

## PATTERN OF ACUTE APPENDICITIS IN BASRAH. IRAQ

### A retrospective study.

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#### Abstract

**Background:** Appendicitis is a common surgical emergency with a global incidence of approximately 233 per 100,000 population. The incidence is higher in males than in females, and it varies across seasons and countries.

This study aims to throw light on the pattern of appendicitis in Basrah. Iraq

**Methods:** This is a retrospective analysis of all available data in Basrah Teaching Hospital for the last 10 years covering the period from January 1999 to December 2008. The total number of hospital admissions for each year was obtained in addition to age, gender and month of admission for all the cases of appendicitis were recorded. Tables and figures were drawn and an analysis was done, using simple Chi square test, and P value as found appropriate.

**Results:** There were 5412 patient underwent Appendectomy with M: F ratio as 3.4: 1. The overall mean age was 24.3 years. The highest incidence was in April, May, June, and July with a peak level in December. Ramadan (the fasting month) showed a significant increase in incidence of appendicitis

**Conclusion:** There is an increase incidence of acute appendicitis over the years with more prevalence in males and more common in the second decade of life for both males and females, also the incidence was higher in summer months and in Ramadan.

**Keywords:** Epidemiology, appendicitis, Pattern

## Introduction

**A**cute appendicitis is one of the most common surgical disease in the world.<sup>1, 2, 3</sup> The incidence of acute appendicitis is around 233 per 100,000 population per year, and the lifetime prevalence risk ranging from 6.7 to 8.6%.<sup>4</sup>

Many authors reviewed the incidence of acute appendicitis across the world and noticed the variation in incidence in different countries in addition to the changes along the years, on the other hand there is shortage in data from Iraq.

After a raise incidence of appendicitis in western countries during the early 1900 s, there was a fall in the middle of the 20<sup>th</sup> century. In contrast to the raise of incidence in developing and new industrialized countries at the 21<sup>st</sup> century.<sup>5</sup>

There is insufficient data about the incidence of acute appendicitis in the Middle East or neighboring countries.

Appendicitis can lead to complications that may be dangerous, such as general peritonitis, abscess formation, or even death, in addition to the burden on the health resources.<sup>5</sup>

In this study, we report the incidence of patients diagnosed with appendicitis in the general population who were admitted to

Basrah Teaching Hospital from the beginning of 1999 to the end of 2022.

Recognizing the change in incidence of appendicitis in different countries is essential for arrangement of health care resources.

Our study check if there has been a change in the mean age of diagnosis, and whether gender and seasonal variation are correlated to the incidence of this disease in addition to the annual number of patients.

So this study can enrich and add data to the worldwide information about appendicitis.

## Patients and Methods

A review of the Medical records of all patients with diagnosis of acute appendicitis who underwent appendectomy in Basrah Teaching Hospital which provides its services to large and densely populated areas and with a capacity of 460 beds. The study covered the period from January 1999 to December 2008.

In the year 2020, the hospital was designated to treat patients with Covid 19 during the pandemic, and all other patients that were referred to other hospitals were not received or treated, so this year was excluded from the study.

We tried to identify the incidence rates during the month of Ramadan, albeit crudely and inaccurately, because the month of Ramadan is not fixed in the Georgian months, rather it is calculated in the Hijri year and ranges

between 29 and 30 days. A separate study could be devoted to this.

The age, gender and month of admission for all the cases of appendicitis were

recovered. The total number of hospital admissions for each year was obtained.

Tables and figures were drawn and an analysis was done, using simple Chi square test, and P value as found appropriate.

A chi square of. 05 is a conventionally accepted threshold of statistical significance; values of less than. 05 are commonly referred to as "statistically significant."

P-value of less than 0.05 was considered statistically significant. Also, Statistical Package for Social Science (SPSS) was used to analyze data.

