Impact Surgery

Original Research Paper

e-ISSN: 2978-1655

Awareness of appendicitis, prevalence of appendicectomy, and postoperative complications in Quetta, Pakistan: a cross-sectional study

Alishba Najeeb[1], Zainab Jamil[2*], Anosha Sajid[3]

Correspondence: Zainab Jamil, Department of Medicine, Dow University Of Health Sciences, Karachi, Pakistan. **Email**: zainabjamil94@gmail.com

[1]MBBS, Department of Surgery, Bolan Medical College, Quetta, Pakistan
[2]MBBS, Department of Medicine, Dow University of Health Sciences, Karachi, Pakistan
[3]MBBS, Department of Medicine, Dow University of Health Sciences, Karachi, Pakistan

Abstract

Introduction: Appendicitis remains a common surgical emergency, yet delayed presentation and limited awareness contribute substantially to morbidity in low-resource settings. Public understanding of symptoms, treatment options, and complications plays a critical role in timely healthcare seeking and postoperative outcomes. This study evaluated awareness of appendicitis, prevalence of appendicectomy, and associated complications among patients attending a tertiary care outpatient department in Quetta, Pakistan.

Methods: A cross-sectional study was conducted at Sandeman Provincial Hospital from April to July 2024 using non-probability convenience sampling. Adults aged 18 years and above were recruited through face-to-face interviews after informed consent. A structured questionnaire assessed sociodemographic characteristics, awareness of appendicitis, knowledge of treatment, and postoperative outcomes. Associations were examined using the chi-square test, with $p<0.05$ considered statistically significant.

Results: A total of 384 participants were included, of whom 52.6% demonstrated overall awareness of appendicitis. Awareness was highest among individuals aged 18-30 years (56.6%). Education level showed a strong association with awareness, whereas age and gender were not significantly associated. Fifty-six participants reported prior appendicectomy, all performed using an open approach. Minor complications were reported by 50% of patients, while 30.4% experienced major complications, most commonly wound infection and abscess formation.

Conclusions: Awareness of appendicitis in this population remains limited and is strongly influenced by educational attainment. The exclusive use of open appendectomy and the notable burden of postoperative complications identifies the need for public education, improved surgical capacity, and strengthened health system resources to support early diagnosis and safer operative care.

Cite as: Najeeb A, Jamil Z, Sajid A. Awareness of appendicitis, prevalence of appendicectomy, and postoperative complications in Quetta, Pakistan: a cross-sectional study. *Impact Surg*, 3(1), 401–406. https://doi.org/10.62463/surgery.309

Introduction

Appendicitis is one of the most common causes of acute abdominal pain requiring emergency surgical intervention worldwide. The vermiform appendix is a narrow, blind-ended tube arising from the caecum and contains abundant lymphoid tissue within its mucosa and submucosa[1]. Acute appendicitis results from luminal obstruction caused by lymphoid hyperplasia, faecoliths, strictures, or neoplasms and most frequently affects adolescents and young adults, although it can occur at any age[2]. Early diagnosis remains essential because delayed presentation may lead to perforation, peritonitis, and other serious complications[3].

Clinical presentation typically includes peri-umbilical pain migrating to the right iliac fossa, low-grade fever, and localised tenderness, although atypical manifestations are common and may complicate diagnosis[3]. Computed tomography is considered the most reliable diagnostic modality, enabling differentiation between uncomplicated and complicated disease and guiding management decisions[4,5]. Treatment options include conservative antibiotic therapy in selected uncomplicated cases and surgical removal of the appendix, performed either by open or laparoscopic appendicectomy[6]. Laparoscopic techniques are associated with reduced postoperative pain and shorter recovery, although resource limitations often favour open procedures in low-resource settings[7-8].

