



Study of the effect of age, gender and seasonal variation on appendicitis in Azizyah-Iraq

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Abstract

Appendicitis is the most common acute surgical condition of the abdomen. The rate of acute appendicitis varies among countries. Declining rates of acute appendicitis have been reported in the United States and Europe. However, the frequency appears to be increasing in the developing countries. Age, gender and seasonal variations of acute appendicitis have been observed in many studies, but the reasons for these variations are not clear. Although acute appendicitis is a common surgical condition, little is known about its epidemiology in Iraq. Statistical analysis was done for 400 patients diagnosed as cases of appendicitis during a two year period from January 2013 to December 2014, treated in Azizyah hospital. Data were analyzed for age, sex, and season (month of admission).

A total of 400 patients were diagnosed as cases of appendicitis. Appendicitis was more common in males (n=224, 56%) than females (n=176, 44%) with male to female ratio of 1.27:1, Highest rates of appendicitis was found in the age group of 10 to 19 years (n=158, 39.5%) and the lowest was 50 and more (n=11, 2.75%). Acute appendicitis high incident in November and December and lowest in June and July but it was high in March and April in teenage group.

In the current study clear differences in the frequencies of appendicitis were noted the appendicitis has clear seasonality with highest rates in winter and spring season. Appendicitis rates were found to be higher in male gender than female. The prevalence peaks in teen age group.

Introduction

Appendicitis is the most common acute surgical condition of the abdomen.¹ The rate of acute appendicitis varies among countries. Declining rates of acute appendicitis have been reported in the United States and Europe.²⁻⁴ However, the frequency appears to be increasing in the developing countries.^{5,6} Age, sex and seasonal variations of acute appendicitis have been observed in many studies, but the reasons for these variations are not clear. Although acute appendicitis is a common surgical condition, little is known about its epidemiology in Iraq. Therefore, this study was conducted to explore the demographic characteristics, incidence, seasonal variation and trends of acute appendicitis in Azizyah/Iraq between January 2013 and December 2014.

Despite the high prevalence of the disease, the uncertainty of just how many appendicitis patients will present to emergency clinics each day still remains an unpredictable situation for surgeons, with some days bringing a large number of cases, and others relatively few.

The epidemiological data on appendicitis is still scarce in the Iraq and Asian populations as most of the studies have been performed on western population.^{2,7-12}



Recently we have been impressed by the seasonality of acute appendicitis which led us to start this epidemiological study in Azizyah, Iraq . This study is aimed to investigate the changes in frequencies of appendicitis in different seasons, gender and age groups.

The lifetime risk for appendicitis is 7%; commonly occurring in adolescents and young adults.¹³ The rate of acute appendicitis varies among countries. In USA, from 1979 to 1984 the annual appendicitis incidence rate in different parts of the country varied from 94 to 154 per 100,000.¹⁴ Declining rates of acute appendicitis have been reported in the United States and Europe.¹⁵ In the UK, at North Tees Hospital, the incidence of acute appendicitis declined from about 100 to 52 per 100,000 population from 1975 to 1991.¹⁴ In developing countries, the incidence is increasing in most urban centers, probably due to adoption of western diet.¹⁶

Materials and Methods

Four hundred appendicitis patients were participate in the present study during a two year period from January 2013 to December 2014. Out of which 165 (41.25%) were found in 2013 and 224 (58.75%) in 2014 treated in Azizyah hospital which cover area include rural and urban, which content about 225,000 people in Azizyah, Tajdeen, Zubiadyah, Duboony and villages nearby. From the samples, 224 (56%) were men and 176 (44%) were women underwent surgery for suspected acute appendicitis. Data were analyzed for age, sex, and season (month of admission) Age-specific analysis was employed on six clinically relevant age groups: 0–9 years, 10–19 years, 20– 29 years, 30–39 years), 40-49 years and >or=50 years).

Statistical analysis:

Differences among groups in demographic variables were assessed by means of the t-test for continuous variables. The age, sex and population adjusted incidence rates of appendicitis for each month and year were calculated Ordinary least-square linear regression was used to examine changes in rates of appendicitis over time. SPSS version 19 was conducted to assess cyclical patterns in event occurrence on a monthly basis to identify the seasonal variation.

