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Research Article

A CROSS-SECTIONAL STUDY ON THE ETIOLOGIES PRESENTING WITH ACUTE PAIN IN THE RIGHT ILIAC FOSSA IN THE ADULT POPULATION AT A TERTIARY CARE HOSPITAL

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Abstract: ***Introduction:*** Acute right iliac fossa (RIF) pain is a common surgical emergency and presents a diagnostic challenge because of the wide range of gastrointestinal, genitourinary, gynecological, and neoplastic disorders that may mimic acute appendicitis.**Objective:** To evaluate the etiological spectrum of acute right iliac fossa pain in adults presenting to a tertiary care hospital.**Methods**: This observational cross-sectional study was conducted in the Department of General Surgery, Medical College and Hospital, Kolkata, from January 2024 to January 2025. A total of 200 consecutive patients aged 12–65 years presenting with acute right iliac fossa pain were included. All patients underwent detailed clinical evaluation and transabdominal ultrasonography, while computed tomography was performed in selected cases with inconclusive findings. Final diagnoses were established based on clinical, radiological, operative, and histopathological findings where applicable.**Results**: Of the 200 patients, 114 (57%) were females and 86 (43%) were males. Acute appendicitis was the most common diagnosis, accounting for 84 cases (42%), including uncomplicated appendicitis in 54 (27%) and complicated appendicitis in 30 (15%) patients. Appendicular lump was the most frequent complication (63.3%), followed by perforation (20.0%) and abscess (16.7%). Non-appendiceal causes constituted 58% of cases, with urinary tract infection (11%), mesenteric lymphadenitis (9%), pelvic inflammatory disease (8%), and right ureteric colic (7.5%) being the most common alternative diagnoses.**Conclusion:** Although acute appendicitis remains the leading cause of acute RIF pain, non-appendiceal conditions collectively account for the majority of presentations. Comprehensive clinical assessment supported by appropriate imaging is essential for accurate diagnosis and effective management.

Keywords: Acute appendicitis; Right iliac fossa pain; Acute abdomen; Differential diagnosis; Cross-sectional study.

INTRODUCTION

Acute pain in the right iliac fossa (RIF) is one of the most common causes of emergency surgical admissions worldwide and constitutes a significant diagnostic challenge for clinicians. The right iliac fossa contains several gastrointestinal, genitourinary, gynecological, vascular, and musculoskeletal structures, making the differential diagnosis broad and complex. Although acute appendicitis remains the most frequent surgical cause of RIF pain, a wide variety of other conditions may present with similar clinical manifestations, necessitating careful evaluation and timely management [1,2].

Acute abdominal pain accounts for a substantial proportion of emergency department visits, with right iliac fossa pain representing nearly one-third to one-half of acute surgical admissions. Prompt identification of the underlying etiology is essential because delayed diagnosis may result in serious complications, including perforation, peritonitis, sepsis, prolonged hospitalization, and increased mortality [3]. Conversely, inaccurate diagnosis may lead to unnecessary surgical intervention, exposing patients to avoidable operative risks and healthcare costs [4].

Among the various etiologies, acute appendicitis remains the most common cause of RIF pain in adults and is recognized as the most frequent intra-abdominal surgical emergency. The lifetime risk of developing appendicitis has been estimated at approximately 7–8%, with peak incidence occurring during the second and third decades of life [5,6]. Classical appendicitis typically presents with periumbilical pain that subsequently migrates to the right iliac fossa, accompanied by anorexia, nausea, vomiting, fever, and localized tenderness. However, atypical presentations are common, particularly among elderly patients, women, and individuals with anatomical variations of the appendix, making diagnosis challenging [7,8].

Despite the predominance of appendicitis, numerous non-appendiceal conditions may mimic its presentation. Gastrointestinal causes include mesenteric adenitis, Meckel's diverticulitis, Crohn's disease, cecal diverticulitis, ileocecal tuberculosis, epiploicappendagitis, bowel obstruction, and inflammatory bowel disease [1,9]. Genitourinary disorders such as ureteric calculi, urinary tract infections, and pyelonephritis may also present with pain localized to the right lower abdomen [10]. In female patients,

gynecological conditions including ovarian torsion, ruptured ovarian cysts, ectopic pregnancy, pelvic inflammatory disease, and endometriosis represent important differential diagnoses that must be considered, particularly during the reproductive years [11,12].

