

Demographic and Clinical Characteristics of Inguinal Hernia Patients: A Retrospective Analysis

Dhirendra Kumar¹, Manoj Kumar², Ashesh Kumar Jha³, Prateek Abhishek⁴

¹Senior Resident, Department of General Surgery, AIIMS, Patna, Bihar, India

²Professor and HOD, Department of General Surgery, AIIMS, Patna, Bihar, India

³Additional Professor, Department of General Surgery, AIIMS, Patna, Bihar, India

⁴Assistant Professor, Department of General Surgery, AIIMS, Patna, Bihar, India

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Corresponding Author: Dr. Dhirendra Kumar

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Abstract:

Background: Inguinal hernia is among the most common surgical conditions in the world and causes approximately 75% of all abdominal wall hernias. Pathogenesis is polyfactorial with anatomical, occupational, and possibly genetic determinants. Local demographic and clinical characteristics are underreported, particularly in low-resource environments, despite the prevalence being high.

Objective: To characterize the demographic and clinical profile of primary inguinal hernia patients in terms of occupational risk factors, anatomical types, and presentation.

Methodology: A retrospective study was conducted in the Department of General Surgery, AIIMS Patna, in 80 patients aged 15-75 years with established diagnosis of primary inguinal hernia and undergoing elective surgical repair. Patients were randomly allocated to laparoscopic (TAPP/TEP) and open (Lichtenstein) repair. Demographic, occupation, type, site, and duration of hernia data were collected and analyzed in SPSS v27, and $p < 0.05$ was considered as statistically significant.

Results: 98.75% were males out of 80 patients. The most prevalent occupation was agriculturists (33.75%), indicating a connection with hard work. Inguinal swellings were prevalent in 70% patients, and 50% patients had symptoms for 1-6 months. Indirect hernias were the most prevalent (71.25%).

Conclusion: Inguinal hernia is predominantly found in men, especially those who work in high-strain jobs. Indirect hernias are the most common and are usually presented late. Such findings emphasize the need for targeted awareness and early intervention measures, especially among high-risk occupational groups.

Keywords: Demographic Profile, Hernia Epidemiology, Indirect Hernia, Inguinal Hernia, Laparoscopic Repair, Lichtenstein Repair, Occupational Risk.

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Introduction

Inguinal hernia remains among the most common clinical problems in surgical practice worldwide. Hernias as a clinical entity are a frequent cause for referral to surgical intervention, though their specific incidence is difficult to quantify due to heterogeneity of clinical presentation and surgical access. Of all abdominal wall hernias, approximately 75% occur in the inguinal region, and this highlights clinical incidence and prevalence of the condition [1]. There are direct and indirect inguinal hernias, of which indirect account for nearly two-thirds of inguinal hernias. This anatomical classification is vital in decision-making for diagnosis and management.

Gender-specific variation in the incidence of inguinal hernia is striking, with the male gender having a 25-fold higher risk of a groin hernia than the female gender. Direct inguinal hernias are also more common than indirect inguinal hernias in both genders,

though the male population does bear a higher incidence of indirect hernias in a 2:1 ratio. Direct inguinal hernias are virtually non-existent in females. A lifetime risk of a groin hernia is approximately 25% in males versus less than 5% in females, taking into account the factor of heightened clinical suspicion in the male gender. More Definitions.

Indirect inguinal hernias are anatomically more prevalent on the right side. The etiology is believed to be secondary to the delayed atrophy of the processus vaginalis, a vestigial protrusion of the peritoneum, secondary to the delayed descent of the right testicle during fetal life [2]. This is a congenital anomaly that results in a failure of closure of the processus vaginalis, thus making the area prone to herniation in the inguinal area.

The prevalence of inguinal hernias has significant geographical variation. This can be accounted for in

terms of variation in several factors, including age demography of the population, availability and accessibility of operative therapy, and variation in mortality rates secondary to hernia-complications. Inguinal hernias are responsible for significant mortality all over the world, with approximately 40,000 deaths annually due to complications of hernia like incarceration and strangulation. These figures point out the significance of early diagnosis and effective operative treatment, particularly in developing nations where medical facility accessibility is not an issue.