Results

Appendicitis was more common ($p < 0.05$) in males ($n = 224$, 56%) than females ($n = 176$, 44%) with male to female ratio of 1.27:1. The range of age of the patients included in the study was 5 to 63 years (mean=27.44 years). Highest rates of appendicitis was found in the age group of 10 to 19 years ($n = 158$, 39.5%) and the lowest was 50 and more ($n = 11$, 2.75%) Table 1, Figure 2

Table 1: Age groups and gender of appendicitis patients.

Age group (year)	Gender		
	Male	Female	Total
00 -09	13	8	21
10 -19	86	72	158
20 - 29	77	52	129
30 – 39	25	29	54
40 – 49	15	12	27
> 50	8	3	11
Total	224	176	400

In our study, Acute appendicitis high incident ($p < 0.05$) in November and December and lowest in June and July but it was high in march and April in teenage group. (Table 2 and Figure 1)

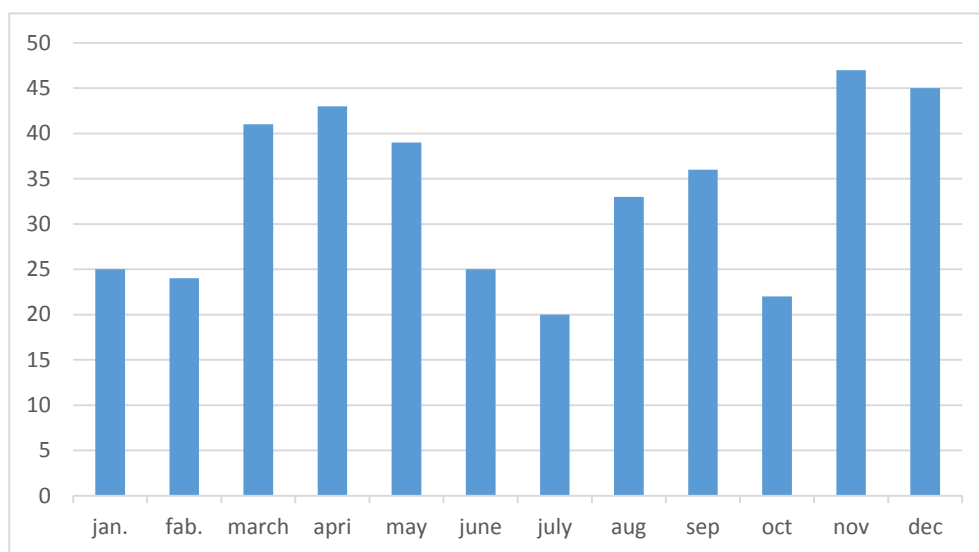


Figure 1: No. of appendicitis patients in different months



Table 2: Months with age groups of appendicitis patients.

Months	Age groups					
	0-9	10-19	20-29	30-39	40-49	>50
Jan.	0	13	6	3	2	1
Feb.	0	10	9	3	1	1
March	1	18	10	9	2	1
April	5	19	12	4	2	1
May	2	15	11	4	5	2
June	1	11	9	2	1	1
July	0	9	9	1	1	0
Aug.	2	12	12	4	3	0
Sep.	1	14	12	5	3	1
Oct.	0	8	5	6	2	1
Nov.	6	16	17	4	2	2
Dec.	3	13	17	9	3	0
Total	21	158	129	54	27	11

