



# Comparison of Incidence of Inguinal Hernia among Obese and Normal Individuals: A Retrospective Analysis

**Mandar Zade<sup>1</sup> and Sivaram Sridharan<sup>1\*</sup>**

<sup>1</sup>Department of General Surgery, Saveetha Medical College and Hospital, Chennai, Tamil Nadu, India.

## **Authors' contributions**

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

## **Article Information**

DOI: 10.9734/JPRI/2021/v33i47B33173

### Editor(s):

(1) Dr. Syed A. A. Rizvi, Nova Southeastern University, USA.

### Reviewers:

(1) Haydée Serrão Lanzillotti, State University of Rio e Janeiro, Brazil.

(2) Teguh Hari Sucipto, Universitas Airlangga, Indonesia.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/75095>

**Original Research Article**

**Received 10 August 2021**  
**Accepted 14 October 2021**  
**Published 04 November 2021**

## **ABSTRACT**

**Objective:** The objective of the present study was to verify whether obesity is associated with the occurrence of inguinal hernia.

This is a cross-sectional study carried out in a tertiary hospital, including 84 patients, with clinical diagnosis of inguinal hernia, who underwent hernia mesh repair during a 6-month period (January 2021 to June 2021). Demographic, anthropometric and diagnostic data for inguinal hernia were taken from the patients' medical records.

The Chi-square test was used to calculate the significance of association.

**Results:** A total of 84 patients were included in this study. The age of patients varied between 39 - 75 years, averaging 54.8 years.

The study showed an association between BMI and two factors, namely: Age (P = .023) and size of the defect (P = .005). However, hernia type (P = .797) and its content (P = 0.061) did not show such an association.

**Conclusion:** In conclusion, these results may be a useful guide for future studies about the relationship between BMI and hernia and may provide foundation for better understanding of the pathophysiology of hernia in obese.

**Keywords:** Inguinal Hernia; body mass index; obesity.

## 1. INTRODUCTION

Hernia is the bulging of part of the contents of the abdominal cavity through a weakness in the abdominal wall. It is estimated that 1 in every 3 men will require a hernia repair, at some point in his life [1]. Correct incidence of Inguinal hernias in India is a difficult estimate, but about 500,000 cases come to medical attention each year [2], nearly 800,000 are repaired each year in the USA [1], and 70 000 inguinal hernia repairs (62 969 primary, 4939 recurrent) were done in England alone, requiring more than 100 000 hospital bed days [3].

It can be caused due to various reasons like developmental failure of processus vaginalis to close, muscular damage by blunt trauma, increased intra-abdominal pressure, primary muscle pathology, male gender, family history and collagen vascular disease among various others [4].

Since obesity is undeniably associated with increased intra-abdominal pressure, it is often assumed as an important risk factor for increase in incidence of inguinal hernia. On the contrary, recent epidemiological studies have shown an opposing trend, signifying a declining trend in this incidence [5,6], discarding the traditional assumption. Hence, in this study we've tried to gain more insight into this relationship, and to examine the impact of BMI on incidence rates of Inguinal hernia in a semi-urban south Indian population.

## 2. MATERIALS AND METHODS

This is a tertiary hospital based cross-sectional study conducted over 6 months (from January 2021 to June 2021) in Saveetha Medical College and Hospital, Chennai. 84 patients clinically diagnosed and radiologically confirmed as inguinal hernia were enrolled in the study.

Inclusion criterion was patients diagnosed as inguinal hernias, with age between 19-79 years, body mass index between 18 and 35 kg/m<sup>2</sup> and willingness to participate in the study.

Exclusion criteria was for those patients with femoral hernia, strangulated hernia, recurrent hernia, ventral hernias, bilateral hernias and patients with collagen vascular disease.