Public awareness of appendicitis plays a crucial role in timely healthcare seeking and improved outcomes. Limited knowledge of symptoms and treatment options may delay presentation and increase the risk of complications, particularly in regions with constrained healthcare resources. Quetta, the capital of Balochistan, faces significant healthcare challenges including limited access to specialised surgical services and variable literacy levels. This study therefore aimed to assess awareness of appendicitis, determine the prevalence of appendicectomy, and evaluate postoperative complications among patients attending a tertiary care hospital in Quetta, Pakistan.

Methods

Study design and setting

This observational cross-sectional study was conducted at the outpatient department of Sandeman Provincial Hospital, Quetta, Pakistan, a government tertiary care centre that serves a large and diverse population. Data were collected over a three-month period from 1 April to 1 July 2024.

Participants and eligibility criteria

Participants were recruited from walk-in patients attending the general medicine and general surgery outpatient departments regardless of their presenting complaint. Individuals aged 18 years or older who were residents of Quetta and provided informed written consent were included. Critically ill patients, individuals with comorbid conditions known to delay wound healing or influence postoperative complications, and those who did not complete all questionnaire items were excluded. These criteria were assessed through detailed interviews with each participant.

Sampling and sample size

A non-probability convenience sampling technique was used. A sample size of 384 participants was calculated using a standard single-proportion formula with a 95% confidence level, 5% margin of error, and an assumed prevalence of 50%. The 50% estimate was chosen in the absence of prior local data, as it provides the most conservative and statistically robust sample size. The calculation incorporated the estimated population of Quetta (1,190,000), although the effect of finite population correction was negligible due to the large population size. This sample size was considered adequate to estimate awareness levels with acceptable precision within the study timeframe and available resources.

Data collection procedure

A non-probability convenience sampling technique was used. A sample size of 384 participants was calculated using a standard single-proportion formula with a 95% confidence level, 5% margin of error, and an assumed prevalence of 50%. The 50% estimate was chosen in the absence of prior local data, as it provides the most conservative and statistically robust sample size. The calculation

incorporated the estimated population of Quetta (1,190,000), although the effect of finite population correction was negligible due to the large population size. This sample size was considered adequate to estimate awareness levels with acceptable precision within the study timeframe and available resources.

Questionnaire development

The questionnaire comprised three sections. The first section collected sociodemographic information including age, gender, and education level. The second section assessed awareness of appendicitis, knowledge of symptoms, treatment options, complications, and willingness to undergo appendicectomy. Each question carried equal weight, and participants who answered at least three of five awareness questions correctly were classified as aware. The third section evaluated the prevalence of appendicectomy and postoperative outcomes among participants who reported previous surgery. Pilot testing of the questionnaire was conducted on randomly selected individuals prior to the main study. Minor modifications were made to improve clarity and comprehension, and participants involved in the pilot were excluded from the final analysis.

Outcome measures

The primary outcome was awareness of appendicitis and its management. Secondary outcomes included prevalence of appendicectomy and self-reported postoperative complications among individuals who had undergone the procedure.

Statistical analysis

Data were analysed using STATA SE 16. Descriptive statistics were used to summarise frequencies and percentages. Cross-tabulations were performed to assess associations between awareness and sociodemographic variables including age, gender, and education level. The chi-square test was used to evaluate statistical significance, with $p<0.05$ considered significant.

Ethical Considerations

Ethical approval was obtained from the Ethical Review Committee of the Post Graduate Medical Institute, Quetta (No. PGMI/ERC-06/2024). All participants provided written informed consent prior to inclusion, and confidentiality of responses was maintained throughout the study.

Results

Participant Characteristics

A total of 384 participants were included in the study. Of these, 212 (55.2%) were male and 172 (44.7%) were female. The largest age group was 18–30 years, comprising 166 participants (43.2%), followed by 31–40 years (29.2%), 41–50 years (16.7%), and over 50 years (10.9%). Educational status varied, with 104 participants (27.1%) uneducated, 79 (20.6%) having matric-level education, 66 (17.2%) intermediate education, 75 (19.5%) graduates, and 14 (3.6%) postgraduates.

