

# A Study on Incidence of Inguinal Hernia in Relation to BMI

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## ABSTRACT

**Background:** Inguinal Hernias (IH) are the most common hernia of abdominal wall. These hernias affect both males and females. There are many factors that are linked with the increased risk of developing these hernias. Obesity is believed to be one of them. However, with current epidemiological advances, increased body mass index (BMI) has proven to have fewer incidences of inguinal hernias.

**Objective:** The aim of this study is to determine the relationship of inguinal hernia both unilateral and bilateral with body mass index (BMI)

**Study Design:** This is a cross-sectional study.

**Methodology:** This study was conducted in the department of General Surgery Unit 2 of Dow University Hospital, Karachi, Pakistan. A total of 60 patients were included in this study using non probability convenient sampling which was conducted from January of 2022 till December of 2022.

**Results:** A total of 60 patients who were clinically diagnosed with inguinal hernia were enrolled in our study. Their mean age was  $39.25 \pm 14.18$  years, mean height was  $170.55 \pm 5.51$  cm and mean weight was  $67.28 \pm 8.64$  kg. Their average BMI was  $23.10 \pm 2.55$  kg/m<sup>2</sup>. 56 (93.3%) of the participants were males and 4 (6.7%) were females. Only 1 (1.7%) patient with inguinal hernia was underweight, 48 (80%) patients were normal weighted, 10 (16.7%) patients were overweight and 1 (1.7%) patient was obese.

**Conclusion:** According to the research that we conducted, most patients who underwent surgical hernia repair of either right, left or bilateral sides had normal BMI.

**Keywords:** Inguinal Hernia, Body Mass Index (BMI)

## INTRODUCTION

Inguinal Hernia (IH) is a prevalent condition that warrants surgical repair as its treatment. Around 75% of the abdominal wall hernias were reported in the category of inguinal hernia with a lifetime risk of 27% in males and 3% in females. (1) Approximately, 50% of the people with inguinal hernia are not aware of having this condition. (2) It has also been proposed that 1 out of 2 men will undergo surgical repair for inguinal hernia in their lifetime. (3)

The predisposing factors that are linked with development of inguinal hernia include smoking, male gender, increasing age, connective tissue disorders, family history and increased intra-abdominal pressure (IAP). (4, 5) Obesity is associated with increased intra-abdominal pressure and hence, it was previously linked with increased risk of causing inguinal hernia. (6, 7) However, latest epidemiological reports have produced contradictory suggestion that increased body mass index decreases the risk of acquiring inguinal hernia. Nevertheless, increased BMI is still associated with increased risk of recurrence of inguinal hernia. (8)

The relation between Body Mass Index (BMI) and genesis of Inguinal Hernia (IH) is still up for debate. We conducted this study with an aim to evaluate the relation between the said variables in a country where obesity has high prevalence.

## MATERIALS AND METHODS

This is a cross-sectional study conducted in Dow University Hospital, Karachi in the Department of General Surgery Unit 2 from January of 2022 till December of 2022. Our study population comprised of 60 patients sampled through conventional non-probability sampling technique. Informed consent was obtained from the patients included in our study.

All patients above 18 years of age presenting with swelling of the inguino-scrotal region, clinically diagnosed with inguinal hernia undergoing surgery irrespective of the mode of anaesthesia were included in our study. Patients were excluded from our study who presented with inguinoscrotal swelling other than inguinal hernia, those who did not give consent and patients with familial collagen vascular diseases.

Patients' height was recorded in centimetre (cm) and weight was recorded in kilograms (kg) and their BMI was calculated using CDC recommended formula (9):

$$\text{BMI} = [\text{weight (kg)} / \text{height (cm)}] \times 10,000$$

And patients were categorized into different BMI groups using CDC provided classification (10):

- Underweight with BMI of  $<18.5$  kg/m<sup>2</sup>
- Normal with BMI of  $18.5-24.9$  kg/m<sup>2</sup>
- Overweight with BMI of  $25-29.9$  kg/m<sup>2</sup>
- Obese with BMI of  $>30$  kg/m<sup>2</sup>

Statistical Analysis was done using SPSS version 21 where percentages and frequencies were represented as qualitative data and mean and standard deviation was represented as quantitative data.