Patient demographics, history and details of height, weight, type of hernia, content of hernia, size of defect were obtained after request from the department of medical records, Saveetha Medical College, Chennai. According to the body mass index, patients greater than equal to ( $\geq$ ) 26 kg/m<sup>2</sup> were defined as the overweight group (O Group) and patients less than equal to ( $\leq$ ) 25.9 kg/m<sup>2</sup> were defined as the normal weight group (N Group). The above groups were chosen for their

Inguinal hernia was classified as Indirect (also known as lateral hernia) and Direct (also known as medial hernia). The two major contents of hernia were selected and chosen as omentocele and enterocele, rare contents like appendix, ovary with fallopian tubes, urinary bladder, sigmoid colon, and cecum were not included. Size of defect in the study varied from 3.8 to 7.2 cm studied intraoperative and were divided into two groups, that is, equal to smaller ( $\leq$ ) than 5.8 cm and equal to greater than ( $\geq$ ) 6 cm (correction up to 0.2 cm). This correction is suggested by the main surgeon on the case, as written on the surgical record.

A 2 X 2 Chi-square test was used to calculate the significance of association. P value of <0.05 was taken as positively significant. Approval from the Institute Ethical Committee was taken. Research Ethics Committee approval protocol number

## 3. RESULTS

A total of 84 patients were included in this study. The age of patients varied between 39 - 75 years, averaging 54.8 years. While the body mass index of patients ranged between 17.9 kg/m<sup>2</sup> to 36.4 kg/m<sup>2</sup>, averaging 27.3 kg/m<sup>2</sup>.

The assessment of nutritional status, according to the BMI, showed that 48% of the subjects are eutrophic (N Group) and 52% are obese (O Group).

Table 1 shows the association between BMI and the various factors under study, along with their calculated P values. Statistically significant positive association between BMI and Age ( $P=0.023$ ) and size of defect ( $P=0.005$ ) was found out. Type of hernia ( $P=0.797$ ) and Content ( $P=0.061$ ) did not show positively significant association (as  $P>0.05$ ) with BMI.

**Table 1. Shows the association between BMI and various factors under study, along with their calculated P values**

Factor		BMI		Total (N + O)	P-value
		Normal (N)	Obese (O)		
Age	< 55 years	28	20	48 (57%)	.023
	> 55 years	12	24	36 (43%)	
Type	indirect	20	28	48 (57%)	.797
	direct	4	32	36 (43%)	
Content	omentocele	20	36	56 (67%)	.061
	enterocele	16	12	28 (33%)	
Size of defect	≤ 5.8 cms	9	11	20 (24%)	.005
	≥ 6 cms	20	44	64 (76%)	

(Percentages rounded off to significant figures)

#### 4. DISCUSSION

Inguinal hernias are one of the commonest causes of morbidity and mortality in surgery around the world. Patients diagnosed with inguinal hernia (n=84) were included in the study. In a country like India, patients with BMI  $\geq 35$  are very rare and patients with BMI  $\geq 40$  patients are extremely rare, unlike the western world. Hence, in this study, we could not include or study patients with BMI  $\geq 35$ . So we compared obese patient group and normal weight patient group.

Mean age in this study was found to be 54.8 years ranging between 39 to 75 years. In a similar study done by Shengulwar Sayanna et al. [2], found inguinal hernia most common in the age group of 41 to 50 (29%) correlating to our study, where about 57% belonged to the less than 55 age group. In other cohort studies by Abramson et al. [7] on Israeli men, and by Liem et al. [8] and Ruhl CE et al. [9] showed an increasing incidence of inguinal hernias in men with increasing age, similar to our retrospective study results (age is a significant factor with  $P=.023$ ). This could probably be due to diminished muscular power and bulk with age, failure of protective mechanisms [10], constipation and other factors that are known to increase intra-abdominal pressure, which are pretty common in elderly men.

In our study, the type of hernia was not significantly associated with obesity ( $P=.797$ ; non significant), with indirect hernia being more common (57%) between the two. Although direct had a slightly higher incidence in obese, it's relation couldn't be proved significantly. These results match with those by Chan Yong Park et al. [11].

In an attempt to take this study further, we decided to study the incidence of two most common contents of inguinal hernia, Omentocele and Enterocele, excluding other minor contents like appendix, ovary with fallopian tubes, urinary bladder, sigmoid colon, and cecum. We found omentocele (66%) as the most common content overall, which was also the most common type in obese but its significance couldn't be proved statistically ( $P=.061$ ).

