

Seasonal Pattern of Acute Appendicitis in Basrah

Noori H. Jasim¹ Ahmed Z.K Alhussainy² Salah Kadim³

1.MBChB, F.I.C.M.S, PhD GI Surgery (United Kingdom), Consultant Surgeon and Assistant Professor,
Department of Surgery, College of Medicine, University of Basrah, Basrah General Hospital

2.MBChB, F.I.C.M.S, Specialist Surgeon and Lecturer, College of Nursing, University of Basrah, Basrah
General Hospital

3.MBChB, F.I.C.M.S, C.A.B.S Consultant Surgeon and Assistant Professor, College of pharmacy, University of
Basrah, Basrah General Hospital

Abstract

Background: appendicitis is the most common acute surgical condition of the abdomen. **Aim:** The aim of the project is to study the seasonal variation in the incidence of acute appendicitis in Basrah and its correlation to gender, age, presentation and length of hospital stay of affected patients. **Material and methods:** Patients with acute appendicitis who admitted to the surgical unit in Basrah General hospital during the period from January 2010 to December 2013 were prospectively evaluated according to the demographic features, particularly age and sex, length of hospital stay, seasonal variation and the postoperative outcome. **Results:** out of 1261 patients included in the study (57%) patients were males and (43%) of patient were females with age range from 3-70 years. All the patients treated surgically by open and laparoscopic means. 34 patients found to have perforated appendix, 25 patients presented with abdominal mass and 7 patients were presented with appendicular abscess. A significant seasonal effect was observed, with the rate of acute appendicitis being higher in the summer months. **Conclusion:** Appendicitis is more common in males, in those aged 10-19years, and during the summer months

Introduction

The most common emergent surgical operation in the world is appendectomy.¹ It is reported that about 7% of people in the world underwent appendectomy due to acute appendicitis during their life. The rate of appendectomy over the life for male patients is 12% and for female patients is 25%, during approximately a 10-year period from 1987 to 1997.^{2,3} It is observed that the rate of appendectomy for appendicitis has reported at 10 per 10,000 patients per year.^{2,3} It is observed that the second to the fourth decades are the most frequent ages of patients affected by appendicitis during their life reporting that 31.3 years as a mean age and 22 years as a median age.^{2,3,4}

Consistently, other report has observed that in infant, acute appendicitis is relatively rare, and becomes increasingly common in childhood and early adult life, reaching a peak incidence in the adolescents and early 20s. after middle age, the risk of developing appendicitis is quite small.⁵ It is shown that the male is slightly more affected than female (male: female ratio 1.2-1.3:1)^{5,2,3} showing that

there is approximately equal incidence of appendicitis among males and females before puberty.⁵

To the best of our knowledge and although acute appendicitis is a common surgical condition, we could not find any report studying the seasonal variation of acute appendicitis in Basrah city and generally, little is known about this point. Hence, this subject was studied in this project in one hand as well as gender and age variations in other hand and examining their influence or correlation to the complications of acute appendicitis and subsequently the length of hospital stay for patients underwent appendectomy.

Patients and Methods

This is a cross-section prospective study of patients who underwent appendectomy for acute appendicitis admitted to Basrah General Hospital, department of surgery from January 2010 to December 2013. The demographic features, length of hospital stay, seasonal variation and post-operative outcome were assessed in this study. population in current study were divided by sex and age into 7 groups (0–9, 10–19, 20–29, 30–39, 40–49, and ≥ 50 years).

In current study the diagnosis of acute appendicitis were established by history, examination and investigations in term of leukocyte count, urinalysis and ultrasound exam in many of these cases. All the normal appendices were excluded from the study.

In southern Iraq, the year is divided into two well-marked seasons with short transitional periods between the long hot rainless Summer (May to October) and comparatively short cool winter (December to February)⁶. SPSS version 16 was used for all the statistical assessments and analysis.

Results

One thousand two hundred and sixty one patients included in this study, the mean age of the patient is 21. age

range from 3-70years, 727 patients were males(57.7%) and 534 patients were females (42.3%) as in table 1. Table (1) population distribution according to different age groups

Age groups	Females no.(%)	Males no.(%)	Total no.(%)
0-9	42(3.33)	71(5.63)	113(8.96)
10-19	230(18.23)	270(21.4)	500(39.65)
20-29	141(11.18)	203(16)	344(27)
30-39	92(7.29)	116(9.19)	208(16.49)
40-49	19(1.5)	44(3.5)	63(5)
50+	10(0.8)	23(1.8)	33(2.61)
Total	534(42.3)	727(57.7)	1261(100)