The etiology of inguinal hernia is controversial among clinicians. While congenital factors may play a role in children, inguinal hernias in adults are generally attributed to acquired defects in the abdominal wall [3]. The defects are generally due to an imbalance between intra-abdominal pressure and the strength of the abdominal wall musculature. Several risk factors have been implicated for the development of the hernia, including strenuous physical activity, smoking, COPD, obesity, multiple pregnancies, and connective tissue disorders. The interplay of these factors leads to weakening of the abdominal wall, with subsequent herniation through the inguinal canal.

More recent research has highlighted the tissue biology and genetic predisposition to the development of hernia. Microscopic and molecular studies have shown that alterations in the type of connective tissue composition, in the form of an abnormal type I type III collagen ratio, are present in hernia [4]. These findings suggest a potential genetic collagen defect, a very promising field of future inquiry. Although the exact molecular mechanisms of inguinal hernia development remain to be discovered, such studies give us valuable insight into the disease's pathophysiological mechanisms and can result in more targeted prevention and treatment interventions.

Clinically, an inguinal hernia is protrusion of intra-abdominal contents along the path of the inguinal canal. The majority of patients have a bulge in the groin which is exacerbated by an increase in intra-abdominal pressure, i.e., with cough, straining, or erect posture. The hernia is generally reducible and is only accompanied by minimal pain in the majority of patients. Complications such as incarceration or strangulation can occur acutely and require immediate surgical correction. Inability to manually reduce the hernia typically indicates incarceration, and immediate surgical repair is indicated to avoid ischemic complications.

Inguinal herniotomy is the most frequent elective surgical procedure in India. Despite the fact that it is extremely frequent, the national prevalence and demographic pattern are not well established in most regions. It is estimated that 15% to 20% of the

general population is affected by hernias, and among them, inguinal hernias are affecting 1.5 to 2 million individuals in India [5]. The lifetime risk has been estimated to be around 27% in Indian males and 3% in females [6]. Age is also a major factor in the epidemiology of inguinal hernias. In men, there is a bimodal curve with peaks in the first year and after the fourth decade of life, again indicating the importance of age-specific vigilance and intervention [7,8].

Given the heavy clinical workload, heterogeneity of presentation, and numerous etiological risk factors, knowledge of the demographic and clinical profile of the inguinal hernia patient is critical. Analysis of disease patterns of occurrence, patient profile, and treatment outcomes from retrospective studies can be extremely enlightening and is critical in guiding public health policy and optimizing the delivery of surgical care. The current study aims to identify the demographic and clinical profile of the inguinal hernia patient, determine prevailing trends, and contribute to the existing knowledge base, thus guiding clinical practice and future research.

Methodology

Study Design: This study was conducted as a retrospective study aimed at analyzing the demographic and clinical characteristics of inguinal hernia patients undergoing surgical repair.

Study Area: The study was carried out in the Department of general surgery, AIIMS, Patna, Bihar, India.

Study Duration: The study was conducted over the period for one year.

Sample Size: A total of 80 patients diagnosed with primary inguinal hernia were included in the study. Of these, 40 patients underwent laparoscopic repair (Transabdominal Preperitoneal [TAPP] or Totally Extraperitoneal [TEP]) and 40 patients underwent open repair using Lichtenstein mesh technique.

Sample Population: The study population included male and female patients aged between 15 and 75 years who were diagnosed with primary inguinal hernia and underwent elective surgery.

Inclusion Criteria

- Elective cases operated in the Main Operation Theatre.
- Patients undergoing inguinal hernia repair by:
 - Laparoscopic techniques: TAPP or TEP.
 - Open technique: Lichtenstein mesh repair.
- Patients aged between 15 to 75 years.
- Both unilateral and bilateral hernia cases.
- Only primary hernia cases were included.

Exclusion Criteria

- Patients with recurrent inguinal hernia.
- Patients undergo emergency hernia repair or with complicated hernias.
- Patients outside the 15 to 75 age range.

