Original Research Article

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20214249

Acute appendicitis: is it a seasonal disease?

Yasir Babiker Elshambaty^{1,2*}, Saleh A. Alzahrani¹, Talal A. AlOmari¹, Waleed S. Shahwan¹, Abdullah A. Alzahrani¹, Osama A. Alghamdi¹

¹Faculty of Medicine, Albaha University, Saudi Arabia

Received: 31 August 2021 Accepted: 18 October 2021

*Correspondence:

Dr. Yasir Babiker Elshambaty, E-mail: yasiralshambaty@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The aim of this study was to review the management of acute appendicitis in a rural hospital. It was generally reported to be more common in men. Appendicitis is the most common surgical cause of abdominal pain worldwide. Appendectomy is the lonely curative treatment of appendicitis.

Methods: This was a retrospective study in which we reviewed the records of the patients who had been diagnosed and operated on for appendicectomy from January to December 2017 in a rural hospital. The data were analyzed with SPSS version 25.

Results: The total number of the patients was 114. About 69.3% are males. The mean age was 25.11 years. About (39.5%) were above 20 years old. Most of the cases presented in the period between January and March (27.3%). Right lower quadrant pain was the most common presenting symptom (93.9%). Nausea and vomiting mentioned by 57 (50%) and 74 (64.9%) of the participants respectively, fever in 42 (36.8%), muscle guarding in 0.9%, tenderness in 44 (38.6%), abdominal ultrasound was requested in 96 (84%). The most common histological diagnosis was acute suppurative appendicitis with peri-appendicitis in 15 (13.2%). All the cases were treated with open appendicectomy.

Conclusions: We concluded that male are more affected with acute appendicitis. The most common presenting symptom was right lower quadrant pain. The vast majority of the cases were in the winter. Ultrasound has been used in the most cases particularly in male more than in females. The most common histological diagnosis was acute suppurative appendicitis. Open appendicectomy is the main operative management in our pts.

Keywords: Acute appendicitis, Appendectomy, Rural hospital, Histology

INTRODUCTION

Appendicitis is known as inflammation of the vermiform appendix. The lifetime risk of appendicitis is 8.6% for males and 6.7% for females. 1,2 It is generally reported to be more common in men. 3-6 Appendicitis is the most common surgical cause of abdominal pain worldwide. 7,8 The etiology and pathogenesis of appendicitis are not entirely comprehended but probable hypotheses are stated which include obstruction of the appendiceal lumen either by fecaliths, hypertrophy of lymphoid tissue, neoplasm, or worms (oxyuris vermicularis). The progressive increment in intraluminal pressure that compromises the

venous efflux, stagnation of luminal contents, which favors bacterial multiplication, triggers ischemia and inflammatory responses which ensuing tissue edema as well as neutrophilic infiltration of the lumen, muscular wall and peri appendiceal soft tissues. The most prominent etiologies of appendiceal lumen obstruction are lymphoid hyperplasia and fecaliths. 1.2.9.10 The perforation of appendix is related to multiple risk factors which encompasses extremes of age, immunosuppression, diabetes mellitus, previous abdominal surgery, pelvic appendix and fecalith obstruction. The clinical characteristics of appendicitis involve periumbilical pain which diffuse and finally localized to right lower

²Faculty Of Medicine, Bakht Elruda University, Elduiem, White Nile state, Sudan

quadrant (RLQ), anorexia, nausea, vomiting, diarrhea or constipation, signs include low-grade fever, tenderness with utmost at or nearby McBurney's point, muscle guarding and rebound tenderness. Appendectomy is the lonely curative treatment of appendicitis.²

Objectives

The aim of this study was to know the common presenting symptoms of acute appendicitis, the time of incidence, work-up, type of management and the pathological diagnosis.

METHODS

Study design

The study design is retrospective records review.

Study area

The study was conducted in Almekhwah hospital, Almekhwah region, Albaha province, Saudi Arabia.