The clinical assessment of patients presenting with RIF pain relies on a detailed history, thorough physical examination, laboratory investigations, and appropriate imaging studies. Various clinical scoring systems, such as the Alvarado score and Appendicitis Inflammatory Response (AIR) score, have been developed to improve diagnostic accuracy and reduce negative appendectomy rates [13]. Nevertheless, clinical findings alone may be insufficient because many diseases share overlapping symptoms and signs. Therefore, imaging modalities play a crucial role in modern diagnostic pathways.

Ultrasonography is widely regarded as the initial imaging modality for evaluating RIF pain because it is non-invasive, readily available, cost-effective, and free from ionizing radiation. It is particularly useful in young adults and female patients where gynecological pathology must be excluded. Recent evidence demonstrates that ultrasonography possesses high sensitivity and specificity for diagnosing acute appendicitis when performed by experienced operators [14]. Computed tomography (CT) has emerged as the most accurate imaging modality for evaluating adult patients with suspected appendicitis and other causes of acute RIF pain, significantly improving diagnostic precision and reducing unnecessary surgical exploration [15].

The spectrum of diseases responsible for RIF pain varies according to age, sex, geographic location, socioeconomic factors, and healthcare accessibility. Developing countries often encounter infectious and inflammatory conditions such as ileocecal tuberculosis and parasitic infestations more frequently than developed nations [16]. Furthermore, changes in lifestyle, dietary habits, and healthcare-seeking behavior may influence disease patterns over time. Consequently, local epidemiological studies are essential to understand the prevalence and distribution of specific etiologies within a given population.

A cross-sectional evaluation of adult patients presenting with acute RIF pain at a tertiary care hospital can provide valuable insights into the relative frequencies of various etiological factors, clinical presentations, and diagnostic outcomes. Such information can assist clinicians in formulating evidence-based diagnostic approaches, optimizing resource utilization, and improving patient care. Understanding the local disease burden is particularly important in tertiary care centers that serve as referral institutions for complex and atypical cases.
Therefore, the present study was undertaken to assess the various etiologies presenting with acute pain in the right iliac fossa among the adult population attending a tertiary care hospital. The findings are expected to contribute to a better understanding of the clinical spectrum of RIF pain and facilitate early diagnosis and appropriate management strategies.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based observational cross-sectional study was conducted in the Department of General Surgery at Medical College and Hospital, Kolkata, a tertiary care referral center in Eastern India. The study was carried out over a period of 13 months, from January 2024 to January 2025. The primary objective was to evaluate the spectrum of etiologies responsible for acute right iliac fossa (RIF) pain in the adult population presenting to the emergency and outpatient surgical services.

Study Population

A total of 200 consecutive patients presenting with acute pain localized to the right iliac fossa were enrolled during the study period. Patients were recruited from both the Emergency Department and the Outpatient Department of General Surgery using a consecutive sampling technique to minimize selection bias.

Eligibility Criteria

Inclusion Criteria

- Patients were considered eligible for participation if they met all of the following criteria:
- Age >12 years and <65 years.
- Presentation with acute pain localized to the right iliac fossa.
- Willingness to undergo the required diagnostic investigations and management at the study center.
- Provision of written informed consent prior to enrollment.

Exclusion Criteria

Patients were excluded if they had any of the following:

- Hemodynamic instability requiring immediate resuscitative intervention.
- Known or previously diagnosed malignancy.
- Pregnancy.
- History of previous lower abdominal surgery.
- Multiple significant medical comorbidities that could confound the clinical presentation.
- Generalized peritonitis on clinical examination.
- Pediatric patients (<12 years) and geriatric patients (≥65 years).

Data Collection Procedure

Following enrollment, a detailed clinical evaluation was performed for each participant. Demographic characteristics including age and sex were recorded. A comprehensive history focusing on the onset, duration, character, and associated symptoms of abdominal pain was obtained. Clinical examination included assessment of vital signs and detailed abdominal examination, with

particular attention to tenderness, guarding, rebound tenderness, palpable masses, and signs suggestive of appendiceal or alternative pathology.

Routine laboratory investigations were performed as deemed clinically appropriate, including complete blood count, urine analysis, and other relevant biochemical parameters. The findings were documented in a structured data collection proforma.