Table 1: Sociodemographic characteristics of participants (n = 384)

Category	Variable	n (%)
Gender	Male	212 (55.2)
	Female	172 (44.7)
Age (years)	18–30	166 (43.2)
	31–40	112 (29.2)
	41–50	64 (16.7)
	>50	50 (10.9)
Education level	Uneducated	104 (27.1)
	Primary	46 (12.0)
	Matric	79 (20.6)
	Intermediate	66 (17.2)
	Graduate	75 (19.5)
	Postgraduate	14 (3.6)

Awareness of appendicitis

Overall, 202 participants (52.6%) were classified as aware of appendicitis, while 182 (47.4%) were unaware. Awareness of clinical symptoms was reported by 211 participants (54.9%), and 233 (60.7%) recognised potential complications. Only 18 participants (4.7%) were aware of both open and laparoscopic surgical approaches, whereas 121 (31.5%) were unaware of any treatment option. Most participants (326, 84.9%) expressed willingness to undergo appendicectomy if diagnosed.

Association between awareness and socio-demographic factors

No statistically significant association was observed between awareness and gender ($p=0.306$) or age group ($p=0.590$). Awareness was highest among participants aged 18–30 years (56.6%). Educational status demonstrated a strong association with awareness, with higher education levels corresponding to greater awareness

Table 2: Awareness of appendicitis and associated factors (n=384)

Category	Variable	Aware n (%)	Not aware n (%)	p value
Knowledge items	Awareness of the term appendicitis	194 (50.5)	190 (49.5)	
	Awareness of clinical symptoms	211 (54.9)	173 (45.1)	
	Awareness of surgical approaches	18 (4.7)	366 (95.3)	
	Awareness of complications	233 (60.7)	151 (39.3)	
	Overall awareness	202 (52.6)	182 (47.4)	0.307
Gender	Male	117 (55.2)	95 (44.8)	0.306
	Female	85 (49.4)	87 (50.6)	
Age (years)	18–30	94 (56.6)	72 (43.4)	0.590
	31–40	55 (49.1)	57 (50.9)	
	41–50	32 (50.0)	32 (50.0)	
	>50	21 (50.0)	21 (50.0)	
Education level	Uneducated	29 (27.9)	75 (72.1)	<0.001
	Primary	20 (43.5)	26 (56.5)	
	Matric	42 (53.8)	36 (46.2)	
	Intermediate	45 (68.2)	21 (31.8)	
	Graduate	53 (70.7)	22 (29.3)	
	Postgraduate	13 (92.9)	1 (7.1)	

($p=4.418\times10^{-19}$). Among uneducated participants, 72.1% were unaware, whereas awareness reached 92.9% among postgraduates.

Appendicectomy prevalence and clinical characteristics

Fifty-six participants (14.6%) reported a history of appendicectomy. Of these, 42 (75%) presented to the emergency department, while 14 (25%) presented to outpatient services. The time from symptom onset to presentation was within one day in 41.1% of cases and between two days and one week in 39.3%. All procedures were performed using an open surgical approach.

Postoperative outcomes and complications

Among participants who underwent appendicectomy, 32 (57.1%) reported an inflamed appendix and 12 (21.4%) reported perforation. Hospital stay ranged from one to two days in 42.9% of cases and three days to one week in 50%. Follow-up visits were reported by most participants, with 32.4% attending more than two visits.

Minor complications were reported by 28 participants (50%), most commonly fever (18 cases) and vomiting (12 cases). Major complications were reported by 17 participants (30.4%), with wound infection (13 cases) and abscess formation (8 cases) being the most frequent.