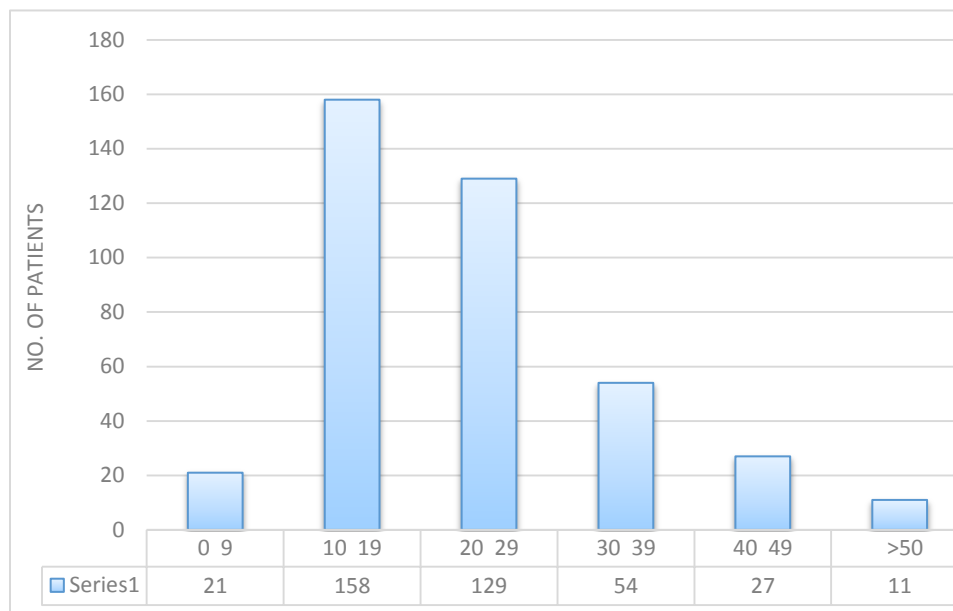


Figure 1: Number of appendicitis patients according to age (years).

Table 3: Number of patients in different months.

Month	No. of patients	Male	Female
Jan.	25	12	13
Feb.	24	13	11
March	41	17	24
April	43	23	20
May	39	24	15
June	25	10	15
July	20	11	9
Aug.	33	19	14
Sep.	36	27	9
Oct.	22	16	6
Nov.	47	23	24
Dec.	45	29	16
Total	400	224	176



Discussion

The appendix tissue possesses the features of a lymphoid organ and there is a larger amount of lymphoid tissue in young subjects. Lymphoid hyperplasia can be caused by any obstruction occurring in the lumen of the appendix and this can develop into appendicitis if the condition continues. Appendicitis is therefore seen more frequently in young people. As seen in our study, between 10 and 29 years was (n=287, 71.75%). These observations are supported by studies from different parts of the world. Some research observed similar results in Lahore, Pakistan with 65% patients falling in age group of 15 years to 30 years¹⁷. While others showed highest appendicitis incidence in males aged 20-29 years and females aged 10-19 years in their study from Tehran¹⁸. Supporting results were also reported from Canada⁷, Nigeria¹⁶, United States¹⁹, and Turkey²⁰.

In this study male to female ratio was 1.27:1 (56% males and 44% females) which is consistent with the findings in other studies.^{7, 11, 18, 21}

Acute appendicitis may more prevalence with change of temperature or humidity, in our study high in November and December (Winter) but it was also high in march and April (Spring) specially in teen age group, lowest in June and July (Summer) (Figure 1). The reasons for seasonal variations in the occurrence of acute appendicitis are not clear, but May due to variation in exposure to infectious agents owing to natural life cycle of agent or to the change in the opportunity for exposure, variation in diet and variant in exposure to allergens and other environment factors

Several studies have investigated acute appendicitis and seasonal variations in rates of occurrence.^{2, 11, 15, 18, 22-25} Most of those studies reported an increase during summer, but others was reported an increase during winter.²⁶

Conclusion

In the current study clear differences in the frequencies of appendicitis were noted The appendicitis has clear seasonality with highest rates in winter and spring season. Appendicitis rates were found to be higher in male gender than female. The prevalence peaks in teen age group. Further studies on the epidemiology and demographics can help to give more information about appendicitis and it's treatment.

Reference

1. Liu CD, McFadden DW. Acute abdomen and appendix. In: Greenfield LJ, Mulholland MW, Zelenock GB, Oldham KT, Lillemoe KD, editors. Surgery: scientific principles and practice. 3rd ed. Philadelphia: Lippincott-Raven; 1997:1246-61.
2. Addiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. Am J Epidemiol 1990;132:910-25.
3. Arnbjornsson E, Asp NG, Westin SI. Decreasing incidence of acute appendicitis, with special reference to the consumption of dietary fiber. Acta Chir Scand 1982; 148:461-4.
4. McCahy P. Continuing fall in the incidence of acute appendicitis. Ann R Coll Surg Engl 1994;76:282-3.
5. Osman AA. Epidemiological study of appendicitis in Khartoum. Int Surg 1974; 59:218-21.