Monthly and seasonal fluctuations of the incidence of acute appendicitis are shown in figure 1 and 2 respectively. It shows increase in incidence of acute appendicitis in May to October (Summer) in comparison to December to February (Winter)

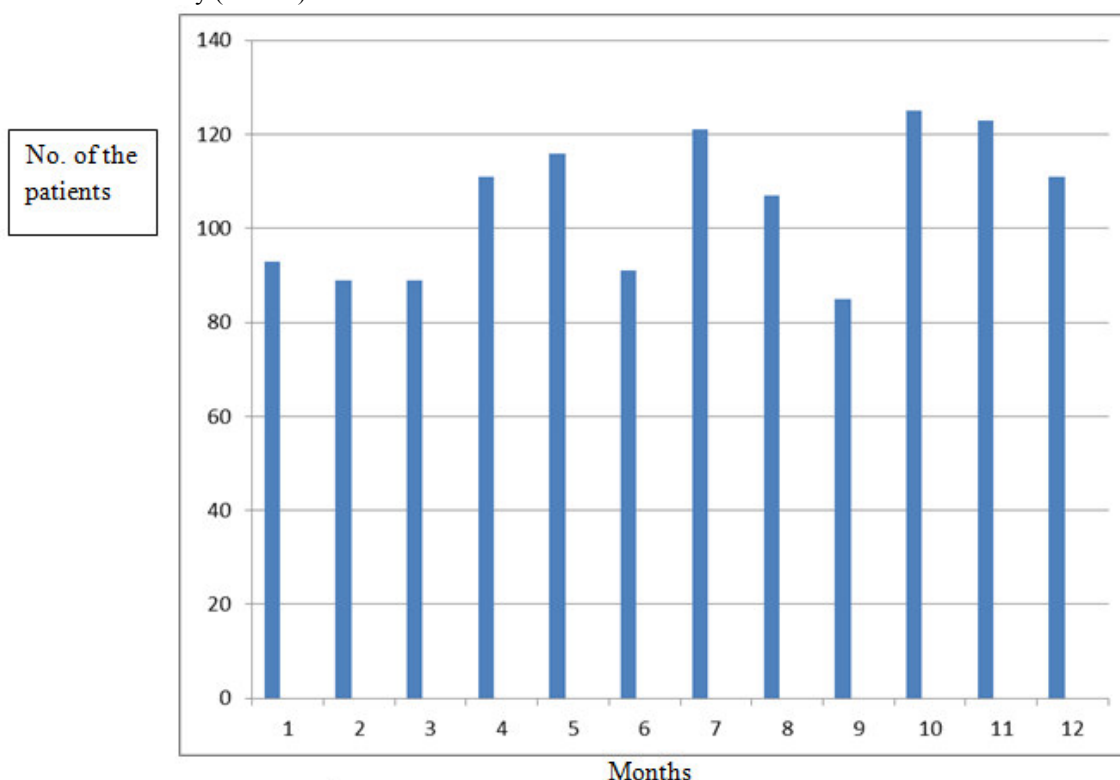
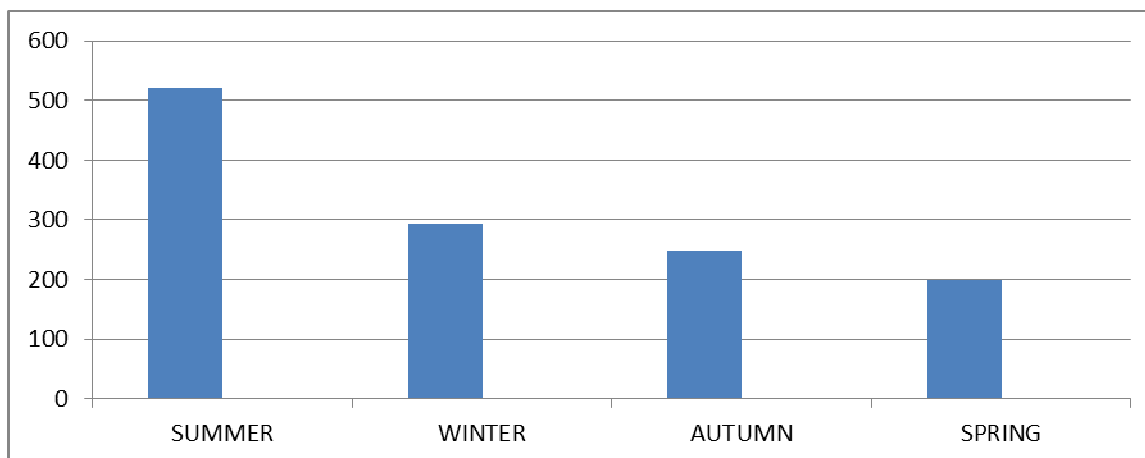


Figure (1) shows monthly distribution of the incidence of acute appendicitis. It shows increase in incidence of acute appendicitis in May to October (Summer) in comparison to December to February (Winter)

This study shows that 520 patients (41%) were presented in Summer in comparison to 293(23.2%) and 248(20%) in winter and autumn respectively. Whereas in short spring season only 200 patients (15.8%) were presented with acute appendicitis (Figure2). This shows that there was statistically significant seasonal variation in the incidence of acute appendicitis, which was evident and peaked in summer and dipped in spring (P value 0.01).