It is a common assumption, that the defect size in an inguinal hernia would be dependent on the proportion of increase in intra abdominal pressure. In an attempt to further provide evidence against this we also studied the size of defect of the hernia intra-operatively. It ranged from 3.2 to 7.9 centimeters, averaging 4.28 centimeters. Defect size showed significant association with obesity ( $P=.005$ ). We hope these results will provide the foundation to studies in the future.

#### 5. CONCLUSION

Inguinal hernia repair is one of the most commonly encountered surgical procedures around the world. Increased intra abdominal pressures are unarguably one of the most important causes whatsoever, so obesity by default is considered a risk factor. But, recent upcoming studies like our's were unable to significantly associate this relationship, hence suggesting an alternate hitherto unknown mechanism behind this. Studies like these might be a useful guide for future studies about the relationship between BMI and hernia, and may provide a base for better understanding of the pathophysiology of hernia in obese, helping in early detection and treatment of inguinal hernias in the future.

## 6. SCOPE OF STUDY

### 6.1 Merits

By doing this study we have tried to establish the relation of obesity with inguinal hernia, which could provide an important insight into risk factor detection as well as help with the treatment of inguinal hernia cases in the future.

### 6.2 Demerits

The demerits to the study include its short study period, leading to a smaller study group, which was due to the unforeseen circumstances of the Covid-19 pandemic.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## ACKNOWLEDGEMENT

The authors express their sincere thanks to Dr. Saveetha Rajesh, The Director of Saveetha Medical College and Hospital, The Department of General Surgery and the Medical Records Department, Saveetha Medical College and hospital, for their constant motivation and cooperation for this study.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Zendejas B, Ramirez T, Jones T, et al. Incidence of Inguinal Hernia Repairs in Olmsted County, MN: A Population-Based Study. *Annals of surgery*. 2013;257:520–6. DOI: 10.1097/SLA. 0b013e31826d41c6 [PubMed: 23388353]
2. Sayanna et al. Prevalence of inguinal hernia in Indian population: a retrospective study. *MedPulse – International Medical Journal* February 2015;2(2):75-78. <http://www.medpulse.in> (accessed 23 February 2015).
3. Williams N, Bulstrode C, O'Connell P, Bailey H, Love R. Bailey & Love's short practice of surgery.
4. Jenkins JT, O'Dwyer PJ. Inguinal hernias. *BMJ (Clinical research ed.)*. 2008;336(7638):269–272. [https://doi.org/10.1136/bmj.39450.428275. AD](https://doi.org/10.1136/bmj.39450.428275.AD)
5. Rosemar A, Angerås U, Rosengren A, Nordin P. Effect of body mass index on groin hernia surgery. *Annals of surgery*. 2010;252:397–401. 10.1097/SLA.0b013e3181e985a1 [PubMed: 20647921]
6. Rosemar A, Angerås U, Rosengren A. Body mass index and groin hernia: a 34-year follow-up study in Swedish men. *Annals of surgery*. 2008;247:1064–8. 10.1097/SLA.0b013e31816b4399 [PubMed: 18520236]
7. Abramson JH, Gofin J, Hopp C, et al. The epidemiology of inguinal hernia. A survey in western Jerusalem. *J Epidemiol Community Health*. 1978;32:59 – 67.
8. Liem MS, van der Graaf Y, Zwart RC, et al. Risk factors for inguinal hernia in women: a case-control study. *The Coala Trial Group. Am J Epidemiol*. 1997;146:721–726.
9. Ruhl et al. Risk factors for inguinal hernia among adults in the US population. *Am J Epidemiol*. 2007;165:1154 –1161.
10. Sorensen T, Jorgensen L, Gottrup F. Biochemical aspects of abdominal wall hernia formation and recurrence. In: Fitzgibbons R Jr, Greenburg AG, eds. *Nyhus and Condon's Hernia*. 5th ed. Philadelphia: Lippincott Williams & Wilkins, 2002:9 –15.
11. Park et al. Inguinal hernia repair in overweight and obese patients. *Journal of the Korean Surgical Society*, 81(3):205–210. <https://doi.org/10.4174/jkss.2011.81.3.205>

© 2021 Zade and Sridharan; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:  
<https://www.sdiarticle4.com/review-history/75095>