Table 3: Appendicectomy characteristics and postoperative outcomes (n = 56)

Category	Variable	n (%)
Time to hospital presentation	1 day	23 (41.1)
	2 days–1 week	22 (39.3)
	1 week–1 month	7 (12.5)
	>1 month	4 (7.1)
Point of presentation	Outpatient department	14 (25.0)
	Emergency department	42 (75.0)
Preoperative medication	None	20 (35.7)
	Painkillers	11 (19.6)
	Antibiotics	13 (23.2)
	Both	12 (21.4)
Surgical approach	Open appendicectomy	56 (100)
	Laparoscopic appendicectomy	0 (0)
Condition of appendix	Inflamed	32 (57.1)
	Perforated	12 (21.4)
	Not remembered	12 (21.4)
Duration of hospital stay	1–2 days	24 (42.9)
	3 days–1 week	28 (50.0)
	>1 week	4 (7.1)
Follow-up visits	None	12 (21.4)
	1–2 visits	26 (46.4)
	>2 visits	18 (32.4)
Minor complications (n = 28)	Fever	18 (64.3)
	Vomiting	12 (42.9)
	Diarrhoea	6 (21.4)
	Constipation	1 (3.6)
	Respiratory infection	6 (21.4)
Major complications (n = 17)	Wound infection	13 (76.5)
	Abscess	8 (47.1)

Discussion

This study evaluated awareness of appendicitis, prevalence of appendicectomy, and postoperative complications among patients attending a tertiary care hospital in Quetta, Pakistan. The findings demonstrate that awareness remains limited, with just over half of participants recognising the condition and its clinical implications. Comparable studies in similar populations have reported higher levels of awareness, suggesting that disparities in education, access to healthcare information, and public health outreach contribute substantially to knowledge gaps 9. Limited awareness may delay presentation and increase the likelihood of complicated disease, particularly in resource-constrained settings.

Educational attainment emerged as the strongest determinant of awareness, with higher levels of education strongly associated with improved understanding of appendicitis. This finding aligns with evidence indicating that health literacy plays a critical role in early healthcare seeking and disease recognition[10]. Although younger participants demonstrated slightly higher awareness, neither age nor gender showed a statistically significant association, reinforcing the importance of educational exposure rather than demographic characteristics alone.

The prevalence of appendicectomy observed in this study reflects the substantial global burden of appendicitis, which remains one of the most common surgical emergencies worldwide[11]. Notably, all procedures reported by participants were performed using an open approach, highlighting persistent structural and training limitations in low-resource surgical systems. Previous research has shown that laparoscopic appendicectomy is associated with reduced postoperative pain, shorter hospital stay, and fewer wound complications, yet its adoption remains uneven in many developing healthcare settings[12].

Postoperative complications were reported by a considerable proportion of participants, with wound infection and intra-abdominal abscess being the most frequent major outcomes. These findings are consistent with existing literature demonstrating that delayed presentation and perforated appendicitis significantly increase postoperative morbidity[13]. The presence of perforation in a notable subset of patients underscores the clinical consequences of delayed diagnosis and inadequate public awareness.

The results of this study highlight the need for targeted public health interventions to improve recognition of appendicitis symptoms and encourage early presentation. Community-based education, school programmes, and culturally appropriate media campaigns may help address knowledge gaps and reduce preventable complications. In parallel, strengthening surgical capacity through improved training and access to minimally invasive techniques could enhance patient outcomes and reduce postoperative morbidity[14].

Several limitations should be acknowledged. The use of convenience sampling limits generalisability beyond the study population, and reliance on self-reported postoperative outcomes introduces potential recall bias. In addition, the absence of hospital record verification may affect the accuracy of complication reporting. Despite these limitations, the study provides valuable insight into awareness and surgical outcomes in an under-represented population and supports the need for broader epidemiological and health systems research in similar settings[15].