## RESULTS

In our study, a total of 60 patients were diagnosed with inguinal hernia. Their mean age was  $39.25 \pm 14.18$  years, with their mean height being  $170.55 \pm 5.51$  cm and mean weight of  $67.28 \pm 8.64$  kg. The average BMI of patients with inguinal hernia in our study was  $23.10 \pm 2.55$  kg/m<sup>2</sup>. Of the participants, 56 (93.3%) were males and 4 (6.7%) were females. The diagnosis was Right Inguinal Hernia (RIH) in 21 (35%) patients, Left Inguinal Hernia (LIH) in 28 (46.7%) patients and Bilateral Inguinal Hernia (BIH) in 11 (18.3%) patients. Only 1 (1.7%) patient with inguinal hernia was underweight, 48 (80%) patients were normal weighted, 10 (16.7%) patients were overweight and 1 (1.7%) patient was obese. (Table 1)

Table 1: General outline of patients with inguinal hernia

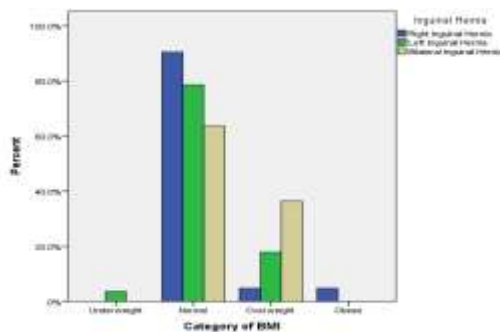
Variables		No. (Percentages)
Gender	Male	56 (93.3%)
	Female	4 (6.7%)
Mean age in years		$39.25 \pm 14.18$
Mean weight in kg		$67.28 \pm 8.64$
Mean height in cm		$170.55 \pm 5.51$
Mean BMI		$23.10 \pm 2.55$
Diagnosis	Right inguinal hernia	21 (35%)
	Left inguinal hernia	28 (46.7%)
	Bilateral inguinal hernia	11 (18.3%)
BMI	Underweight	1 (1.7%)
	Normal	48 (80%)

	Overweight	10 (16.7%)
	Obese	1 (1.7%)

It was seen that 21 (35%) males had RIH, 24 (40%) males had LIH and 11 (11.3%) males had BIH. All 4 (6.7%) females included in our study had LIH. The 1 (1.7%) patient that was underweight had LIH. There were 19 (31.7%) patients with normal weight that had RIH, 22 (36.7%) patients with normal weight had LIH and 7 (6.7%) patients with normal weight had BIH. In overweight category, 1 (1.7%) patient had RIH, 5 (8.3%) patients had LIH and 4 (6.7%) patients had BIH. There was only 1 (1.7%) patient in the obese category and that patient had RIH. (Table 2)

Table 2: Incidence of inguinal hernia in relation to Gender and BMI

Variables		RIH	LIH	BIH
Gender	Male	21 (35%)	24 (40%)	11 (11.3%)
	Female	0	4 (6.7%)	0
BMI	Underweight	0	1 (1.7%)	0
	Normal	19 (31.7%)	22 (36.7%)	7 (11.7%)
	Overweight	1 (1.7%)	5 (8.3%)	4 (6.7%)
	Obese	1 (1.7%)	0	0



**DISCUSSION**

It was previously postulated that obesity increases intra-abdominal pressure thereby increasing the risk for development of inguinal hernia. (11) Upon further researches, it was found that increase in BMI decreases the risk of developing inguinal hernia. (12)

There have been multiple hypotheses that have been put forward to explain how high BMI can prove to be protective towards genesis of inguinal hernia: Increased pre-peritoneal fat or intra-abdominal fat can stop herniation of contents of the abdominal cavity by serving as a plug; Obese patients are physically less active as compared to non-obese population when physical activity is a risk factor for development of inguinal hernia; Due to increased fat, there is difficulty in clinically diagnosing obese patients with inguinal hernia. (13,14)

According to Melwani et al., a single unit rise of BMI (3 to 4 kg) can lead to reduced risk of having inguinal hernia by 4% in males aged between 47 to 55 years. (15) However, in our research, it was noted that both extremes of BMI that is underweight and overweight categories had decreased incidence of inguinal hernia as compared to those with normal BMI.

In a study conducted by Ried et al., it was produced that 28% patients with inguinal hernia had normal BMI and 72% patients were overweight. (16) Our study showed contrary results to this. However, a recent study revealed that that 82.9% people with inguinal hernia had normal BMI and 17.1% people had low BMI. (17) These results resonated with the results yielded by our study.

Albukairi et al., suggested that unilateral inguinal hernias were more common than bilateral inguinal hernia which confers with the results of our study. (18) Our study also showed similar results to those conducted by Dietz et al and Gaebler et al which stated that 85% of males showed inguinal hernia whereas only 15% females presented with the similar complaint. (19, 20)

The limitation of our study was small sample size, heterogeneous group of patients, and lack of randomization in

sampling. A study conducted on larger sample size keeping in account other parameters such as waist size, intra-abdominal visceral fat could also be taken in account while evaluating further facts in future studies.

**CONCLUSION**

Our study has yielded results that show an increased risk of developing inguinal hernia in patients with normal BMI as compared to those who are underweight or overweight. Bilateral inguinal hernias occur less frequently as compared to unilateral inguinal hernia. Males are more likely to be affected by inguinal hernia than females.

**Conflict of Interest:** There are no conflicts of interest.

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