Figure(2) shows seasonal variation of the incidence of acute appendicitis. It shows increase in incidence of acute appendicitis in Summer in comparison to Winter.

Sixty six patients were presented with complicated appendicitis. Thirty four patients (3.4%) presented with perforated appendix, 25 (1.9%) patients presented with abdominal mass and 7 (0.05%) patients presented with appendicular abscess (Figure 3)

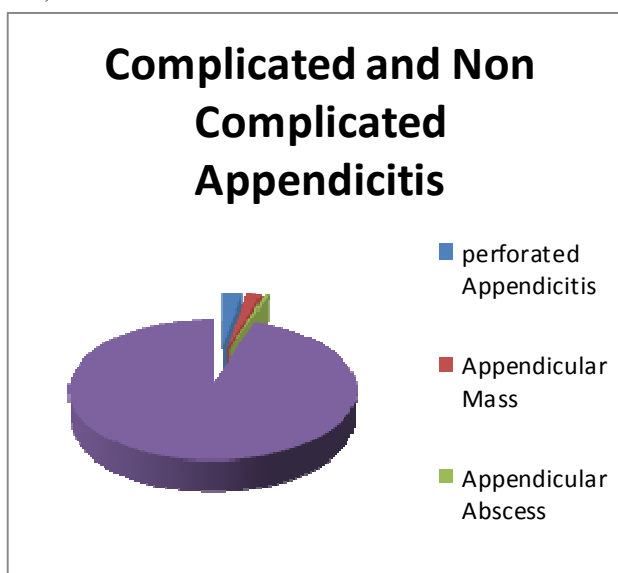


Figure (3) shows distribution of complicated and Non complicated appendicitis

The current study showed that complicated appendicitis in male (3.5%) more than the female (1.66%) as shown in table 2. This might be explained by more overall number of male 727(57.7%) with acute appendicitis in comparison to female patients 534(42.3%) and male to female ratio is 1.36:1.

Table (2) cases of acute appendicitis according to sex and complications.

Sex of patients	Overall	Non Complicated Acute Appendicitis	Complicated Acute Appendicitis
Female	534(42.3%)	513(40.6%)	21(1.66%)
Male	727(57.7%)	682(54%)	45(3.5%)
Total	1261(100%)	1195(94%)	66(5.23%)

The complications of acute appendicitis was observed mainly in patients in age group 40 and over (table3). Complicated appendicitis in current study was significantly correlated to age variation (P value 0.01).

Table(3) shows distribution of the complicated appendicitis according to the age groups

Age group(no)	Females No	Males no	Total no(%)
0-9(113)	1	3	4(3.53%)
10-19(500)	8	13	21(4.2%)
20-29(344)	4	12	16(4.6%)
30-39(208)	5	9	14(6.7%)
40-49(63)	2	5	7(11.1%)
50+(33)	1	3	4(12%)
Total(1261)	21	45	66(5.23%)

Complicated appendicitis in this study was significantly distributed over the different seasons of year and showed more complicated appendicitis in summer probably due to more overall cases of acute appendicitis (P value 0.02) as in table 4.

Table (4) shows distribution of complicated acute appendicitis over different seasons

Seasons	Non-Complicated Acute Appendicitis	Complicated Acute Appendicitis	Total
Summer	483	38(7.30%)	520
Winter	276	10(3.41%)	293
Autumn	241	9 (3.62%)	248
Spring	195	9(4.50%)	200
Total	1195	66(5.23%)	1261

It was found that the mean length of hospital stay for patients with acute appendicitis was 2 days and the mean length of hospital stay for patients with complicated acute appendicitis was 4 days. There was no difference in the length of hospital stay between males and females and between patients presented in summer and winter. But this parameter linked to whether the case associated with complications or not.