Study population

The study population comprised of all patients with appendicitis who were admitted at Almekhwah hospital.

Inclusion and exclusion criteria

The inclusion criteria of the study was all patients who have been diagnosed and operated on with appendicitis in Almekhwah hospital from January to December 2017. Patients who had been referred to another hospital were excluded.

Data collection

Data was collected by retrieving information from patients records at the hospital. We concentrated on demographic features of the patients, the presenting symptoms, the clinical signs, the imaging requested to the patients, what type of surgery was done and the histopathological reports if was requested.

Data analysis

Data was statistically analyzed using SPSS software version.25. A p value of less than 0.05 was considered significant.

Ethical concern

The ethical approval was obtained from university research ethical committee. Also the permission from the hospital administration was considered.

RESULTS

Demographic characteristics

The total number of the patients involved in this study was 114. These patients were presented to a rural hospital. All these patients were diagnosed with acute appendicitis and operated on. Table 1 shows the demographic features of the participants of this study. About 69.3% were males and 30.7% were females. Concerning the ages of the patients, unfortunately 36 patients had no age in their records. The mean age of those with recorded age was 25.11 years. We divided the 78 patients whose age we knew into the following the age groups. There was only one patient whose age was less than 10 years. Thirty one (27.2%) in the age group 11-20 years and 45 (39.5%) were above 20 years old.

Table 1: Demographic characteristics (n=114).

Variables	Frequency (%)	
Gender		
Male	79 (69.3)	
Female	35 (30.7)	
Age (in years)		
1-10	1 (0.9)	
11-20	31 (27.2)	
>20	45 (39.5)	
Not recorded	37 (32.5)	
Residency		
ALBaha region	37 (32.5)	
Outside Albaha region	11 (9.6)	
Not recorded	66 (57.9)	
Nationality		
Saudi	35 (30.7)	
Non-Saudi	7 (6.1)	
Not recorded	72 (63.2)	

Table 2: Seasonal variation of acute appendicitis (n=114).

Variables (time frame)	Number of appendicectomy cases	
January-March	N (%) 39 (27.3)	
April-June	18 (15.7)	
July-September	28 (24.6)	
October-December	29 (25.4)	

Concerning the residence of the patients 37 (32.5%) were from Almekhwa, Albaha region where the hospital was, 11 (9.6%) were from outside Almekhwa and 66 (57.9%) of the patients their residence was not mentioned in their records. Thirty five (30.7%) patients were Saudi, 7 (6.1%) were non-Saudi and 72 (63.2%) patients, the records did not mention where their nationality. Concerning the seasonal incidence of the appendicitis. Table 2 shows an obvious increase in the cases started

from July-September to October-December through January-March when the incidence reached its peak and then showed decline in the period April-June.

Clinical presentations

Regarding the symptoms and signs in our patients, Table 3 summaries it. The most common presenting symptom was RLQ pain which was present in 107 (93.9%) of the cases. There was only one patient who presented with epigastric pain and she was female. Anorexia was present in 49 (43%) of the patients with no statistical difference between the gender (p=0.986). Nausea mentioned by 57 (50%) of the patients (p=0.155) whereas the vomiting reported by 74 (64.9%) of the participants (p=0.332). Fever was detected in 42 (36.8%) which was more obvious in females than males (p=0.032) and diarrhea in 10 (8.8%) which was more common in females compared with males p=0.005), constipation was present in 11 (9.6%). Regarding the signs detected by the examiner of the case. Tenderness with utmost at or near McBurney's point was reported in 44 (38.6%) of the patients and muscle guarding in only one patient.

Table 3: The presenting symptoms and signs of acute appendicitis (n=114).

