

# Association of Primary Inguinal Hernia with Body Mass Index in Patients of Bundelkhand Region of India.

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## ABSTRACT

**Background:** Inguinal hernia is a common condition dealt by surgeons in our country. It is said to be associated with increasing age, male gender, smoking, connective tissue disorder and factors responsible for increased intraabdominal pressure. Development of inguinal hernia and its relation with body weight is controversial. So present study has been carried to find out relation of body mass index with development of inguinal hernia in both gender, various age groups and its association with type of inguinal hernia. **Methods:** This was a prospective study carried out on patients of primary inguinal hernia belonging to Bundelkhand region of India. Patients were categorized according to Body Mass Index (BMI) as normal weight (BMI=18.5-24.9), overweight (BMI=25-29.9), class 1 obese (BMI=30-34.9), and morbid obese i.e. class 2 & 3 obese (BMI≥35). Data were further classified in groups formed on the basis of BMI of patient versus age, gender of patients and type of inguinal hernia viz. direct/ indirect hernia. All the findings were tabulated and inferences were drawn followed by statistical comparison with the help of "Statistical Calculator v 4.0" using suitable test viz. chi-square test with p value <0.05 considered as significant. **Results:** Age groups ranging from 21 years up to 70 years had highest number of patients who were having normal weight (BMI =18.5-24.9). Among the male gender, highest number of patients belonged to BMI group of 18.5-24.9 (i.e. normal weight). Patient group with BMI of ≥ 35 (i.e. class 2 & 3 obese) had the least frequency distribution in males as well as in females. Among the patients of primary direct inguinal hernia and primary indirect inguinal hernia, patient group with BMI of 18.5-24.9 (normal weight) showed highest frequency and patient group with BMI ≥ 35 (class 2 & 3 obese) showed least frequency. **Conclusion:** Present study shows that in our study population, high Body mass index is not associated with high occurrence of inguinal hernia among the genders and different age groups, rather it seems to be protective for inguinal hernia.

**Keywords:** Body Mass Index, BMI, Inguinal Hernia, primary inguinal hernia.

## INTRODUCTION

An inguinal hernia is protrusion of abdominal cavity contents through inguinal canal.<sup>[1]</sup> It is one of most common type of hernia. It is said to be often associated with increasing age, male gender, smoking, connective tissue disorder and factors responsible for increased intraabdominal pressure.<sup>[2]</sup> Being overweight is also considered as a common cause amongst conditions increasing intraabdominal pressure. Contrary to what may seem intuitive, obesity is protective against inguinal hernia.<sup>[3]</sup> Development of inguinal hernia and its relation with body weight is controversial, though obesity is now a known risk factor for recurrence of inguinal hernia.<sup>[4]</sup>

Present study has been carried out in Bundelkhand region among patients of primary inguinal hernia, to

find out relation of body mass index with development of inguinal hernia in both gender, various age groups and its association with type of inguinal hernia.

## MATERIALS AND METHODS

This study was done only on patients of Bundelkhand region of India, suffering from primary inguinal hernia presented in Department of surgery, Rajkiya Medical College, Jalaun, Uttar Pradesh and Ambe Nursing Home, Orai (Jalaun), Uttar Pradesh on 170 patients over a period of evaluation from October 2014 to February 2018. Patients belonging to other regions were not included in this study. Patients showing recurrence of inguinal hernia were also excluded from the study. A prior approval was taken for this study from research ethical society of the institute. A very detailed history taking and thorough examination of all the patients were done. Patients were first categorized according to Body Mass Index (BMI) as normal weight (BMI=18.5-24.9), overweight (BMI=25-29.9), class 1 obese (BMI=30-34.9), and morbid obese i.e. class 2 & 3

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obese (BMI $\geq$ 35).<sup>[5]</sup> Body Mass Index (BMI) is a simple index of weight-for height. It is defined as the weight in kilograms divided by the square of height in metres.<sup>[6]</sup> It is used for categorizing the patients because BMI values are age independent and same for both gender.<sup>[5]</sup>

Data were further classified in groups formed on the basis of BMI of patient versus age, gender of patients and type of inguinal hernia viz. direct/indirect hernia. All the findings were tabulated and inferences were drawn followed by statistical comparison with the help of “Statistical Calculator v 4.0” using suitable tests viz. chi-square test with p value <0.05 considered as significant.

