



## Characteristics of Appendicitis Patients Who Underwent Operative Appendectomy at Waled Hospital, Cirebon Regency for the 2020–2025 Period

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KEYWORDS	ABSTRACT
Patient characteristics, Appendicitis, operative appendectomy	Appendicitis is a common cause of acute abdominal pain that often necessitates surgical intervention, typically through appendectomy, which can be performed via open or laparoscopic techniques. Understanding the characteristics of patients undergoing appendectomy is crucial to improving diagnostic accuracy and clinical management. This study aimed to examine the characteristics of appendicitis patients undergoing operative appendectomy at Waled Regional Hospital, Cirebon Regency, from January 2020 to June 2025. The study utilized a descriptive observational design with a retrospective approach, analyzing medical records of patients who underwent appendectomy during this period. A total of 65 patients met the inclusion criteria. The results showed that the majority of patients were in the late adolescent age group (17–25 years), comprising 40.0% of the sample. Female patients represented 75.4% of the total cases. All patients (100%) presented with right lower abdominal pain, which is characteristic of appendicitis according to the Alvarado score. Laparoscopic appendectomy was the most commonly performed procedure, accounting for 66.2% of the cases. These findings highlight the prevalence of appendicitis in younger, female populations and suggest a higher frequency of laparoscopic appendectomy, emphasizing its adoption as the preferred surgical approach. These results can guide future clinical management and improve diagnostic strategies for appendicitis patients.

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### INTRODUCTION

Appendicitis is inflammation in the appendix vermicularis and is the most common cause of acute abdominal pain in children and adults. Age does not affect the risk of developing appendicitis. Appendicitis is rarely reported in children under one year of age. The highest number of cases occurred in people aged twenty to thirty, then decreased. However, acute appendicitis can occur at any time, from infancy to old age. Appendicitis in men has a 7% higher risk than in women (Pujawan et al., 2023). During the physical examination, there are signs of pressure pain in the McBurney spot (Khamila & Limas, 2023). Appendicitis is a surgical emergency condition that requires immediate attention because it has the potential to result in serious problems if not treated promptly. This condition involves inflammation of the appendix vermiformis, which can develop into perforation and peritonitis. Untreated appendicitis can develop into appendix perforation, increasing the risk of peritonitis and sepsis. Perforation usually occurs within 48-72 hours after symptom onset (Singh et al., 2024).|| According to data from the Indonesian Ministry of Health, the number of cases of appendicitis in Indonesia is 596,132, making it a non-communicable disease (Haryanti et al., 2023).

Symptoms of appendicitis are usually pain when pressed on the lower right abdomen. Pain in the lower right part of the abdomen occurs when the lower left part of the abdomen is pressed. One of the symptoms of appendicitis that often appears and needs to be watched out for is sharp pain in the McBurney spot or in the lower right part of the abdomen when pressed, usually accompanied by a radiating pain. Pain in the lower left side when touched can also occur if you have a long appendix (Purnamasari et al., 2023).

On the physical examination there are signs of Rovsing's sign. Positive occurs when pressure is applied to the lower left part of the abdomen, but pain is felt in the lower right part of the abdomen. This is caused by peritoneal irritation that causes the pain to spread. Obturator sign positive is when pain is felt when the hips and knees are bent and then twisted out and in. This indicates there is appendicitis in the lower abdomen. When the psoas muscle is stimulated, the right hip joint is actively flexed, or it is too wide, it is possible that there is appendicitis vermiformis in the main muscle that causes pain. This is usually called a psoas sign positive (Purnamasari et al., 2023).

All cases of appendicitis must have the inflamed appendix removed, either by open appendectomy or laparoscopic appendectomy. If left untreated, the death rate can increase due to peritonitis and shock. In the early stages of acute appendicitis, the subserous blood vessels develop congestion, there is perivascular neutrophil infiltrates in the layers of the appendix. The inflammatory reaction changes from a normal smooth serous layer to an erythema, granular, and rough surface. Acute appendicitis can be diagnosed by finding neutrophil infiltration in the muscolosis propria. Then, a focal abscess can appear on the appendix wall (suppurative acute appendicitis) (Pujawan et al., 2023).