Imaging Evaluation

All enrolled patients underwent transabdominal ultrasonography (USG) as the first-line imaging modality. Ultrasonography was performed by experienced radiologists using standard abdominal imaging protocols to evaluate appendiceal pathology and alternative causes of right iliac fossa pain.

Patients in whom ultrasonographic findings were equivocal, inconclusive, or discordant with clinical findings underwent contrast-enhanced computed tomography (CT) of the abdomen and pelvis to establish a definitive diagnosis. CT imaging was interpreted by consultant radiologists blinded to the study objectives.

The final etiological diagnosis was established based on a combination of clinical findings, imaging results, operative findings where applicable, histopathological examination of surgical specimens, and follow-up assessments.

Outcome Measures

- The primary outcome measure was the distribution of etiologies responsible for acute right iliac fossa pain among adult patients presenting to a tertiary care hospital.
- Secondary outcome measures included:
- Age and sex distribution of patients presenting with acute RIF pain.
- Frequency of appendiceal and non-appendiceal causes.
- Diagnostic yield of ultrasonography and CT scan in establishing the final diagnosis.

Sample Size

A total sample size of 200 patients was included during the study period. All eligible patients presenting consecutively during the study duration were recruited until the desired sample size was achieved.

Ethical Considerations

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Institutional Ethics Committee approval was obtained prior to commencement of the study. Written informed consent was obtained from all participants or their legally authorized representatives before enrollment. Confidentiality and anonymity of patient information were maintained throughout the study.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) software version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on data distribution. Categorical variables were summarized as frequencies and percentages. The prevalence of various etiologies of right iliac fossa pain was reported with corresponding proportions. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test as appropriate. A two-tailed p-value <0.05 was considered statistically significant.

RESULTS

A total of 200 patients presenting with acute right iliac fossa (RIF) pain were enrolled during the study period. Among them, 114 (57.0%) were females and 86 (43.0%) were males. The mean age at presentation was 24 years among females and 33 years among males.

Table 1. Demographic Characteristics of the Study Population (N = 200)

Variable	Frequency (n)	Percentage (%)
Female	114	57.0
Male	86	43.0
Total	200	100.0
Age Variable		**Mean Age (Years)**
Females		24
Males		33

Table 1 presents the demographic profile of the study participants. A total of 200 patients presenting with acute right iliac fossa pain were included in the study. Females constituted the majority of the study population, accounting for 114 cases (57%), while males comprised 86 cases (43%). The mean age at presentation was 24 years among females and 33 years among males. These findings indicate a female predominance among patients presenting with right iliac fossa pain, whereas male patients tended to present at a relatively older age.

Table 2. Distribution of Final Diagnoses Among Patients with Acute Right Iliac Fossa Pain

Diagnosis	Frequency (n)	Percentage (%)
Acute uncomplicated appendicitis	54	27.0
Acute complicated appendicitis	30	15.0
Urinary tract infection	22	11.0
Non-specific mesenteric lymphadenitis	18	9.0
Pelvic inflammatory disease	16	8.0
Right ureteric colic	15	7.5
Non-specific abdominal pain	9	4.5
Acute gastroenteritis	8	4.0
Ileo-caecal tuberculosis	6	3.0
Right colon cancer	5	2.5
Ruptured ovarian cyst	4	2.0
Ruptured ectopic pregnancy	3	1.5
Right colonic diverticulitis	3	1.5
Right ovarian torsion	2	1.0
Meckel's diverticulitis	2	1.0
Total	**200**	**100.0**

Table 2 summarizes the final diagnoses established among the study participants. Acute appendicitis was the most common diagnosis, identified in 84 patients (42%), including 54 cases (27%) of uncomplicated appendicitis and 30 cases (15%) of complicated appendicitis. Among alternative diagnoses, urinary tract infection was the most frequently encountered condition, affecting 22 patients (11%), followed by non-specific mesenteric lymphadenitis in 18 patients (9%) and pelvic inflammatory disease in 16 patients (8%). Other notable causes included right ureteric colic (7.5%), non-specific abdominal pain (4.5%), acute gastroenteritis (4%), ileo-caecal tuberculosis (3%), and right colon cancer (2.5%). Less common etiologies were ruptured ovarian cyst, ruptured ectopic pregnancy, right colonic diverticulitis, right ovarian torsion, and Meckel's diverticulitis. The findings highlight the wide spectrum of diseases presenting as acute right iliac fossa pain.