Data Collection: Data collection started after clearance from the institutional ethical committee and taking written informed consent from all study patients. All study patients were subjected to a comprehensive clinical assessment at admission, with detailed medical history taking and physical examination. Preoperative routine investigations such as complete blood counts, blood glucose, serum creatinine, chest roentgenograms, electrocardiograms (ECGs), were performed in all study patients. In those with doubtful clinical presentations, or where suspicion of other pathologies existed, further diagnostic investigations in the form of abdominal ultrasonography and/or abdominal computed tomography (CT) scans were done. All study patients conformed to the inclusion and exclusion criteria as specified and were followed with extreme care during the enrollment process.

Procedure: Following admission and assessment, patients were randomized into two different cohorts based on the surgical method used. Group A consisted of patients who underwent laparoscopic repair, either TAPP or TEP, while Group B consisted

of those patients who underwent open repair through the Lichtenstein mesh technique. The operations were carried out by experienced operators using standard operating protocols. The surgical method used depended on the experience of the surgeon, patient choice, and clinical suitability. Intraoperative pertinent data, demographic, and clinical data were documented meticulously for each case.

Statistical Analysis: All collected data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 27. Continuous variables were summarized in terms of mean and standard deviation, and categorical variables were summarized as percentages and frequencies. An independent t-test was used for comparison between continuous variables in laparoscopic and open repair groups, whereas categorical variables were compared using either the Chi-square test or Fisher's exact test. All comparisons were considered statistically significant if there was a p-value of less than 0.05.

Result

Table 1 shows a significant gender disparity among the 80 inguinal hernia patients studied, with 79 males (98.75%) and only 1 female (1.25%), indicating that inguinal hernias are overwhelmingly more common in males compared to females in this patient population.

Table 1: Sex distribution in patients studied

Gender	No.	%
Female	1	1.25
Male	79	98.75
Total	80	100

Table 2 presents the occupational distribution of the 80 inguinal hernia patients studied, revealing that the majority were agriculturists (27 patients, 33.75%), followed by factory/tea garden workers and small-scale businessmen (10 patients each, 12.5%). Other occupations included unemployed individuals (6, 7.5%), shopkeepers (7, 8.75%),

students (5, 6.25%), masons (4, 5%), teachers (3, 3.75%), rickshaw drivers (3, 3.75%), truck drivers (3, 3.75%), and rickshaw pullers (2, 2.5%). This distribution suggests that individuals engaged in physically demanding or labor-intensive work, particularly in agriculture, are more commonly affected by inguinal hernia.

Table 2: Occupation distribution of patients studied

Occupation	No.	%
Unemployed	6	7.5
Factory/tea garden worker	10	12.5
Small scale businessman	10	12.5
Student	5	6.25
Rickshaw puller	2	2.5
Rickshaw driver	3	3.75
Truck driver	3	3.75
Mason	4	5
Teacher	3	3.75
Shopkeeper	7	8.75
Agriculturist	27	33.75
Total	80	100

Table 3 shows the site of swelling in the 80 inguinal hernia patients studied, with the majority presenting with inguinal swellings (56 patients, 70%), while a smaller proportion had inguinoscrotal swellings (24

patients, 30%). This indicates that inguinal hernias are more commonly diagnosed before progressing to the inguinoscrotal stage.

Site of Swelling	No.	%
Inguinoscrotal	24	30
Inguinal	56	70
Total	80	100

Table 4 illustrates the duration of swelling among the 80 patients studied, with half of the patients (40, 50%) experiencing swelling for 1–6 months, followed by 19 patients (23.75%) with symptoms lasting 6–12 months, and 13 patients (16.25%) reporting

a duration of more than 1 year. Only 8 patients (10%) had swelling for less than a month. These findings suggest that most patients are delayed seeking medical attention, often presenting after a prolonged period of symptoms.

