

**A study on association between inguinal hernia and benign prostatic hyperplasia**

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**Abstract**

**Aim:** This study aims to find out whether BPH is a significant risk factor for developing inguinal hernia in males.

**Methodology:** This 1:1, age-matched, case-control study was conducted at L N medical college and J K Hospital, Bhopal. A total of 62 male participants aged 40 years above: 31 cases and 31 controls were selected according to inclusion criteria. Following prostate gland-related parameters were measured: International Prostate Syndrome Score (IPSS), Prostate volume and Uroflometric in both groups.

**Result:** Only 4 cases and 3 controls mentioned lower urinary symptoms (LUS) as one of the complaints during a clinical examination. The mean IPSS values among the cases and control were 9.12 and 8.62 (p=0.292). None of the participants had a severe IPSS score; only 6 cases and 4 controls had moderate IPSS scores (p= 0.455). The

mean prostate volume on USG among cases and controls was 28.8 ml and 27.4 ml (p = 0.844). None of the participants either in the case or control group had Prostatomegaly. On uroflowmetric analysis, the peak flow rate was 16.8 and 16.7 among cases and controls (p = 0.844).

**Conclusions:** There was no significant difference in the prostate-related parameters among patients with and without inguinal hernia.

**Keywords:** BPH, Inguinal hernia, IPSS, Prostate volume, Peak flow rate

**Introduction**

An inguinal hernia (IH) is the protrusion of abdominal-cavity contents through the inguinal canal [1]. Some patients are not affected by bothersome symptoms, such as a protruding, painless lump, thus a physician may choose conservative therapy [2–4]. Approximately 66% of afflicted individuals may experience more severe

symptoms, including discomfort or pain while lifting, exercising, coughing, or bowel motions [5]. The worst-case scenario is when the intestines get caught and compressed in the groyne or scrotum and are unable to return to the abdomen, resulting in an incarcerated or even strangulated inguinal hernia. This often causes extreme pain and discomfort in the affected region, as well as intestinal strangling, in which the blood flow to a portion of the intestine is restricted, which may result in bowel perforation [6] or gangrene [7]. Multiple factors contribute to IH, including Musculo-fascial weakening, anatomical changes, connective tissue modifications, and elevated intra-abdominal pressure. Increased cumulative intra-abdominal pressure, such as lifting, standing, and walking, is associated with the development of IH. A study with a large population (1.5 million subjects) indicated that increased cumulative intra-abdominal pressure, like lifting, standing and walking, is related to the development of IH; furthermore, reducing daily cumulative intra-abdominal pressure could prevent IH surgery by 30%.

Benign prostatic hyperplasia (BPH) is one of the most prevalent causes of lower urinary tract symptoms (LUTS) in men, and it develops with age. As LUTS-BPH worsens despite medicinal therapy, it is possible to identify post-void residual (PVR) and urinary tract infections needing surgical surgery. It is not unusual for a urologist to observe the confluence of an inguinal hernia with symptomatic BPH. In 1982, when conducting transurethral resection of the prostate, Thompson et al. discovered that 20% of males with LUTS-BPH had an inguinal hernia. Further, several researchers have reported that a significant proportion of patients coming with complaints of hernia also have symptoms suggesting prostate pathology. Wu YH et al. reported that during the 10 years of follow-up, 5.84% of men with LUTS-BPH and 2.53%

of men without LUTS-BPH developed IH. After adjusting for age and comorbidities, LUTS-BPH was associated with a two-fold increased risk of IH.

Elderly people are more likely to have an inguinal hernia and symptomatic benign prostatic hyperplasia combined. Thus, there may be a strong association or even potential causation between benign prostatic hyperplasia and inguinal hernia. However, other investigations revealed that rather than being deemed a cause and effect, their co-occurrence is simply viewed as a co-existence. The purpose of this study is to determine if men who have Inguinal Hernia are at significantly increased risk of having a Prostate related symptom.

## **Material and methods**

### **Study Design**

This was a 1:1, age-matched, Case-Control Study.

### **Study Setting**

Department of Surgery, LN, Medical College, Bhopal.

### **Study Duration**

8 Months.

### **Study Outcome**

The parameters related to the development of Benign Prostate Hypertrophy Viz. International Prostate Symptoms Score, Prostate Volume, and uroflowmetric analysis.

### **Measurement of Outcome**

#### **International Prostatism Symptom Score**

The International Prostate Symptom Score (IPSS) is used to measure the severity of lower urinary tract symptoms. It is a validated, reproducible scoring system to assess disease severity and response to therapy.