Competing Interest: None

Funding: None Received

References

1. Bhangu A, Søreide K, Di Saverio S, Assarsson JH, Drake FT. Acute appendicitis: modern understanding of pathogenesis, diagnosis, and management. *Lancet*. 2015;386:1278–1287.doi:10.1016/S0140-6736(15)00275-5
2. Snyder MJ, Guthrie M, Cagle S. Acute appendicitis: efficient diagnosis and management. *Am Fam Physician*. 2018;98:25–33. PMID: 30215950.
3. Bom WJ, Scheijmans JCG, Salminen P, Boermeester MA. Diagnosis of uncomplicated and complicated appendicitis in adults. *Scand J Surg*. 2021;110:170–179. doi:10.1177/14574969211008330
4. Oyeh E, Nsaful J, Bediako-Bowen A, Gbadamosi H, Mensah YB, Adu-Aryee NA, Nyarko V. Mucocoele of the appendix. *Ghana Med J*. 2024;58:109–114. doi:10.4314/gmj.v58i1.15
5. Song MY, Ullah S, Yang HY, Ahmed MR, Saleh AA, Liu BR. Long-term effects of appendectomy in humans: is it the optimal management of appendicitis? *Expert Rev Gastroenterol Hepatol*. 2021;15:657–664. doi:10.1080/17474124.2021.1868298
6. Salminen P, Sippola S, Haijanen J, Nordström P,

Rantanen T, Rautio T, et al. Antibiotics versus placebo in adults with CT-confirmed uncomplicated acute appendicitis (APPAC III): randomised double-blind superiority trial. *Br J Surg*. 2022;109:503–509. doi:10.1093/bjs/znac086

7. Di Saverio S, Podda M, De Simone B, Ceresoli M, Augustin G, Gori A, et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. *World J Emerg Surg*. 2020;15:27. doi:10.1186/s13017-020-00306-3
8. Nepal YJ, Paudyal S, Shah S, Giri N. Laparoscopic appendectomy versus open appendectomy in acute appendicitis. *J Nepal Health Res Counc*. 2023;20:825–829. doi:10.33314/jnhrc.v20i4.3681
9. AlSaleh R, Kishta AJ, Shamakh AA, Balamesh AA, Alabaidy MH, Alsharari NA, et al. Awareness of appendectomy and its complications among Saudis. *Cureus*. 2023;15:e46823. doi:10.7759/cureus.46823
10. Naderan M, Shahr Babaki AE, Shoar S, Mahmoodzadeh H, Nasiri S, Khorgami Z. Risk factors for the development of complicated appendicitis in adults. *Turk J Surg*. 2016;32:37–42. doi:10.5152/UCD.2015.3031
11. Ferris M, Quan S, Kaplan BS, Molodecky N, Ball CG, Chernoff GW, et al. The global incidence of appendicitis. *Ann Surg*. 2017;266:237–241. doi:10.1097/SLA.0000000000002188
12. Biondi A, Di Stefano C, Ferrara F, Bellia A, Vacante M, Piazza L. Laparoscopic versus open appendectomy: a retrospective cohort study assessing outcomes and cost-effectiveness. *World J Emerg Surg*. 2016;11:44. doi:10.1186/s13017-016-0102-5
13. Danwang C, Bigna JJ, Tochie JN, Mbonda A, Mbanga CM, Nzalie RNT, Guifo ML, Essomba A. Global incidence of surgical site infection after appendectomy: a systematic review and meta-analysis. *BMJ Open*. 2020;10:e034266. doi:10.1136/bmjopen-2019-034266
14. Tartaglia D, Costa G, Camillò A, et al. Intra-abdominal abscess after appendectomy for complicated appendicitis: risk factors and management. *Updates Surg*. 2021;73:1327–1334. doi:10.1007/s13304-021-01024-5
15. Ahmed HO, Muhedin R, Boujan A, Aziz AHS, Abdulla AM, Hardi RA, Abdulla AA, Sidiq TA. A five-year longitudinal observational study of morbidity and mortality of negative appendectomy in Sulaimani Teaching Hospital, Kurdistan Region, Iraq. *Sci Rep*. 2020;10:2028. doi:10.1038/s41598-020-58847-1