Both procedures pose no significant risk, and morbidity and mortality depend on how severe the appendicitis is. Technically, laparoscopy is considered better because of the lower risk of infection in the wound. There was less pain on the first day after surgery, and the hospital stay was also shorter. Open surgery is associated with lower intraabdominal abscess rates, slightly faster surgery duration, and lower costs. The timing of an appendectomy is still a matter of debate; When appendicitis has already led to perforation and gangrene, surgery should be performed as soon as possible. Laparoscopic appendectomy for appendicitis without complications should be performed within the first 24 hours after diagnosis (Finance et al., 2023).

Complications that often occur after appendicitis removal surgery are infections in the surgical area, such as infected wounds and abscesses inside the abdomen. Surgical site infections are rare in appendicitis without complications, but can appear in 10% of patients with a perforated appendix. The death rate can vary depending on where people live. For example, developed countries have a mortality rate of about 0.09% to 0.24%, while developing countries have a rate of about 1% to 4% (Alexandra & Saran, 2024).

Based on the explanation above, the author wants to conduct research on the characteristics of appendicitis patients who underwent operative appendectomy at Waled Hospital, Cirebon Regency for the 2020-2025 period.

This study aims to determine the characteristics of appendicitis patients who undergo operative appendectomy at Waled Hospital, Cirebon Regency, for the 2020-2025 period. The formulation of the main problem is how the characteristics of the patient are based on age, gender, main symptoms, and the type of surgical procedure performed. This study has a general objective to describe the characteristics of the patient as a whole, as well as a specific objective to identify the demographic and clinical aspects of patients undergoing appendectomy. The benefits of this research include contributing to science as a reference for further research, improving health services for appendicitis cases, providing education to the public, and developing the ability of researchers in the academic field and medical practice.

This research is original with a descriptive approach, distinguishing it from some previous studies. Comparisons with previous studies, such as those conducted by Pujawan et al. (2023), Sani et al. (2020), Nisa et al. (2024), and Wang et al. (2019), show similarities in methodological approaches but differences in the age range, location, and variables analyzed. This study emphasizes on a wider age range (5-45 years) and is specific to the patient data of Waled Hospital, so it is expected to provide a more contextual picture of local conditions and become the basis for improving medical services in the area.

## **RESEARCH METHOD**

This research was within the scope of surgery and was conducted at Waled Hospital, Cirebon Regency, from April to June 2025 using an observational descriptive design based on secondary data from the medical records of appendicitis patients. The study population included all patients diagnosed with appendicitis during the period 2020–2025, with the inclusion criteria being patients who underwent appendectomy and had complete medical record data. The sampling technique used was total sampling. The single variable in this study was the characteristics of appendicitis patients, including age, gender, main symptoms, and type of surgical procedure. Data were collected through medical records, analyzed univariately to illustrate frequency distribution, and processed through editing, tabulation, and cleaning. The research process was carried out in three stages: preparation, implementation, and completion, following scientific and administrative procedures.

This study received ethical approval from the Research Ethics Committee of Waled Hospital with recommendation letter number 000.9.2/119/KEPK/2025 dated January 24, 2025. All data used were anonymous and consisted only of medical information without the patient's personal identity, maintaining confidentiality and research ethics in accordance with applicable standards. There was no immediate risk to the subjects as no direct contact or intervention was made. This research was expected to provide scientific benefits, serve as evaluation material in medical services, and strengthen the database for the future development of clinical management of appendicitis patients.

## **RESULTS AND DISCUSSION**

This study aims to describe the characteristics of appendicitis patients who undergo operative appendectomy at Waled Hospital, Cirebon Regency in the 2020–2025 period. Data was obtained from hospital medical records and analyzed based on several variables, namely age, gender, main symptoms, and type of surgical procedure. Of the total 282 patients

diagnosed with appendicitis during the period, only 65 patients were selected as a study sample after meeting the inclusion criteria.