The IPSS is made up of 7 questions related to voiding symptoms. A score of 0 to 7 indicates mild symptoms, 8 to 19 indicates moderate symptoms and 20 to 35 indicates severe symptoms.

- Prostate Volume
- Measured using the Sonography
- Uroflowmetric Analysis: Using Uro-flowmeter.

### Sample size calculation

We enrolled a total of 62 participants: 31 cases and 31 controls. The participants were recruited in the present study after verifying that they fulfilled the selection criteria.

### Cases

Patients aged more than 40 years of age diagnosed with inguinal hernia.

### Selection criteria for Cases

#### Inclusion criteria for cases

- Male sex
- Age more than or equal to 40 years

#### Exclusion criteria for cases

- Patients who are already on drugs or have had any form of surgery for BPH in the past.
- Presence of complications of hernia such as irreducibility, strangulation or obstruction.
- Urethral stricture
- Prostate carcinoma
- Previous therapy for voiding Dysfunction

### Control

Patients of the same age as cases but without inguinal hernia.

#### Inclusion criteria for controls

- Male sex
- Not seriously ill.

#### Exclusion criteria for controls

- Patients who are already on drugs or have had any form of surgery for BPH in the past.
- Presence of any abdominal wall hernia
- History of surgery done for abdominal wall hernia in the past

- Seriously ill or bedridden patient.

### Informed consent

A bi-lingual (Hindi & English) consent form was drafted following the prescribed guidelines for research on human participants. The contents of the consent form were explained to all the prospective participants. All the questions from participants about the study, procedure, follow-up, and data privacy were answered. The participants were informed and explained that they have the right to withdraw from the study at any point in time.

### Data collection

The data were collected in a paper-based proforma. The proforma had two parts as follows: (i) Clinical details, and (ii) Laboratory findings.

### Source of data

There were two sources of data. First was the interview with the participants containing details about the demographic details, clinical history, symptoms, signs, and previous treatments (if any). The second source of the data was clinical records containing details about the clinical examination, laboratory & radiographic findings.

### Statistical analysis plan

The primary outcome was the difference in the various parameters related to the development of Benign Prostate Hyper trophy. We aimed to identify from the collected data the degree of difference in the various outcome parameters related to the prostate gland among cases and control participants. The data were analysed using Stata 17.1 version. For the interval and ratio data types, the author calculated the mean, median, mode, and standard deviation (25). For the nominal and ordinal data, the author calculated the frequency, percentage, and proportion. The interval and the ratio data variables were analysed using a student's t-test test. Categorical variables were analysed using chi-square ( $\chi^2$ ) tests (26). We also calculated the Odds Ratio for the ordinal

data. A *P*-value <0.05 was considered statistically significant.

**Results**

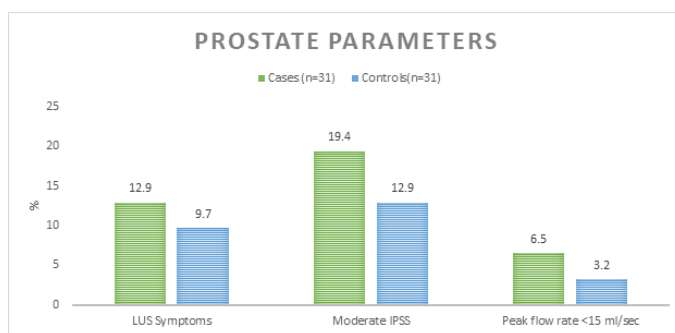
The mean age of the cases and control was 56.7 years. The mean duration of symptoms related to inguinal hernia was 7 months. The most common comorbidity both among cases and controls was diabetes (26% and 27%, respectively), however, this difference was statistically insignificant.

Table 1 shows the values of different outcomes among the cases and controls. Only 4 cases and 3 controls mentioned lower urinary symptoms (LUS) as one of the complaints during a clinical examination. The mean IPSS values among the cases and control were 9.12 and 8.62, however, the difference was statistically insignificant (*p*=0.292). None of the participants had a severe IPSS score; only 6 cases and 4 controls had moderate IPSS scores (*p*= 0.455). The mean prostate volume on USG among cases and controls was 18.8 ml and 17.4 ml, respectively, however, this difference was insignificant (*p* = 0.844). A total of 9.7% and 6.5% participants in the case or control group had Prostate megalaly. On uro flow metric analysis, the peak flow rate was 16.8 and 16.7 among cases and controls (*p* = 0. The odds ratio for participants having moderate IPSS scores among cases and controls was 1.45 (95% CI= 0.48 – 4.51; *p*-value =0.454).

