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A CROSS-SECTIONAL STUDY TO ASSESS THE PROBABILITY OF ADVERSE POSTOPERATIVE INCIDENCE AND RELATED FACTORS IN PATIENTS WITH APPENDICITIS.

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ABSTRACT

BACKGROUND: As appendicitis is a surgical emergency, an appendix that is inflamed may need to be removed. The unfavorable outcomes could include perforation, appendicular abscess, and even death if left untreated. **OBJECTIVE**: In order to explore poor outcomes and associated factors among patients who had appendicitis surgery, this study was carried out. **METHODS:** A retrospective cross-sectional study was conducted on 121 patients who underwent appendicitis surgery between September 1, 2022, and July 30, 2023. A checklist was used to gather data. For data entry and analysis, Epi-data and SPSS version 25 were utilized, respectively. Utilizing a binary logistic regression model, independent factors were found. The statistical significance of factors was set at $p < 0.05$. **RESULTS:** Nine patients did not recover fully among the 121 who had surgery for acute appendicitis. Wound infection was the most common postoperative condition, despite one sepsis-related death being reported. **CONCLUSION:** There was a high risk of an adverse outcome from acute appendicitis in this study. More than 10% of cases of appendicitis resulted in adverse events. A mass in the lower right quadrant, being hospitalized for more than three days, living outside of the hospital setting area, and having a long record of sickness were the risk factors for appendicitis. However, females were less likely to experience negative outcomes from the condition.

KEYWORD: Appendicitis, Inflamed, Patients, Surgical Emergency

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INTRODUCTION

Appendicitis is the most common surgical emergency involving the abdomen worldwide; accounting for over 250,000 cases annually[1]. Despite a declining incidence, a large proportion of the developed world's population still has it[2]. The incidence of appendicitis has been rising in over the past few decades[3]. Previous researches indicates those sociodemographic characteristics like age, sex (being male), being female, prompt

surgical intervention, duration of diagnosis, and behavioral characteristics are significant predictors of a poor postoperative prognosis.

A number of unfavorable outcomes had reported, including deaths, wound infections, hospital-acquired pneumonia, septic shock, peritonitis, and abdominal obstruction[4].

According to past studies, the most common complications in Pakistan were 45 perforated and 25 gangrenous making 17.4% and 9.5% respectively and death after procedure with a 1.2% death rate[5, 6]. The question of whether a prolonged hospital stay or a late presentation is to blame for acute appendicitis remains unresolved despite these studies. The purpose of this study was to determine whether behavioral, personal, or hospital-related factors were linked to poor appendectomy outcomes. The present study posits that the unfavorable outcome can be attributed to factors related to the operation and the delayed presentation of cases. Additionally, this research will shed light on the symptoms related to appendices that may contribute to poor outcomes following appendectomy.

The results will have a significant impact on decision-makers in the policy making process, healthcare professionals particularly nurses and surgeons and patients, who will be able to make an informed choice about when to seek early intervention for appendicitis.

METHODOLOGY:

From September 1, 2022, to July 30, 2023, this study was conducted in Lahore general hospital (LGH). LGH is a public sector teaching hospital. In the hospital, currently only open appendectomy procedures are available.

All patients who have appendicitis surgery participated in a cross-sectional study that was retrospectively conducted within the institution. Included were all appendix-operating patients with appendicitis. Nevertheless, the study did not include those appendicitis patients who received treatment without undergoing surgery. Since every patient who has an appendicitis operation in ward number 3 is included in the study, no sampling technique was used.

A pre-tested questionnaire developed by looking through earlier literature reviews was used to gather data[7]. Information was collected from patient registries and the surgical ward. The data collectors were postgraduate trainers who received 1 day training regarding the goals and the methodology related to this study. The validity and reliability of the tool were pre-tested. Pre-testing was done on patients with appendicitis who had surgery prior to July 20, 2022. Keeping regular monitoring and follow-up on the data acquiring techniques was the principal investigator's primary priority.

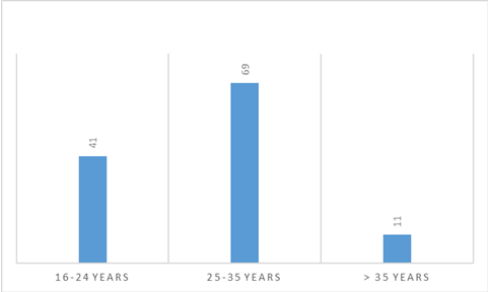
For analysis and data entry, Epi-data and SPSS version 25 were utilized, respectively. The standard deviation (SD), mean, and range were utilized to display the continuous variable's descriptive statistics. In a comparable manner, the proportion described the participants' discrete characteristics. The odds ratio with a 95% confidence interval of the statistical correlation between the outcome and predictor variables was calculated using a binary logistic regression model.