### Characteristics of Appendicitis Patients Who Underwent Operative Appendectomy Based on Age

**Table 1. Characteristics of Appendicitis Patients by Age**

Age	Sum	Percentage (%)
Children 5–11 years	3	4,6%
Teen early 12–16 years	16	24,6%
Teens 17–25 years	26	40,0%
Adults early 26–35 years	7	10,8%
Adults late 36–45 years	5	7,7%
Senior early 46–55 years	5	7,7%
Seniors late 56–65 years	2	3,1%
Senior >65 years	1	1,5%
<b>Total</b>	<b>65</b>	<b>100%</b>

From table 1, it can be seen that the incidence of appendicitis performed by operative appendectomy based on age is the most in the age group in the late adolescents of 17–25 years, namely 26 patients (40.0%), early adolescents of 12–16 years, which is 16 patients (24.6%), while the least in the early adult age group of 26–35 years, namely 7 patients (10.8), late adults of 36–45 years, namely 5 patients (7.7%), Children 5–11 years old, which is 3 patients (4.6%), early elderly 46–55 years old, 5 patients (7.7%), late elderly 56–65 years old, 2 patients (3.1%), and seniors >65 years, 1 patient (1.5%).

### Characteristics of Appendicitis Patients Who Underwent Operative Appendectomy Based on Gender

**Table 2. Characteristics of Gender Appendicitis Patients**

Gender	Total	Percentage (%)
Male	16	24,6%
Female	49	75,4%
<b>Total</b>	<b>65</b>	<b>100%</b>

From table 2, it can be seen that the incidence of appendicitis performed by operative appendectomy by gender was the most in women, namely 49 patients (75.4%) while the least in males were 16 patients (24.6%).

### Characteristics of Appendicitis Patients Who Underwent Operative Appendectomy Based on Main Symptoms

**Table 3. Characteristics of Appendicitis Patients Main Symptoms**

Characteristics of Appendicitis Patients Who Underwent Operative Appendectomy at Waled Hospital, Cirebon Regency for the 2020–2025 Period

<b>Main Symptoms</b>	<b>Sum</b>	<b>Percentage (%)</b>
Lower right abdominal pain	65	100%
Other main symptoms	0	0%
<b>Total</b>	<b>65</b>	<b>100%</b>

From table 3, it can be seen that the incidence of appendicitis performed by operative appendectomy based on the main symptoms, namely having the main symptoms in accordance with the Alvarado score of 65 patients (100%).

### **Characteristics of Appendicitis Patients Who Underwent Operative Appendectomy Based on Surgical Procedures**

**Table 4. Characteristics of Appendicitis Patients Surgical Procedure**

<b>Operating Procedure</b>	<b>Sum</b>	<b>Percentage (%)</b>
Open Appendectomy	22	33,8%
Appendectomy Laparoscopy	43	66,2%
<b>Total</b>	<b>65</b>	<b>100%</b>

From table 4, it can be seen that the incidence of appendicitis performed by operative appendectomy based on surgical procedures was the most in laparoscopic appendectomy, which was 43 patients (66.2%) and the fewest was open appendectomy, which was 37 patients (33.8%).

### **Discussion**

From the results of the research on the characteristics of appendicitis patients who underwent operative appendectomy at Waled Hospital, Cirebon Regency in the 2020-2025 period, there were 282 patients diagnosed with appendicitis. However, only 65 patients met the inclusion criteria and were used as a research sample. The inclusion criteria in this study were patients diagnosed with appendicitis by undergoing surgery. Meanwhile, another 217 patients were excluded based on exclusion criteria, namely: patients with appendicitis who experienced peritonitis and underwent lapotomy appendectomy, and patients with appendicitis who underwent infiltrate and did not undergo an appendectomy.

### Overview of Appendicitis Patients by Age

Based on the results of the study according to age, the incidence of appendicitis was more in adolescents at the end of 17-25 years, namely 26 patients (40.0%). These results are in line with previous research conducted by Kheru et al. (2022), where it is known that the incidence of acute appendicitis is most common at the age of 17 to 25 years, with 15 people or (30.0%) of all cases. Research with similar results conducted by Antu and Suarno (2024) showed that the most appendicitis patients were in the age group of 12-25 years with 13 patients (48%), followed by the age group 26-45 years old as 10 patients (37%) and age group 45-65 years old 4 patients (15%).