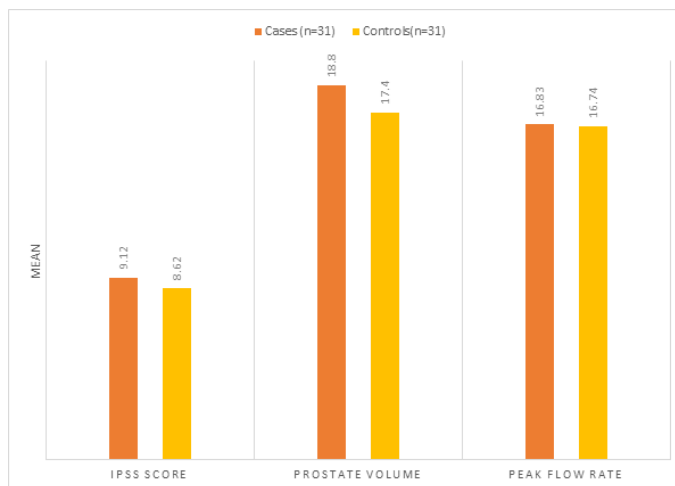
Parameters	Cases (n=31)	Control (n=31)	P-value
Complaints about LUS	4 (12.9%)	3 (9.7%)	0.570
IPSS Score	9.12	8.62	0.292

[Mean (SD)]	(2.69)	(2.49)	
Moderate IPSS	6 (19.4%)	4(12.9%)	0.455
Prostate Volume	18.8 (4.19)	17.4 (4.08)	0.142
Prostatomegaly	3 (9.7%)	2 (6.5%)	0.083
Peak Flow Rate [Mean (SD)]	16.83 (2.90)	16.74 (2.76)	0.844
Peak flow rate <15 ml/sec	2 (6.5%)	1(3.2%)	0.648
Age [Mean, (SD)]	56.7		

Graph 1:



Graph 2:



**Discussion**

In the early 19th century, the hernia was believed to be caused by "a mechanical mismatch between the visceral pressure and the resistance of the abdominal muscle" and "the strength of an abdominal wall that was believed to be weakened by insufficiency, debility, or age". Cough, obesity, constipation, benign prostatic hyper trophy,

pregnancy, ascites, and excessive lifting were frequently cited as contributing to the development of a hernia. Today, we have evolved from the simple idea of increasing intra-abdominal pressure overcoming a thin abdominal wall to a complicated disease that requires the application of various fundamental sciences to describe the disease's numerous characteristics, although a common mechanism. All known damaging stressors target the collagen matrix, which is also associated with the ageing process in the bladder and other organs.

Ours is one of the few studies, that have attempted to examine the association between the existence of IH and LUS suggesting developing or coexisting prostate pathology. The frequency of males with mild, and moderate, LUTS symptoms did not differ significantly between cases and control. However, most of the prostate-related symptoms were worse among cases than controls, however, there was no statistically significant difference between cases and controls concerning any prostate-related parameters.

The mean IPSS values among the cases and control were 9.12 and 8.62, however, the difference was statistically insignificant ( $p=0.292$ ).

Reis et al. stated that the patients with inguinal hernia had a higher IPSS score than the patients without inguinal hernia.

Parthiban SS et al., reported a lower IPSS score in the inguinal hernia group when compared with the control group, however, the difference was not significant.

McDonald DF and Huggins C reported that the incidence of IH in men undergoing prostatic surgery was 11-30%. Jasper WS reported that the incidence of IH in men undergoing prostatic surgery was around 20%.

Devarajan R et al., reported that 85 patients underwent 88 primary inguinal hernia repairs with TURP (three were bilateral). Two patients developed mild wound infection

after surgery, but only two patients (2%) had a recurrence of the hernia.

A possible explanation for this association is that patients with obstructive voiding dysfunction may need to strain to urinate. This effort over time may have a direct impact on the abdominal wall, contributing to the development of IH. Another possible explanation is that IH and BPH are part of the ageing process, which includes other functional and anatomic disorders.

The primary limitation of the present study is the limited sample size and its retrospective design.

### Conclusion

There was no difference in the prostate related lower uterine symptoms, prostate volume, and uroflow analysis between those with inguinal hernia and without hernia.

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