## RESULTS

**Table 1: Distribution of patients on the basis of BMI and age group**

BMI (kg/m <sup>2</sup> )	Age of patients in years							
	≤10	11-20	21-30	31-40	41-50	51-60	61-70	≥70
18.5-24.9 (normal weight)		2	4	22	43	15	3	1
25-29.9 (overweight)	2	4	7	5	7	4	3	
30-34.9 (class 1 obese)			1	11	8	6	2	1
≥ 35 (class 2 & 3 obese)	2	4	3	5	4	1		

(Chi square test: X<sup>2</sup>= 50.9 df=21 p=0.0003)

**Table 2: Distribution of patients on the basis of BMI and gender**

BMI(kg/m <sup>2</sup> )	Gender of patients	
	Male	Female
18.5-24.9 (normal weight)	78	12
25-29.9 (overweight)	23	9
30-34.9 (class 1 obese)	17	12
≥ 35 (class 2 & 3 obese)	12	7
	130	40

(Chi square test: X<sup>2</sup>= 12.58 df=3 p=0.0056)

**Table 3: Distribution of patients on the basis of BMI and type of inguinal hernia**

BMI(kg/m <sup>2</sup> )	Type of inguinal hernia	
	Direct	Indirect
18.5-24.9 (normal weight)	20	70
25-29.9 (overweight)	12	20
30-34.9 (class 1 obese)	8	21
≥ 35 (class 2 & 3 obese)	3	16
	43	127

(Chi square test: X<sup>2</sup>= 3.96 df=3 p=0.27)

## DISCUSSION

Out of 170 patients of inguinal hernia, 52.94% patients were normal weight (BMI =18.5-24.9), 18.82% were overweight (BMI =25-29.9), 17.06% were class1 obese. (BMI $\geq$  30-34.9) and 11.17% were class 2 & 3 obese (BMI $\geq$ 35). [Table 1] All the

age groups ranging from 21 years up to 70 years had highest number of patients who were having normal weight (BMI =18.5-24.9). [Table 1] and had the least number of patients in class 2 & 3 obese group (BMI $\geq$ 35).

A study on Swedish population have attributed a protective effect to obesity in development of inguinal hernia. They reported that obese men have 43% lower risk of groin hernia than men of normal weight.<sup>[7]</sup>

Similar to our finding, in two other studies on American population, authors have reported that being overweight and obesity are associated with lower incidence of inguinal hernia,<sup>[8]</sup> while lower BMI was found associated with increased risk of hernia.<sup>[9]</sup>

Out of 170 patients of inguinal hernia, 76.47% were male and 23.53% were female. Among the male patients, patient group with BMI of 18.5-24.9 (normal weight) showed highest frequency distribution of 60%, followed by the patient group with BMI of 25-29.<sup>[9]</sup> (overweight). Among the female patients, patient groups with BMI of 18.5-24.9 (normal weight) and patient groups with BMI of 30-34.<sup>[9]</sup> (type1 obese) showed equal frequency distribution. Patient group with BMI of  $\geq$  35 (class 2 & 3 obese) had the least frequency distribution in males as well in females. [Table 2]

In another study over 459 men with inguinal hernia in western Jerusalem, authors noted that prevalence rate were low in presence of overweight or adiposity.<sup>[10]</sup>

Obesity (Quetelet index >30) was found protective for inguinal hernia in a case-control study done in women by Liem et al.<sup>[11]</sup>

Among the patients of primary direct inguinal hernia and primary indirect inguinal hernia, patient group with BMI of 18.5-24.9 (normal weight) showed highest frequency and patient group with BMI  $\geq$  35 (class 2 & 3 obese) showed least frequency. [Table 3]

In another study done in Central India, authors did not found association of increased body mass index with incidence of inguinal hernia in their patient groups.<sup>[12]</sup>

One hypothesis for this phenomenon is that the intraabdominal visceral fat prevents hernia from occurring. Moreover, the clinical diagnosis of inguinal hernia in obese patient is more challenging resulting in lower diagnostic sensitivity.<sup>[3]</sup>

## CONCLUSION

Inguinal hernias continue to be a source of morbidity and mortality in our country and globally. Present study shows that in our study population, high Body Mass Index is not associated with high occurrence of inguinal hernia among the genders and different age groups, rather it seems to be protective for inguinal hernia.

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