Research with similar results was also conducted by Sani et al. (2020). Patients by age: The majority of people with acute appendicitis are 25-44 years old, which is the highest age. In addition, 5 patients aged 45-64 years, with presentation (7.7%), were in the age decreasing phase.

Pathophysiologically, the period of late adolescence to young adulthood is a phase of the development of the lymphoid system in the intestinal cavity, which leads to an increased risk of obstruction of the lumen of the appendix, one of the main triggers of acute inflammation. Epidemiologically, the incidence of appendicitis decreased after age 30 but then experienced a moderate increase in the elderly group ( $\geq 55$  years), as recorded in various populations. Therefore, the age in this study with a peak in late adolescence corresponds to real-world distribution patterns (Wickramasinghe et al., 2021).

The clinical implications of these findings are the importance of increased awareness of appendicitis symptoms in adolescents and young adults, as well as the readiness of emergency services to address peak incidence in these age ranges. Medical professionals need to implement diagnostic algorithms that take into account age, lymphoid conditions, and possible clinical presentation in vulnerable groups, in order to optimize the early management of acute appendicitis (Wickramasinghe et al., 2021).

### Description of Appendicitis Patients by Gender

Based on the results of the study by gender, the incidence of appendicitis was more experienced by women, namely 49 patients (75.4%). These results are in line with previous research conducted by Antu and Suarno (2024) where appendicitis was found more in women as many as 15 cases (55.6%). Research with similar results conducted by Mustaqim and Sophia (2021) found that more patients with acute appendicitis were female, namely 31 people (55.6%).

According to international literature, Kollias et al. (2024) in a systematic review entitled "Sex Differences in Appendicitis" states that although men have a slightly higher physiological risk of developing acute appendicitis, women more often undergo negative appendectomy due to symptoms that overlap with gynecological complaints, such as ovarian cysts, pelvic inflammatory disease, or ectopic pregnancy. This leads to a higher rate of surgical procedures in women, although it is not necessarily true appendicitis.

Meanwhile, Schildberg et al. (2025), which is appropriate in World Journal of Emergency Surgery, found that the accuracy rate of clinical diagnosis was lower in women than in men. This is due to the atypical symptoms being more commonly found in female

patients, which leads to the use of imaging or earlier operative measures to prevent complications, although the risk of negative appendectomy is increased.

In addition, predictive scoring systems such as the Alvarado Score and RIPASA Score are known to have better accuracy in male patients, while their effectiveness decreases in female patients, as described by Capoglu et al. (2022) in a comparative study of the appendicitis diagnosis score system. This decrease in accuracy led to an increase in the number of appendectomy procedures in women with vague symptoms.

Thus, the higher incidence of appendicitis in women at the site of this study not only indicates a greater physiological risk, but also relates to diagnostic complexity and a more defensive clinical approach to female patients. This underlies the need for more precise diagnostic approaches in female patients, including the use of imaging (ultrasound, CT) and a diagnosis score system adapted to gender characteristics (Capoglu et al., 2022).

### **Overview of Appendicitis Patients Based on Main Symptoms**

Based on the results of the study, according to the main symptoms in the incidence of appendicitis, there were more patients with lower right abdominal pain, namely 65 patients (100%). These results are in line with previous research by Purnamasari et al. (2023) where it was found that complaints of abdominal pain were found in 28 patients (100%). A study with similar results conducted by Wendari et al. (2025) found that patients who had complaints of lower right abdominal pain amounted to 21 respondents (39.6%).

Pathophysiologically, abdominal pain in appendicitis begins from the process of obstruction of the lumen of the appendix, which is usually caused by fecalites, tumors, foreign bodies, or lymphoid tissue hyperplasia. Ischemia, a disruption of blood flow, is caused by increased intraluminal pressure as a result of this obstruction, bacterial growth, and inflammation of the appendix wall. In the initial stage, this inflammation involves only the mucosal and submucosal layers, which are innervated by the visceral nerves of the mesenteric plexus, so that pain is felt diffusely in the epigastric or periumbilicus (Reismann, 2022).