Table 3. Distribution of Appendicitis Cases According to Disease Severity

Type of Appendicitis	Frequency (n)	Percentage (%) of Total Population
Uncomplicated appendicitis	54	27.0
Complicated appendicitis	30	15.0
Total appendicitis	84	42.0

Interpretation: Contaminated and dirty wounds had significantly higher infection rates.

Table 4: Duration of Surgery

Duration	SSI	No SSI	p-value
<2 hrs	10	60	
>2 hrs	28	52	0.004

Table 3 depicts the severity distribution among patients diagnosed with appendicitis. Of the 84 patients with appendicitis, 54 patients (27% of the total study population) had uncomplicated appendicitis, while 30 patients (15%) presented with complicated appendicitis. Overall, appendicitis accounted for 42% of all cases of right iliac fossa pain. Uncomplicated appendicitis represented approximately two-thirds of appendicitis cases, indicating that most patients presented before the development of complications.

Table 4. Pattern of Complicated Appendicitis (n = 30)

Complication	Frequency (n)	Percentage (%)
Appendicular lump	19	9.5
Appendicular perforation	6	3.0
Appendicular abscess	5	2.5
Total	30	15.0

Table 4 illustrates the distribution of complications among patients with complicated appendicitis. Appendicular lump was the most common complication, observed in 19 patients (9.5% of the total study population and 63.3% of complicated appendicitis cases). Appendicular perforation was identified in 6 patients (3%), while appendicular abscess was present in 5 patients (2.5%). These findings suggest that appendicular lump represents the predominant form of complicated appendicitis in the study population.

Table 5. Sex Distribution among Patients with Complicated Appendicitis (n = 30)

Sex	Frequency (n)	Percentage (%)
Male	21	70.0
Female	9	30.0
Total	30	100.0

Table 5 presents the sex-wise distribution of complicated appendicitis cases. Of the 30 patients with complicated appendicitis, 21 (70%) were males and 9 (30%) were females. This demonstrates a marked male predominance among patients developing appendiceal complications. The findings suggest that male patients may be at a higher risk of delayed presentation or progression to complicated appendicitis compared with females.

Table 6. Distribution of Appendiceal and Non-Appendiceal Causes of Right Iliac Fossa Pain

Category	Frequency (n)	Percentage (%)
Appendicitis (all forms)	84	42.0
Alternative diagnoses	116	58.0
Total	200	100.0

Figure 1. Sex distribution of patients presenting with acute right iliac fossa pain

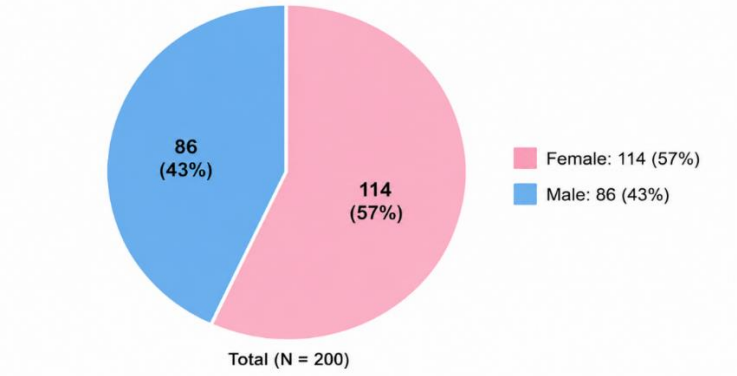

Figure 1 illustrates the sex-wise distribution of the 200 patients included in the study. Female patients constituted the majority of the study population, accounting for 114 cases (57%), whereas male patients comprised 86 cases (43%). The findings demonstrate a female predominance among adults presenting with acute right iliac fossa pain at the tertiary care center during the study period. This higher proportion of female patients may be attributed to the presence of gynecological conditions, such as pelvic inflammatory disease, ruptured ovarian cysts, ectopic pregnancy, and ovarian torsion, which are important differential diagnoses of right iliac fossa pain in women. Despite the greater number of female presentations, subsequent analyses revealed that complicated appendicitis occurred more frequently among male patients. Overall, the figure highlights the gender distribution of patients evaluated for acute right iliac fossa pain and underscores the importance of considering sex-specific etiologies during clinical assessment.