Variables	Frequency (%)	P value
RLQ pain	107 (93.9)	
Epigastric pain	1 (0.9)	
Fever	42 (36.8)	0.032
Anorexia	49 (43)	0.986
Nausea	57 (50)	0.155
Vomiting	74 (64.9)	0.332
Diarrhea	10 (8.8)	0.005
Constipation	11 (9.6)	
Tenderness	44 (38.6)	
Muscle guarding	1 (0.9)	

Figure 1 shows that abdominal ultrasound was requested to confirm the diagnosis in 96 (84%), 58% in males and 26% in females. Chest X-ray was requested in only (18%) of the patients. Figure 2 shows the histopathology of the removed appendix was performed in 65 (57%) specimen. The most common histological diagnosis was acute suppurative appendicitis with peri-appendicitis in 15 (13.2%) followed with early acute appendicitis in 12 (10.5%). There were two specimens in which a worm (*Enterobius vermicularis*) was detected.

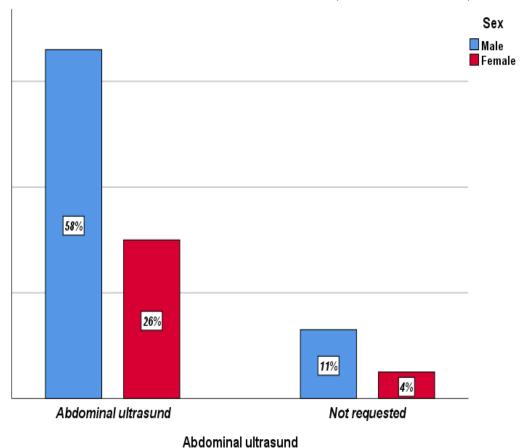


Figure 1: Request of the ultrasound in both gender (n=96).

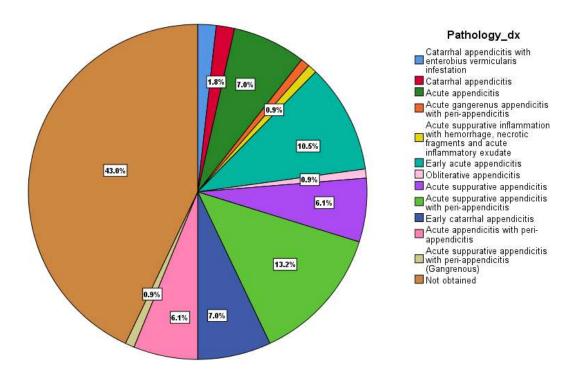


Figure 2: The histological reports of the appendix (n=65).

DISCUSSION

One hundred and fourteen patients were diagnosed with acute appendicitis and underwent open appendicectomy. All these cases were done in a period of one year from January to December 2017 at Almekhwah rural hospital, AlBaha, Saudi Arabia. The lack of the laparoscope made open appendicectomy the only option of the surgery. The overall mean age of the participants was 25.11 years. This was in agreement with several published articles. ¹¹⁻¹³ In this study the number of males far exceeded that of the females. The same result with male more than females reported by other studies. ^{3-6,14-16} The most affected age group were those above 20 years old though some patients had no recorded age in their records.

The vast majority of the cases presented in period January to March and lower presentation was in April to June. This variation in the presentation was definitely different from one climate to another climate. Studies in some warmer countries like United States, Canada, Iran and South Africa showed peak incidence of acute appendicitis during the warmer periods.¹⁷ This was in contrast to our finding because the occurrence was low in period April/June and this period was considered as summer in our study area. The high incidence was observed in January/March and this time was part of winter.

The most presenting symptom in our patients was abdominal pain in the right lower quadrant region which was present in 93.9%. This finding was typical presentation when pain started as central or general abdominal pain and most of patients presented with pain

in this region by the time come to seek medical advice. This finding was similar to what was concluded by other studies.¹⁷ In our study nausea in (50%) and vomiting in (64.9%) this was lower compared to some studies, which reported presence of these in more than 80%. 15-18 Diarrhea and constipation were present in 8.8% and 9.6% respectively and this very close to some published literature and far less to what mentioned by Mallik (30.6%). This can be explained in the context that the population study of Mallik were pre-school children.¹⁸ Fever associated with acute appendicitis was general low grade unless there was complications like peritonitis and abscess. Fever in our participants was detected in 36.8%. This was in contrast to other studies in which fever was present in 64.1%. 18 Dysuria in our patients in just 0.9%, which was close to 2%, but was very low percent to other studies which gave a figure a bit higher 4% and 5.6%, respectively. 15,18,19 We cannot find an appropriate explanation for this difference.