However, when the inflammation reaches the parietal peritoneum in the area of the right iliac fossa, the pain becomes more localized and sharp, as the somatic nerves of T12-L1 are involved. This explains why patients often describe the migration of pain from the middle abdomen to the lower right quadrant, which is clinically known as migratory right iliac fossa pain, one of the classic symptoms with high sensitivity in the diagnosis of appendicitis (Han et al., 2020).

These results are also in line with the clinical literature that mentions that lower right quadrant pain is the most frequent and earliest recognized symptom by patients, as well as being an important indicator in clinical decisions for the diagnosis of appendicitis (Di Saverio et al., 2020).

According to Di Saverio et al. (2020), pain symptoms that move to the right iliac fossa have high sensitivity in the diagnosis of acute appendicitis, especially when accompanied by local pressure pain, loose pain, or positive Rovsing signs. Therefore, the presence of symptoms of lower right abdominal pain in all patients in this study strengthens the relevance of these symptoms as the main diagnostic indicator of acute appendicitis.

## Overview of Appendicitis Patients Based on Surgical Procedures

Based on the results of the study, according to the surgical procedure in the incidence of appendicitis, more operative appendectomy procedures were performed based on the most surgical procedures in laparoscopic appendectomy, namely 43 patients (66.2%). These results are in line with previous research conducted by Patmasari et al. (2022) where the results were obtained that more than half of the cases of appendicitis in children were performed with laparoscopy, namely 46 people (58.97%).

In the last five years, the clinical literature has continued to support the excellence of laparoscopy. A prospective study by Islam et al. (2023) involving 100 patients proves that laparoscopy results in milder postoperative pain (VAS 2.04 vs 5.7), shorter hospitalization (3.12 vs 6.48 days), and complications such as lower wound infections (2 vs 8 cases) compared to the open method. Although the duration of surgery in laparoscopic techniques is consistently longer, the clinical advantages of minimal pain, quick recovery, and improved aesthetics make the procedure an increasingly standard of practice for uncomplicated cases of acute appendicitis (Patil et al., 2024).

The advantages of laparoscopy are not only limited to pain and duration of treatment, but also include faster recovery of intestinal function, lower risk of complications, and better cosmetic outcomes. A meta-analysis by Zhang and Wu (2022) also noted that laparoscopy significantly lowered systemic inflammatory responses, such as postoperative CRP and leukocyte levels. In addition, the recovery of the patient's daily activities was faster with an average difference of 3-4 days compared to open surgery. Another study from Langenbeck's Archives of Surgery (2023) also showed that laparoscopy significantly lowered the rate of negative appendectomy and wound infections, especially in patients with high body mass index and comorbidities. Although the duration of laparoscopic surgery is slightly longer, the time difference is not clinically significant and will decrease as the operator's skills improve (Zhang & Wu, 2022).

Of all these advantages, the use of laparoscopy as the primary approach in appendectomy is further strengthened by the latest scientific evidence. Therefore, the findings of this study are in line with international clinical recommendations and support the relevance of using laparoscopic techniques as a more effective, efficient, and safe operative procedure for patients with acute appendicitis (Srivastava et al., 2025).

## Limitations

This study has two main limitations. First, the sample size was limited, with only 65 patients meeting the inclusion criteria, which may not fully represent the overall appendicitis population in the Waled Hospital area. Second, incomplete medical records posed a challenge in obtaining a comprehensive picture of patient characteristics, as missing data in the records hindered a more thorough analysis of the patient population.

## CONCLUSION

A study of 65 appendicitis patients who underwent operative appendectomy at Waled Hospital, Cirebon Regency, found that the late adolescent age group (17–25 years) was most affected, comprising 40.0% of cases, with a predominance of female patients (75.4%). All patients presented with right lower abdominal pain as the primary symptom, and laparoscopic appendectomy was the most performed surgical method (66.2%). Based on these findings, it is recommended that Waled Hospital and other healthcare facilities continue to prioritize and expand laparoscopic appendectomy services, while medical staff should focus on improving diagnostic accuracy, particularly in adolescents and women. Future research should incorporate additional variables such as duration of surgery, length of hospitalization, and postoperative complications to provide a more comprehensive understanding of patient outcomes. Moreover, public education about the early signs of appendicitis is essential to ensure timely treatment and reduce the risk of severe complications.

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