Discussion

In the current project the highest incidence of acute appendicitis was observed in the summer months and the lowest incidence in the spring months and this represents significant seasonal variation. This comes in accord with the results of other reports.⁷ In other report, a higher incidence of acute appendicitis has been observed in the summer months and a low incidence in the winter months.^{2,8}

In the current study, The highest incidence of acute appendicitis was observed in people aged 10-19 years, both males and females. This finding is consistent with the results of other reports.^{7,8,9,10,11,12} In all age groups, a higher incidence of appendicitis were observed in this study in male patients. Similar result was mentioned in the work of others.^{8,9}

The aetiology of differences in presentations of patients with acute appendicitis in terms of sex, age and seasonal variations are not clear. The higher incidence of acute appendicitis in the summer may be explained in a view of longer summer period in our region⁶. In addition, it is known that the growth of many microorganisms such as Salmonella species is much more in summer than other seasons like Winter. Hence, Summer is blamed to provide an approximately a favorable or even optimal conditions for culture media¹³.

In this study, the complications of acute appendicitis reported mainly in patients in age group 40 and over. This might be attributed to a delay in the presentation of those patients or the diagnosis was late. This is possibly due to the unnecessary usage of analgesia particularly for patients in such age groups. In other records they observe a high perforation rate in patients in the 0-9 year age group and those older than 50 years.⁹ In addition, in current study, Complicated appendicitis in current study was obviously correlated to gender variation possibly explained by more overall number of male with acute appendicitis in comparison to female patients but there was not correlated to seasonal variation. In addition, more complicated acute appendicitis in summer observed in this study could be attributed to more over all patients with acute appendicitis in this season.

The mean length of stay for patients underwent appendectomy comes in accord with results of other workers^{9,14}. It was observed that the difference in length of hospital stay strongly related to whether the case complicated or not complicated appendicitis and it is not linked to the seasonal, gender and age variations. This finding is agreed upon it in other reports.⁹

In summary, acute appendicitis is more common in males, in people aged 10-19 years, and during the summer months particularly in May. the complicated appendicitis mostly seen in older age groups and the mean length of hospital stay is more among patients with complicated appendicitis in comparison to the non-complicated appendicitis.

References

1. Liu CD, McFadden DW. Acute abdomenand appendix. In:Greenfield LJ, MulhollandMW, Zelenock GB,

- Oldham KT, Lillemo K, editors. *Surgery: scientific principles and practice*. 3rd ed. Philadelphia: Lippincott-Raven; 1997. p. 1246-61.
2. Addiss DG, Shaffer N, Fowler BS, et al: The epidemiology of appendicitis and appendectomy in the United States. *Am J Epidemiol* 132:910, 1990. [PMID: 2239906]
 3. Flum DR, Morris A, Koepsell T, et al: Has misdiagnosis of appendicitis decreased over time? A population-based analysis. *JAMA* 286:1748, 2001. [PMID: 11594900]
 4. Flum DR, Koepsell T: The clinical and economic correlates of misdiagnosed appendicitis: Nationwide analysis. *Arch Surg* 137:799, 2002. [PMID: 12093335]
 - 5- P. Ronaan O'Connell The vermiform appendix S. Williams, Christopher J.K. Bulstrode & P. Ronan O'Connell. *Bailey & Love Short Practice Of Surgery* 24 Edition. London, UK. Hodder Arnold, 2008 : 1187.
 - 6- Evan Quest. *Climate Of Iraq*. Evan Quest. *Flora Of Iraq* volume 1. Baghdad, Republic Of Iraq. Ministry Of Agriculture, 1960:18.
 - 7- Gallerani M, Boari B, Anania G, Cavallesco G, Manfredini R. Seasonal variation in onset of acute appendicitis. *Clin Ter*. 2006 Mar-Apr; 157(2):123-7.
 - 8- Luckmann R. Incidence and case fatality rates for acute appendicitis in California. A population-based study of the effects of age. *Am J Epidemiol* 1989; 129:905-18.
 - 9- Al-Omran M, Mamdani MM, McLeod RS. Epidemiologic features of acute appendicitis in Ontario, Canada. *Can J Surg* 2003; 46(4):263-8
 - 10- Luckmann R. Incidence and case fatality rates for acute appendicitis in California. A population-based study of the effects of age. *Am J Epidemiol* 1989; 129:905-18.
 - 11- Semm K: Endoscopic appendectomy. *Endoscopy*, 1983; 15:59. [PMID: 6221925]
 - 12- Luckmann R, Davis P. The epidemiology of acute appendicitis in California: racial, gender, and seasonal variation. *Epidemiology* 1991; 2:323-30.
 - 13- Vanpet W et al. A large increase of Salmonella infections in 2003 in the Netherlands: hot Summer or side effect of the Avian Influenza outbreak?. *Eurosurveillance*, 2004 July; 9(7): 473
 - 14- Daniel Dindo, Nicolas Demartines, and Pierre-Alain Clavien. Classification of Surgical Complications. *Ann Surg*. 2004 Aug; 240(2): 205-213.