Concerning the physical signs, tenderness in right iliac fossa was detected in 38.6% and this was consistent with that found by Victor 39%. Muscle guarding presented in only one patient in our group 0.9%. This can be explained by early presentation of our patients though we had no specific question about the exact time between the onset of the symptoms and hospital presentation. Muscle guarding was usually associated with late presentation and peritonitis. The preoperative images that used to confirmed the diagnosis included abdominal ultrasound which used in 84% of the patients. The ultrasound generally was used in females, children, elderly and when a complication was suspected. however, in 35-40% of

cases the clinical features of acute appendicitis were nonspecific and unclear also in this case ultrasound was used. ¹⁹ According to some studies, the clinical and laboratory findings alone were not enough to diagnose acute inflammation of the appendix and this may show why ultrasound was used in vast majority of this study. ²⁰ Here the modality was used more common in male than in female which was bit unusual.

The histopathological examination was performed in 57% of the removed appendix. The most common histological diagnosis was acute suppurative appendicitis with peri appendicitis followed with early acute appendicitis. This finding was reverse to one Saudi study which showed the early acute appendicitis the most common followed with acute suppurative.²³ The worm infestation was *Enterobius* vermicularis in two cases (1.8%). This was typical in some literature whereas the same study showed schistosomiasis the most common one followed by E. vermicularis. 23,24 This finding in the late study due to Egyptian patients in the above study and at the same time the region where our study done has no schistosomiasis. Egypt is well known of endemicity of schistosoma. Other studies showed E. vermicularis in 7% of the cases.²⁵ This high percentage may be attributed to pediatric population of the study. Normal appendix and cancer were not reported in our samples of the histology. We think this may be due to only more than half of the specimens were examined.

CONCLUSION

From this study we concluded that male are more affected with acute appendicitis. The most common season of acute appendicitis the winter. The most common presenting symptom was right lower quadrant pain. The vast majority of the cases were in the winter. Ultrasound has been used in the most cases particularly in male more than in females. The most common histological diagnosis was acute suppurative appendicitis. Open appendicectomy is the main operative management in our patients.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Brunicardi FC, Andersen DK, Billiar TR. The Appendix: acute appendicitis. Schwartz's Principles of Surgery. 10th ed. New York: McGraw-Hill Education; 2014: 1243-6.
- Medscape. Fact sheet: Appendicitis, 2018. Available at: https://emedicine.medscape.com/article/773895overview. Accessed on 13 August 2021.
- 3. Freud E, Pilpel D, Mares AJ. Acute appendicitis in childhood in the Negev region: some epidemiological observations over an 11-year period