Duration of Swelling	No.	%
> 1 Year	13	16.25
6–12 Months	19	23.75
1–6 Months	40	50
< 1 Month	8	10
Total	80	100

Table 5 highlights the anatomical types of inguinal hernia observed in the 80 patients studied, with indirect hernias being significantly more common (57 patients, 71.25%) compared to direct hernias (23 patients, 28.75%). This indicates that indirect inguinal

hernias are the predominant type in this population, possibly due to congenital factors or increased intra-abdominal pressure associated with strenuous physical activity.

Type	No.	%
Direct	23	28.75
Indirect	57	71.25
Total	80	100

Discussion

Our study shows a significant gender disparity among inguinal hernia patients, 98.75% male and merely 1.25% female. The above observation is corroborated by numerous studies in the remainder of the globe. For instance, Kulacoglu et al. (2011) indicated over 90% cases of inguinal hernia among men, and they attributed this finding to anatomical factors, such as the design of the inguinal canal and the presence of the spermatic cord that makes men prone to developing hernias [9]. In another similar study, Kingsnorth and LeBlanc (2003) also found male gender to be a significant risk factor with a ratio of nearly 12:1 in the entire world [10]. The above observations confirm the biological and mechanical vulnerability of men to inguinal hernias, as reaffirmed by our study.

The occupational pattern of our study classifies 33.75% of the patients as agriculturists, followed by factory workers and small business owners (12.5% each). This pattern reflects a very high correlation of

manual occupation and hernia formation, also reflected in other regional studies. In an Indian study by Agarwal (2023), nearly 40% of the patients with inguinal hernia had hard physical occupations such as farming or construction [11]. Similarly, Ruhl & Everhart (2007) observed direct correlation between hard occupation and high intra-abdominal pressure, an established etiological factor for hernia formation [12]. However, our figures also include students (6.25%) and teachers (3.75%), occupations with minimal physical stress, indicating non-mechanical factors such as genetic predisposition, age, or lifestyle, as per the multifactorial etiology reflected in Ashindoitiang's Study (2012) [13].

With regard to clinical presentation, we noted 70% presented with isolated inguinal swelling, while 30% presented with inguinoscrotal involvement. This is an extremely close pattern from a study by Basu et al. (2013), in which 66% presented with inguinal swelling and 34% presented with inguinoscrotal hernias, with a similar pattern of progression and possibly early presentation in some cases

[14]. Symptom duration in this study revealed that 50% presented with swelling for 1–6 months, with moderate treatment delays. This agrees with the finding of Nilsson et al. (2011), who reported more than 45% of patients delaying surgery by more than three months due to socioeconomic factors, fear, or lack of access to healthcare [15].

Anatomically, indirect type of hernia was the most prevalent in this study (71.25%), followed by direct hernias in 28.75%. These are supported by national and international research. A large-scale study by Jenkins and O'Dwyer (2008) had already shown that indirect hernias were twice as common as direct hernias, particularly in the young age groups [16]. Similarly, a retrospective study by Joudi et al. (2021) had shown that 67.5% of their patients with inguinal hernia had indirect hernias, which is consistent with our finding [17]. This preponderance of indirect hernias is likely due to congenital malformations, i.e., a patent processus vaginalis, whereas direct hernias are likely due to degenerative changes in the musculature of the abdominal wall.

In summary, our results aligned with regional and global evidence, confirming male gender, manual work, indirect hernia type, and delayed care seeking to be prevalent among inguinal hernia patients. The occurrence of cases among non-manual occupations and variation in the timeline of presentation are a testimony to the utility of public awareness, early screening, and availability of care. Future research may be able to further explore genetic markers and comorbidities to create a more predictive model.

Conclusion

A retrospective investigation of patients with an inguinal hernia indicated considerable male predominance, with patients coming primarily from occupations requiring strenuous physical exertion, such as agriculturists. Clinically, the majority of patients presented with inguinal rather than inguinoscrotal swelling, and many had experienced symptoms for more than one month before presentation. Indirect hernias were seen more frequently than direct hernias, suggesting a potential link between occupational stressors and the anatomical variants, as direct inguinal hernias are less common. The study indicates an overall trend of inguinal hernia in men and underscored the significance of early diagnosis relative to the demographics and occupational background of the patients.

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