The Hosmer-Lemeshow test statistics were used to evaluate the multivariable regression model's goodness of fit. Unfavorable outcomes from the appendicitis operation, such as intestinal obstructions and post-operative infections and intra- or post-operative deaths, were the dependent variable. Any patient reporting one or more as their answer was perceived to be having an unfavorable outcome and it was coded as 1, if no outcomes were observed it indicated no unfavorable outcome, hence coded as 0. Sociodemographic traits, behavioral variables, clinical indicators, and surgical procedure factors were the independent variables. The variables that were considered statistically significant were those with a p-value of less than 0.05.

Results: During the period of the study, Lahore general hospital unit three of surgery

department performed an appendicitis operation on 121 patients.

Figure 1: Age categories in years



The study participants range in age from 16 to 78 years, with a mean age of 20.5±9.67 (SD) years. Of the patients who experienced acute appendicitis, 84 were from urban areas city and out of which 60 percent were men (Table 1).

Table 1: Sociodemographic status of patients

Sex		Residency	
Male	73	Urban	84
Female	48	Rural	37

Table 2 Clinical Characteristics and Treatment Findings of Patients with Acute Appendicitis Surgery (n=121)

Variables	Frequency	Percent
Symptoms		
Abdominal pain	121	100
Vomiting	85	70.0
Fever	79	65.0
Nausea	101	83.0
Loss of appetite	112	92.5
Swelling on abdomen	7	0.05
Clinical symptoms		
Generalized abdominal tenderness	12	0.09
RLQ tenderness	102	84.2
Febrile	98	80.0
Roving's sign	71	58.6
Obturator sign	82	67.7
Psoas sign	65	53.7
Right lower quadrant mass	8	0.6
WBCs count		
>10,000	98	80
≤10,000	23	19.9
Incision Type		
Gridiron	20	16.5
Lantz incision (Rocky Davis)	85	70.2
Lower midline	12	0.9
Gridiron and lower midline	4	0.3
Operative finding		
Normal appendix	1	0.08
Inflamed appendix	81	66
Perforated	15	12.3
Gangrenous	19	15.7
Appendicular abscess	2	0.16
Appendicular mass	1	0.08
Inflammatory peritoneal fluid	1	0.08

Seventeen-nine (65%) of the subjects had a fever prior to the study. Vomiting was reported by 85 (70 %) and loss of appetite by 112 (92.5%) of the study participants, respectively. Abdominal tenderness was the most common physical examination symptom, affecting all patients. Clinical findings of the patients presenting with are mentioned in Table 2.

Additionally, of the patients who underwent surgery for appendix complications, 85% had good management outcomes, while 17 (25%) had one or more bad outcomes, including paralytic ileus (abdominal obstruction) and postoperative wound infection as shown in Figure 2

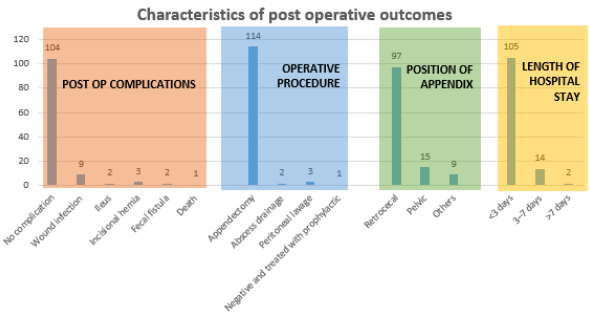


Figure 2: Outcomes of appendectomy patients

Binary logistic regression analysis was used to calculate the factors related to the

management outcome of an acute appendicitis operation. According to this study, there was a lower likelihood of unfavorable postoperative outcomes for female patients with appendicitis. Patient's residences and the management outcome of those who had appendicitis surgery were statistically significantly correlated. Likewise, compared to patients who were reachable within a day, those who were admitted after the disease had started had a higher chance of experiencing one or more negative outcomes. The duration of hospital stay was also related to how appendix cases were managed. Patients with appendicitis cases who were in the hospital longer were more likely to have worse outcomes than those who left the hospital before three days. Research participants with a mass in the right lower quadrant before to surgical care had a nearly six-fold greater risk of experiencing postoperative problems compared to appendicitis patients without a mass on the RLQ (Table 4).

Table 4: Regression analysis of the Appendix-related factors

Variables		**COR (95% CI)**	**AOR (95% CI)**
Sex			
Male	73	1	
Female	48	0.32	0.47
Duration of illness before arrival at the hospital			
<24hours	78	1	
1–3days	14	1.87	1.56
≥4 days	29	5.77	5.78
Length of hospital stay			
≤3 days	84	1	1
>3 days	37	2.88	3.3
Mass in the RLQ			
Yes	13	8.65	6.02
No	108	1	1

DISCUSSION

In the developed world, acute appendicitis is a public health concern. Even though it is less common, appendicitis is a common issue throughout Pakistan[6-9]. The overall unfavorable outcome after surgery was 10%. This outcome is comparable to the 13.5% result of a study conducted in Lagos, Nigeria[10]. Nonetheless, this result is less than the 43.1% of earlier Ghanaian studies[11]. Variation in the population, the study period, and socioeconomic factors could be the cause of this discrepancy. 7.7% of all postoperative complications were wound infections, which is less than the previous studies' 32%, 8%, and 41.5% rates[12]. One death was reported in this study. Sepsis was listed as the cause of death. The study indicates this cause of death[13]. In certain cases, an appendix rupture can actually result in death.

