratio (WHtR) was determined, dividing WC (in cm) by height (in cm). A WHtR cutoff point of 0.50 was used in determining central obesity. Central obesity defined as having WHtR>0.5.

## 2.5. Statistical Analysis

The data was entered and examined entirely utilizing PC software of the Statistical Package for the Social

Science (SPSS) version 20.0. Cross-tabulation analysis (Chi-square test) with 95% confidence was used to evaluate association between central obesity and IBS, and Odds ratio (OR) for central obesity was determined including 95% confidence interval [CI]. A P- value of < 0.05 was been considered to indicate the level of significance throughout the study. Strength of association was measured using Phi coefficient.

## 3. Results

### 3.1. Study Participants

A total of 120 patients were participated with 45 patients excluded from this study. There were 75 patients (with IBS) and 130 persons (without IBS) as a control, enrolled in this study.

### 3.2. Prevalence of Central Obesity

Prevalence of central obesity in IBS group was more than 3 times in non- IBS group (Table 1), and most of control group have no central obesity (Figure 1).

### 3.3. Association between Central Obesity and IBS

There is significant association between central obesity and IBS,  $\chi^2 (1) = 36.2, P < 0.001$ . Patients with central obesity have a risk to have IBS 6 times more than those without central obesity (Table 2). The strength of association using phi coefficient is medium positive ( $\phi=42, p<0.001$ ).

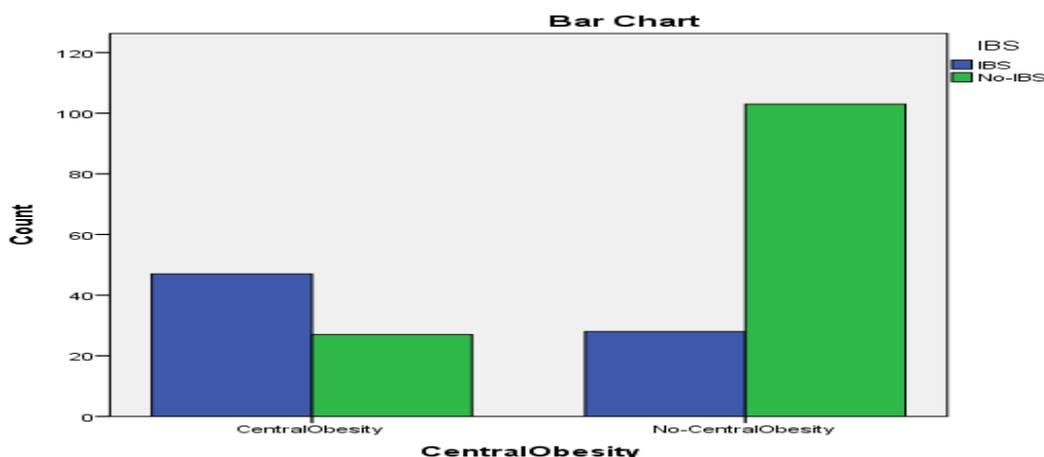


Figure 1. Distribution of central obesity in patients and controls

Table 1. Prevalence of central obesity among participants

			IBS		Total
			IBS	No-IBS	
Central Obesity	Central Obesity	Count	47	27	74
		% within IBS	62.7%	20.8%	36.1%
		% of Total	22.9%	13.2%	36.1%
	No-Central Obesity	Count	28	103	131
		% within IBS	37.3%	79.2%	63.9%
		% of Total	13.7%	50.2%	63.9%

Table 2. Risk Estimation for IBS

	Value	95% Confidence Interval	
		Lower	Upper
<b>Odds Ratio for Central Obesity (Central Obesity / No-Central Obesity)</b>	6.403	3.406	12.038
<b>For cohort IBS = IBS</b>	2.972	2.050	4.307
<b>For cohort IBS = No-IBS</b>	.464	.339	.635

## 4. Discussion

My study indicates that prevalence of central obesity and IBS among all participants was 36.6% and 36.1% respectively. Prevalence of central obesity among IBS vs. non-IBS groups was 62.7% and 20.8% respectively. Central obesity was significantly associated with IBS (odds ratio (OR), 6.4; 95% confidence interval [CI], 3.4 to 12.03).

Central obesity is associated with many medical conditions. There are several studies which had been studied the relationships between general obesity and symptoms of IBS, all these studies use BMI as an index of obesity, but very limited studies evaluated the association between central obesity and IBS. Indeed I found just a single case-control study to evaluate association between central obesity and IBS performed by Lee CG [14] who measure central obesity using abdomen computerized tomography (CT) and found that a higher visceral adipose tissue (OR) =9.42) and waist circumference (OR=7.81) were associated with IBS.

My results are similar to those of most studies which show a positive association between IBS and general obesity [15,16,17]; and between IBS and central obesity [14]. Some studies show that central obesity using WC is more associated with IBS than general obesity [18,19]. However, there are some studies which did not show this association [20,21,22]. To my knowledge this is the first case-control study to evaluate the association between central obesity, using waist-to-height ratio (WHtR), and irritable bowel syndrome. Using waist-to-height ratio (WHtR) as an index of central obesity is a simple practical measure unlike the cost and risk of CT.

Several explanations for the association between IBS and central obesity, It has been suggested that obese persons have uninhibited satiety leading them to overeating of diets that are low in fiber, high in saturated fats and fermentable carbohydrates which may contribute to IBS symptoms [23]. On the other hand, the density of (ghrelin) endocrine cell type is increased in IBS. Ghrelin stimulates food intake leading to central obesity [24].

Alterations in the composition of the gut microbiota have been noticed in both obesity and IBS and may be a common association between the 2 disorders [25,26,27,28,29]. Low grade inflammation or immune activation has been postulated to be one of the mechanisms of IBS pathogenesis through effects on visceral sensitivity and gut epithelial function [30,31]. IBS is associated with higher serum tumor necrosis factor alpha (TNF- $\alpha$ ) levels and increased levels of the proinflammatory cytokines interleukins 6 (IL-6) [32]. Obesity associated with an increased number of adipocytes [33]. There are many evidences that these adipocytes secrete TNF- $\alpha$  and IL-6 in large quantities, which may contribute to insulin resistance and systemic inflammation of obesity [34,35,36].

Further studies are needed to establish the firm association between central obesity and IBS, the proving of such association is important in management of IBS.

In addition to small sample size, one of limitations of this study is the sample not stratified by gender, and IBS patients not categorized into diarrhea predominant or constipation predominant.

## 5. Conclusion

The results of this research indicate a positive association between central obesity and IBS, and central obesity is a risk factor for IBS.

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