Figure 2. Frequency distribution of individual etiologies causing acute right iliac fossa pain

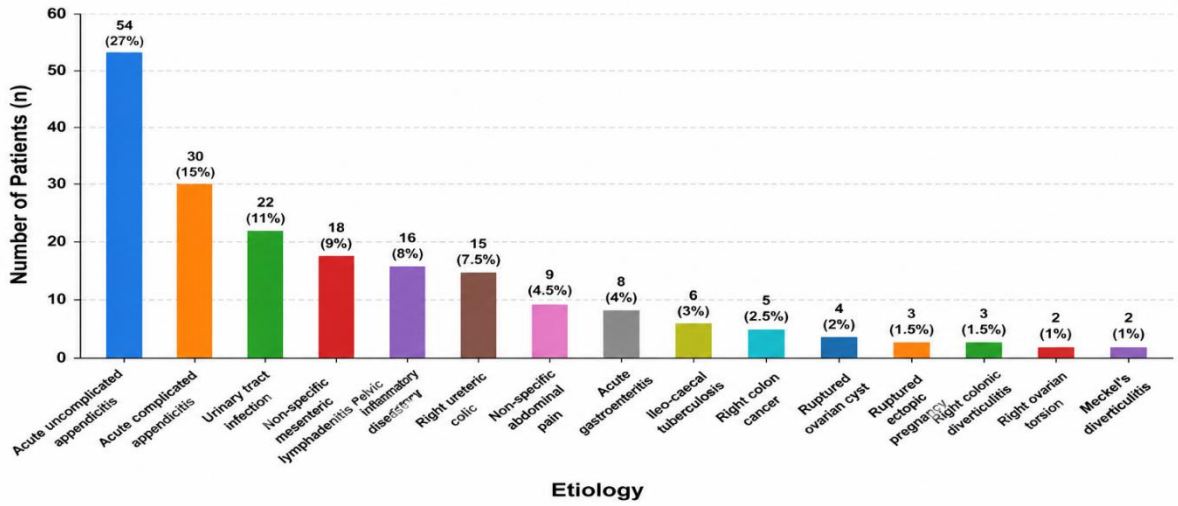

Figure 2 depicts the frequency distribution of the various etiologies identified among the 200 patients presenting with acute right iliac fossa pain. Acute uncomplicated appendicitis was the most common diagnosis, accounting for 54 cases (27%), followed by acute complicated appendicitis in 30 cases (15%). Among the non-appendiceal causes, urinary tract infection was the most frequently encountered condition, observed in 22 patients (11%), followed by non-specific mesenteric lymphadenitis in 18 patients (9%), pelvic inflammatory disease in 16 patients (8%), and right ureteric colic in 15 patients (7.5%).

Figure 3.Distribution of complications among patients with complicated appendicitis.

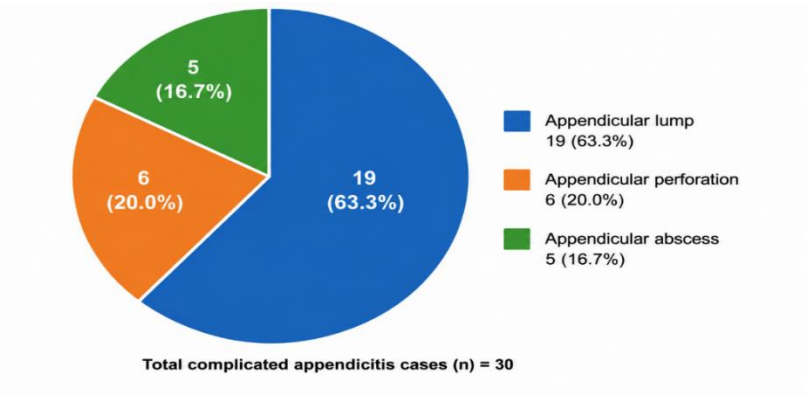

Figure 3 illustrates the distribution of complications observed among the 30 patients diagnosed with complicated appendicitis. Appendicular lump was the most common complication, occurring in 19 patients (63.3%), followed by appendicular perforation in 6 patients (20.0%) and appendicular abscess in 5 patients (16.7%). The predominance of appendicular lump suggests that localized inflammatory containment was the most frequent pattern of complicated appendicitis in the study population.