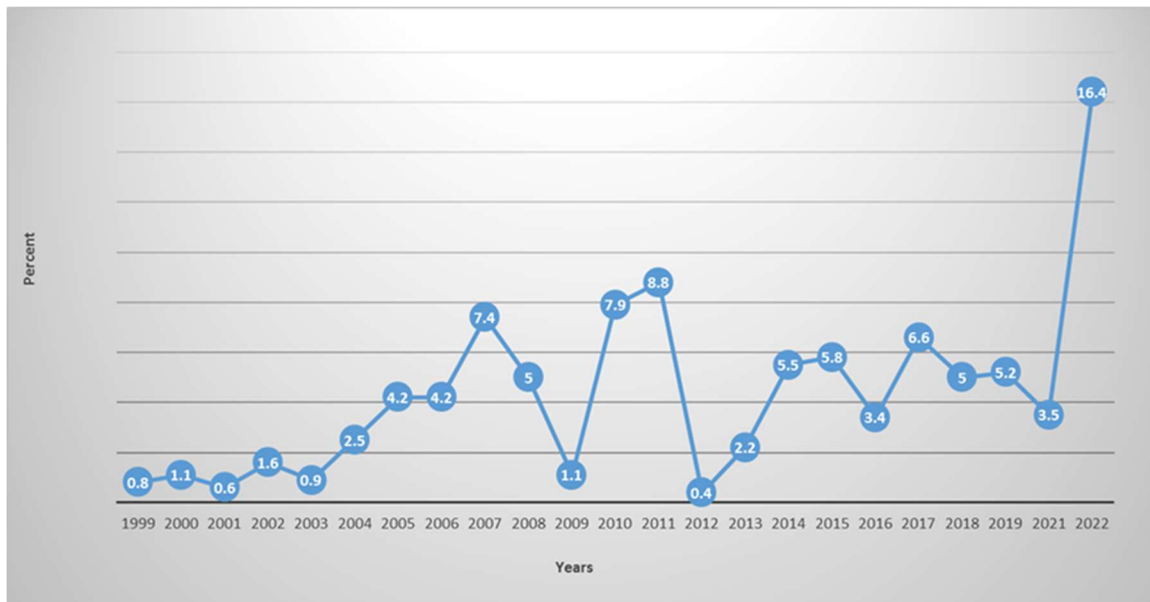
## Results

During the study period from January 1999 to December 2002(except 2020), there were 5412 patient underwent Appendectomy comprising of 4178 males and 1234 females. Males counted 77.2% with M: F ratio as 3.4: 1 (Table I)

**Table I Male and Female percent**

Sex	Frequency	Percentage
Female	4178	77.2
Male	1234	22.8
Total	5412	100

With regard to the annual percent rate, there is a gradual increase from 1999 to 2007, then the percentage declines in the years 2008 and 2009, and returns to an increase in 2010 and 2011, and declines in 2012, then gradually rises to reach a record level in 2022 ( [Figure 1](#) )



The overall mean age was 24.3 years, only 0.2% of patients were recorded at age older than 70 years and 3.6% of patients occurred at 10 year and younger. The maximum incidence in males (40.3%) and females (41.2%) occurred in age group between 11 and 20 year. Table II

**Table II: age distribution among patients**

		Sex		Total
		Male	Female	
Age group (Year)	Ten years or younger	106	90	196
		2.5%	7.3%	3.6%
	From 11 - 20 years	1684	509	2193
		40.3%	41.2%	40.5%
	From 21 - 30 years	1462	390	1852
		35.0%	31.6%	34.2%
	From 31 - 40 years	564	160	724
		13.5%	13.0%	13.4%
	From 41 - 50 years	243	64	307
	5.8%	5.2%	5.7%	
From 51 – 60 years	75	10	85	
	1.8%	0.8%	1.6%	
From 61 - 70 years	35	9	44	
	0.8%	0.7%	0.8%	
Seventy one years or older	9	2	11	
	0.2%	0.2%	0.2%	
Total		4178	1234	5412
		100.0%	100.0%	100.0%

During the first three months of the year (January, February and March), the infection rate was around 8.4% or a little more, then the percentage increased in the following four months (April, May, June, and July) to reach high levels between 9.2% and 10.6%, then It decreases in the months of August, September, October and November, to be between 4.9% to 6.6%, and we noticed a record and unexpected level in December reaching 11.3% (Table III)

**Table III incidence of Appendicitis according to the Months**

Month	Jan	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Frequency	452	482	452	573	543	540	500	357	358	279	267	609
percent	8.4	8.9	8.4	10.6	10	10	9.2	6.6	6.6	5.2	4.9	11.3

The incidence was estimated in the month of Ramadan and over the study years (Table IV)

**Table IV Incidence in Ramadan**

Sex * Ramadan		Ramadan		Total	P-value*
		Yes	No		
Sex	Male	377	3801	4178	0.0001
		88.1%	76.3%	77.2%	
Female	51	1183	1234		
	11.9%	23.7%	22.8%		
Total		428	4984	5412	
		100.0%	100.0%	100.0%	

## Discussion

Acute appendicitis is a global disease and represents a worldwide common concern.<sup>6,4</sup>

There is a clear and fundamental difference in the incidence of acute appendicitis in the world, according to the nature of climate, country, race, gender, age, seasons and during the month of Ramadan<sup>7,8,9</sup>

While the incidence has leveled off, starting in the late 20th century in North America and Europe, but since 2000 the incidence in Asia, South America, Africa and the Middle East is higher than in many Western countries and it can be said that the general picture of annual

incidence rates in these countries is increasing.<sup>4,6</sup>

The lack of studies on this subject in developing countries constitutes a shortage and a gap in the medical literature. Therefore, studying disease trends regionally and nationally is necessary and principle step for setting priorities in health research and can help decision makers use data to take the right steps, for appropriate prevention and treatment.<sup>10</sup>

In this study, we found an increase over the years, although not continuous, in the number of cases, and this is consistent with a number

of studies<sup>11, 12</sup> but there was a big jump in the year 2022.