- (1973-1983). J Pediatr Gastroenterol Nutr. 1988;7(5):680-4
- 4. Luckmann R, Davis P. The epidemiology of acute appendicitis in California: racial, gender, and seasonal variation. Epidemiology. 1991;2(50:323-30.
- 5. Noudeh YJ, Sadigh N, Ahmadnia AY. Epidemiologic features, seasonal variations and false positive rate of acute appendicitis in Shahr-e-Rey, Tehran. Int J Surg. 2007;5(2):95-8.
- 6. Ayoade BA, Olawoye OA, Salami BA, Banjo AA. Acute appendicitis in olabisi onabanjo university teaching hospital Sagamu, a 3-yer review. Niger J Clin Pract. 2006;9(1):52-64.
- 7. Ajao OG. Appendicitis in a tropical African population. J Natl Med Assoc. 1979;71(10):997-9.
- 8. Mungadi IA, Jabo JA, Agwu NP. A review of appendicitis in Sokoto, Northwestern Nigeria. Niger J Med. 2004;13:240-3.
- 9. Kumar V, Abbas AK, Aster JC, Cotran R. The gastrointestinal tract, small intestine and colon. Acute Appendicitis Pathologic Basis of Disease. 9th ed. Philadelphia: Elsevier; 2014: 816.
- Williams NS, Bulstrode CJK, O'Connell PR. The vermiform appendix. Acute Appendicitis. Bailey and Love's short practice of surgery. 26th ed. New York: CRC Press; 2013: 1200-3.
- 11. Oguntola S, Adeoti ML, Oyemolade TA. Appendicitis: trends in incidence, age, sex, and seasonal variations in South-Western Nigeria; Ann Afr Med. 2010;9(4):213-7.
- 12. Akbulut S, Caliskan A, Ekin A, Yagmur Y. Left-sided Acute appendicitis with situs inversus totalis: review of 63 published cases and report of two cases. J Gastrointest Surg. 2010;14(9):1422-8.
- 13. Otan E, Akbulut S, Kayaalp C. Amebic acute appendicitis: systematic review of 174 cases. World J Surg. 2013;37(9):2061-73.
- 14. Stein GY, Rath-Wolfson L, Zeidman A, Atar E, Marcus O, Joubran S, et al. Sex differences in the epidemiology, seasonal variation, and trends in the management of patients with acute appendicitis: Langenbecks Arch Surg. 2012;397(7):1087-92.
- 15. Kong VY, Bulajic B, Allorto NL, Handley J, Clarke DL. Acute appendicitis in a developing country. World J Surg. 2012;36(9):2068-73.
- 16. Harbrecht BG. Acute appendicitis-not just for the young. Am J Surg. 2011;202(3):286-90.
- 17. Anderson JEQ, Bickler SW, Chang DC. Examining a common disease with unknown etiology: trends in epidemiology and surgical management of appendicitis in California, 1995-2009. World J Surg. 2012;36(12):2787-94.
- 18. Mallick MS. Appendicitis in pre-school children: a continuing clinical challenge. A retrospective study. Int J Surg. 2008;6(5):371-3.
- 19. Ferrarese A, Falcone A, Solej M, Bono D, Moretto P, Dervishi N, et al. Surgeon's clinical evaluation and accuracy of ultrasound in the diagnosis of acute appendicitis: a comparison with intraoperative

- evaluation. Five years' experience. Int J Surg. 2016;33(1):45-50.
- Laméris W, Randen AV, Go PM, Bouma WH, Donkervoort SC, Bossuyt PMM, et al. Single and combined diagnostic value of clinical features and laboratory tests in acute appendicitis. Acad Emerg Med. 2009;16(9):835-42.
- 21. Cardall T, Glasser J, Guss DA. Clinical value of the total white blood cell count and temperature in the evaluation of patients with suspected appendicitis. Acad Emerg Med. 2004;11(10):1021-7.
- 22. Wagner JW, McKinney WP, Carpenter JL. Does this patient have appendicitis? JAMA. 1996:276(19):1589-94.
- 23. Khan GM, Grillo IA, Abu-Eshy SA, Khan AR. Pathology of the appendix. J Natl Med Assoc. 2000;92(11):533-5.

- 24. Altun E, Avci V, Azatçam M. Parasitic infestation in appendicitis. A retrospective analysis of 660 patients and brief literature review. Saudi Med J. 2017;38(3):314-8.
- 25. Fleming CA, Kearney DE, Moriarty A. An evaluation of the relationship between Enterobius vermicularis infestation and acute appendicitis in a paediatric population: a retrospective COHORT study. Int J Surg. 2015;18:154-8.

Cite this article as: Alzahrani SA, AlOmari TA, Shahwan WS, Alzahrani AA, Alghamdi OA, Elshambaty YB. Acute appendicitis: is it a seasonal disease? Int J Community Med Public Health 2021;8:5196-201.