6. Ofili OP. Implications of the rising incidence of appendicitis in Africans. *Cent Afr J Med* 1987;33:243-6.
7. Al-Omran M, Mamdani M, McLeod RS. Epidemiologic features of acute appendicitis in Ontario, Canada. *Can J Surg* 2003;46:263-8.
8. Andersson R, Hugander A, Thulin A, Nyström PO, Olaison G. Indications for operation in suspected appendicitis and incidence of perforation. *BMJ* 1994;308:107-10.
9. Blomqvist P, Ljung H, Nyrén O, Ekblom A. Appendectomy in Sweden 1989-1993 assessed by the Inpatient Registry. *J Clin Epidemiol* 1998;51:859-65.
10. Körner H, Söndén K, Söreide JA, Andersen E, Nysted A, Lende TH, *et al.* Incidence of acute nonperforated and perforated appendicitis: age-specific and sex-specific analysis. *World J Surg* 1997;21:313-7.
11. Luckmann R, Davis P. The epidemiology of acute appendicitis in California: racial, gender, and seasonal variation. *Epidemiology* 1991;2:323-30.
12. Sugimoto T, Edwards D. Incidence and costs of incidental appendectomy as a preventive measure. *Am J Public Health* 1987;77:471-5.
13. Turner JR. The Gastrointestinal tract, In: Kumar, Abbas, Fausto (eds). *Robins and Cotran Pathologic basis of disease*. 8th Ed. Saunders: Philadelphia; 2010: 870-1.
14. Walker AR, Segal I. Appendicitis: an African perspective. *J R Soc Med* 1995; 88:616-9.
15. Al-Omran M, Mamdani MM, McLeod RS. Epidemiologic features of acute appendicitis in Ontario, Canada. *Can J Surg* 2003;46:263-8.
16. Oguntola AS, Adeoti ML, Oyemolade TA. Appendicitis: Trends in incidence, age, sex, and seasonal variations in South-Western Nigeria. *Ann Afr Med* 2010;9:213-7.
17. Aslam MN, Kamran A, Gondal KM, Andrabi I, Mahmood T, Chaudhry AM. Appendectomy: A Contemporary Appraisal. *Ann King Edward Med Coll* 1999;5(2):184-7.
18. 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): 95-98
19. Livingston EH, Woodward WA, Sarosi GA, Haley RW. Disconnect Between Incidence of Nonperforated and Perforated Appendicitis Implications for Pathophysiology and Management. *Ann Surg* 2007;245: 886-892
20. Sulu B, Gunerhan Y, Palanci Y, Isler B, Caglayan K. Epidemiological and demographic features of appendicitis and influences of several environmental factors. *TJTES* 2010;16 (1):38-42
21. Korner H, Söndén K, Söreide JA, Incidence of Acute Nonperforated and Perforated Appendicitis: Age-specific and Sex-specific Analysis. *World J. Surg.* 21, 313-317, 1997.
22. Brumer M. Appendicitis. Seasonal incidence and postoperative wound infection. *Br J Surg* 1970;57:93-9.
23. Wolkowicz A, Kornak P, Elsakar M, McGovern P. Seasonal variation of acute appendicitis: a 56-year study. *South Med J* 1987;80:958-60.
24. Nabipour F. Histopathological feature of acute appendicitis in Kerman-Iran from 1997 to 2003. *Am J Environ Sci* 2005;1:130-2.
25. Gallerani M, Boari B, Anania G, Cavallero G, Manfredini R. Seasonal variation in onset of



acute appendicitis. Clin Ter. 2006;157:123-7.

26. Sulu B, Gunerhan Y, Palanci Y, Isler B, Çagalayan K. Epidemiological and demographic features of appendicitis and influences of several environmental factors. Ulus Travma Acil Cerrahi Derg 2010;16 (1):38-42.