This can be explained by several reasons, including the increase in population and the change in society, especially after 2003, when many fast restaurants were opened, different types of food were introduced, and pollution in general increased.<sup>13</sup>

A change in eating habits after the emergence of a large number of restaurants that serve fast food, where high-carbohydrate, low-fiber food is served with sweets or sugary drinks, which contribute to appendicitis as suggested by some authors.<sup>14, 15</sup>

In addition to the above, there is along and diverse list of causes and/or factors that may cause appendicitis including age, gender, season, respiratory infections, intestinal infections or infestations, tumors, smoking, alcohol consumption and ingested foreign bodies<sup>17, 16, 5, 17, 18, 19</sup>

The reason for the surge in incidence in the year 2022 may be due to the closure of the hospital a year earlier due to Covid-19 and the patients' fear of entering the hospital. Then, after the stability and improvement of general conditions, there was rebound in admission to the hospital.

The majority of studies announced that incidence of acute appendicitis in males is higher than in females<sup>20, 21, 22</sup> and our study

demonstrated a statistically significant difference that males by 77.2% outnumbered females with 27.8% which is in accordance with these studies. (Table II)

For the age group, the highest rates and for both gender, is between 11 and 20 years which is close to most studies.<sup>8, 23, 24</sup> (Table III)

The overall male to female ratio is 3.4:1, which approach the ratio ranged from 2.2:1 to 3.3:1 mentioned in a previous study<sup>25</sup>

We noticed a decrease in the incidence with aging, there are conflicting results in different studies but in general, age patterns change in different countries, and this requires further research.<sup>26</sup>(Table III)

Appendicitis appears in all months of the year, but the cases of appendicitis are more in some months than others, although this varies by region. Many authors noted an increase incidence in summer months.<sup>7, 27, 5, 28, 32, 30</sup>(Table IV)

Our study does not differ from this trend where we noticed that the number of patients reached a peak in the summer months from April to July but there was an unexpected and surprising sharp increase in December, the reason may be the large number of patients in 2022 where the number of patients reached 890 compared to the nearest number, 477 in

2011. In addition there are some studies where cases increase in the winter months.<sup>29</sup>

Wei et al<sup>31</sup>, noted a correlation between occurrence of appendicitis and the climatic factors such as temperature, humidity and duration of sunshine.

Other factors are suggested in different studies as air pollution which is more in summer months which results in release of cytokines as tumor necrosis factor which was detected in histological examination of acute appendicitis specimen<sup>29</sup>

Intestinal parasitic infestation and bacterial infection has been associated with development of appendicitis and it's known that during the summer months, intestinal parasitic infections increase, as well as bacterial infections, and this in turn helps in the high incidence of appendicitis.<sup>7, 29</sup>

However it's not known precisely why the number of patient increases in the summer months<sup>29</sup> and this topic needs in-depth research to find out the reason.

We tried to find out, at least in general and roughly, the incidence of appendicitis in the month of Ramadan and we notice a significant increase in cases which is contradicts other studies that showed no

change in the rate of incidence in Ramadan.<sup>9, 30</sup> (Table V)

We must admit that our interpretation may not be accurate because the months are not calculated in the Hijri calendar, so we need a dedicated study to draw accurate results.

#### Conclusion

In this study we tried to point out the trend of acute appendicitis in Basrah by gathering data from all available records, and unfortunately the oldest dated back to 1999.

After analyzing the epidemiological features of patients, we noticed an increase in patients over the years, acute appendicitis was more common in males and more common in the second decade of life for both males and females and in the summer months.

We need studies to answer the reason for the seasonal variation in incidence as well as to find out whether fasting in the month of Ramadan has any relationship or effect on appendicitis.

The limitations of our study are:

- The data were collected from one hospital, and to know the full picture, information must be taken from all Basrah hospitals
- We emphasize the importance of detailed medical documentation to enrich research and obtain better results.

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Concept and design: 1

Data collection and analysis: 1,2,3,4

Responsibility for statistical analysis: 1,2

Writing the article: 3,4,5,6

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**Availability of Data and Material:**

The corresponding author is prompt to supply datasets generated during and/or analyzed during the current study on wise request.

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