A similar pattern of clinical symptoms was also found in this study and earlier research. Every patient had 100% abdominal pain, which was followed by 85.7% vomiting. This outcome agrees with the findings of the earlier research[14, 15]. The right lower quadrant (RLQ)'s tenderness was the primary physical examination finding; these results are consistent with those from Ghana study, 7.7% of patients with unfavorable post-operative outcomes had wound infections[16]. This peak proportion of wound infections after surgery may be explained through the majority of cases appearing soon after they had a more complication phase of the disease. More than 30.56% of the patients with postoperative wound infections had an appendix that had perforated during the surgical procedure. Almost 95.6% of patients in this study had a fever prior to operative management, and 61% of patients with post-operative wound infections stay in the hospital for longer than three days. 52.1% of patients with lower midline types of incisions and 74% of patients with retrocecal appendix positions had wound infections following surgery. Additionally, this study demonstrated that 60.8% of patients with post-operative wound infection sought

medical attention within 24 hours of the illness's onset. Sex, residency, length of illness prior to hospital admission, length of hospital stay, and RLQ mass were found to be the factors associated with the management outcomes of appendicitis operation after the confounding variables were adjusted for in this study. This investigation established that the unfavorable outcome of the appendicitis operation was related to sex. This effect is consistent with research conducted in Mekelle, Gondar Hospital and Anbesa Teaching Hospital, and [17] other locations[17]. Another unique finding of this study was the residency. Compared to those who lived in cities, patients with appendicitis who resided in rural areas were approximately four times more likely to have unfavorable post-operative outcomes. This could be because of hospitals being located far from rural areas.

Consequently, patients in rural areas must make a lengthy trip to get to those hospitals. This study also showed that a prolonged illness without treatment was a risk factor for poor results. Those undesirable results could result from the interaction of these two variables. The latter is consistent with a study conducted at public hospital Faisalabad, which found that a major preventable factor contributing to intervention delay was late hospital presentation[18]. Furthermore, this study found that a statistically significant predictor of unfavorable outcomes following surgery was the duration of hospital stay. As a result, the likelihood of adverse outcomes was increased three fold in patients who remained in the hospital for longer than three days following the procedure. This conclusion is consistent with finding [19], which could be the result of an infection picked up in a hospital.

Mass in the lower right quadrant was another new independent predictor for poor post-operation outcomes. This could be because surgical procedures are most difficult when dealing with body parts that are more sensitive, according to science. Here is where nosocomial infections could occur. Finally, the researchers verified that age did not independently predict unfavorable outcomes following appendectomy. This finding conflicts with earlier research[20]which found that older patients had a higher chance of experiencing unfavorable outcomes following surgery. The differences in the studies' sociodemographic composition and study period could be the cause of this discrepancy[21-22]. Therefore, in order to lower the number of unfavorable outcomes following surgery, there needs to be a greater understanding of the risks by the community and physicians.

Another strength of this study is that it included all patients with appendicitis who had appendix operations during the study period. It is limited by the following, though. First, the temporality of variables could not be determined because a cross-sectional design was used. Similarly, the research excluded other variables that could be risk factors for unfavorable post-operative outcomes, such as professional ties and participant knowledge of the outcome variable. Secondly, the research was conducted within an institution, which makes it challenging to extrapolate the results to the community at large. Lastly, the investigator made a note of issues for future research because the number of operators during surgical procedures and the participants' wealth were not investigated.

CONCLUSION

According to this study, there was an increased percentage of unfavorable outcomes following an appendix operation. More men than women were affected. The hospital admission for more than 3 days, arrival at the hospital after a day, RLQ mass, and residents being in some other city other than where hospital was located were all positive indicators of the unfavorable outcomes of the appendicitis operation. On the other hand, the unfavorable outcome of the appendicitis operation was negatively predicted by the gender of the female. Therefore, early arrival

and active management for early discharge through health education for peripheral residents will decrease the unfavorable outcomes of appendicitis operations. Furthermore, it is advised that medical professional's surgeons in particular should pay close attention to appendicitis cases that exhibit RLQ's tenderness.

Furthermore, the hospital administrators and policymakers suggested prioritizing the use of laparoscopic procedures over open procedures.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

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AUTHORS' CONTRIBUTIONS:

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST: No competing interest declared

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