DISCUSSION

In the present study, females constituted 57% of the study population, while males accounted for 43%. The mean age at presentation was 24 years among females and 33 years among males. Similar female predominance has been reported by Rennie et al., who observed that women represent a substantial proportion of patients presenting with right iliac fossa pain due to the presence of gynecological conditions that mimic acute appendicitis [3]. The younger age observed among female patients in the present study may be attributed to the inclusion of reproductive-age women presenting with pelvic inflammatory disease, ovarian cyst complications, and ectopic pregnancy.

Acute appendicitis was identified as the most common etiology, accounting for 42% of all cases. Among these, uncomplicated appendicitis represented 27% of the total study population, whereas complicated appendicitis accounted for 15%. These findings are consistent with the observations of Addiss et al., who reported appendicitis as the leading cause of acute surgical abdomen and one of the most common causes of right lower quadrant pain worldwide [5]. Similarly, Bhangu et al. demonstrated that appendicitis remains the predominant diagnosis among patients presenting with suspected acute appendicitis despite advances in imaging and diagnostic algorithms [15].

Among patients diagnosed with appendicitis, uncomplicated disease constituted approximately two-thirds of cases, whereas complicated appendicitis represented slightly more than one-third. Comparable findings have been reported by Livingston et al., who noted that improved diagnostic strategies and earlier intervention have increased the proportion of uncomplicated appendicitis diagnosed in clinical practice [16].

Analysis of appendiceal complications revealed that appendicular lump was the most common complication, accounting for 63.3% of complicated appendicitis cases, followed by appendicular perforation (20.0%) and appendicular abscess (16.7%). Similar patterns have been reported by Andersson and Andersson, who observed that appendicular inflammatory masses frequently arise due to localization of the inflammatory process by the omentum and adjacent bowel loops [17]. Perforation and abscess formation remain clinically important because they are associated with increased morbidity and prolonged hospitalization [18].

A notable finding of the present study was the predominance of males among patients with complicated appendicitis, with males accounting for 70% of all complicated cases. Similar observations have been documented by Körner et al., who reported a higher incidence of perforated and complicated appendicitis among male patients [19].

Although appendicitis was the single most common diagnosis, 58% of patients were ultimately found to have non-appendiceal causes of acute right iliac fossa pain.

This finding emphasizes the diagnostic complexity associated with right iliac fossa pain and supports the routine use of imaging modalities for accurate diagnosis. A similar observation was reported by Graffeo and Counselman [20].

Among the alternative diagnoses, urinary tract infection (11%) emerged as the most common etiology. This finding is consistent with previous studies that have identified urinary tract pathology as a frequent mimic of acute appendicitis, particularly among young women [21]. Non-specific mesenteric lymphadenitis (9%) was the second most common alternative diagnosis and has been recognized as an important differential diagnosis in adults presenting with right lower quadrant pain [22].

Pelvic inflammatory disease accounted for 8% of cases and represented the most common gynecological cause of right iliac fossa pain. Similar findings have been reported by Haggerty and Ness, who emphasized that pelvic inflammatory disease often mimics appendicitis in reproductive-age women [23].

Right ureteric colic was observed in 7.5% of patients and constituted another important differential diagnosis. Teichman reported that ureteric calculi commonly present with abdominal pain patterns that may resemble acute appendicitis, necessitating appropriate radiological evaluation [24].

Less common etiologies identified in the present study included ileo-caecal tuberculosis, right colonic diverticulitis, Meckel's diverticulitis, and right colon cancer. Similar observations have been reported from developing countries where intestinal tuberculosis continues to contribute significantly to the burden of abdominal disease [25].

The findings of the present study emphasize the value of a systematic diagnostic approach incorporating clinical examination, laboratory investigations, ultrasonography, and selective use of computed tomography. Such an approach improves diagnostic accuracy and facilitates appropriate management. Overall, while acute appendicitis remains the leading cause of acute right iliac fossa pain, a substantial proportion of patients have alternative diagnoses, highlighting the importance of comprehensive evaluation in all patients presenting with this clinical condition.

CONCLUSION

The present cross-sectional study evaluated the etiological spectrum of acute right iliac fossa pain among 200 adult patients presenting to a tertiary care hospital. Acute appendicitis emerged as the most common cause, accounting for 42% of all cases, with uncomplicated appendicitis being more frequent than complicated disease. Among patients with complicated appendicitis, appendicular lump was the predominant complication, followed by appendicular perforation and appendicular abscess. Male patients demonstrated a higher tendency to present with complicated appendicitis.

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