Original Article

# Parasitic Infection Associated with acute Appendicitis In Surgically removed Appendices

**Abdul-Razak Sh. Hassan*** **PhD**
**Ahmed J. Mohamed**** **MSc**
**Nadhim G. Numan*** **PhD**

*Fac Med Baghdad 2009; Vol.51, No.2*
*Received May, 2008*
*Accepted Sept., 2008*

**Summary:**

**Background:** To explore the parasitic infections associated with acute appendicitis in surgically removed appendices in Diyala province.

**Materials and Methods:** This study include 160 surgically removed appendices with acute appendicitis. The patients were 66 females and 94 males. The age range was 5-53 years with mean age 22.9 ± 7.2 years. The surgically removed appendicitis were submitted for gross inspection and microscopic examination including; direct mount, sedimentation and flotation techniques. Additionally specimens from 25 appendices were processed and examined histopathologically.

**Results:** The rate of parasitic infection in surgically removed appendices was 26.2%. The rate of single parasite infection was 23.1%, while the rate of two parasites was 3.1%. There were insignificant differences in the rate of infection regarding the sex and age of patients. Additionally, there were significant differences in the histopathological changes observed in appendices with parasitic infection compared to those without infection.

**Conclusion:** Parasitic infection may play a role in the development of acute appendicitis in patients with surgically removed appendices in Diyala province.

**Keywords:** parasitic infection, acute appendicitis, Diyala

## Introduction:

Appendicitis is an acute inflammation of vermiform appendix that may occur at any age but 70% of patients are 10-40 years old. Untreated appendicitis often progress to a rupture with a resulting high mortalities [1]. Some authors have reported sex differences in the younger patients less than 45 years, where it may be 13-14 times more common in males [2].

The relationship between protozoal infection and development of acute appendicitis varies among Iraqi provinces from 4.8% to 16.2% [3,4,5,6,7], as well as among countries [8,9,10]. Similarly, studies on the relation of *Enterobius vermicularis* infection and acute appendicitis varies between 0.2% and 41.8% globally [10,11,12].

Histopathological examination of appendicular specimens revealed mucosa erosions, necrosis of submucosa, inflammatory cell infiltration and the presence of E.histolytica trophozoites in the appendicular wall [8,16,17]

## Materials and Methods:

This study includes 160 surgically removed appendices with acute appendicitis, collected from Baquba General Hospital and other private hospitals. The patients were 66 (41.3%) females with an age range 7-45 years (mean 22.7 ± 5.6 years) and 94 (58.7%) males with an age range 5-53 years (mean 23 ± 8.4 years). The surgically removed appendicitis was collected in 50 milliliter bottles containing 20 milliliter normal saline solution. The appendices were promptly submitted for gross inspection and samples from its contents were examined microscopically including direct mount with normal saline solution and loguls iodine solution. The sedimentation and flotation techniques were done according to (Baker and Silverton, 1985) [13] using 33% zinc sulphate solution. Additionally specimens from 25 appendicular walls were processed and examined histopathologically.

## Results:

The results revealed that parasites found in 42 (26.2%) of the contents of the surgically removed appendices. The rate of infection by single parasite was 37 ( 23.1%), While the rate of two parasites was 5 ( 3.1%). The common parasitic infection includes infection by *E.histolytica* 16.2% , *E .coli* 3.7%, *G.lambellia* 2.5%, *E .vermicularis* 1.3%.

The *E. histolytica* trophozoites was found in 3 out of 25 (12%) appendicle contents, while the cysts was found in 13 (52%), and both of them were found in 9 (36%). The *E. coli* trophozoites and cyst was found in 2 specimens, while the other 4 specimens contain the cyst only. The *G. lambelia* trophozoites were found in 3 specimens and the cyst was found in one specimen. The *E. vermicularis* ova and the worm were found in both specimens.

*College of Medicine, Diyala University
**Dept.of Path. College of Vet. Medicine, Diyala University

**Table (1): parasites found in the contents of surgically removed appendices.**

| Type of parasite | No. of appendices infected | % |
|---|---|---|
| Infection by single parasite | 37 | 23.1 |
| E. histo lytica | 25 | 16.2 |
| E. coli | 6 | 3.7 |
| G. lambelia | 4 | 2.5 |
| E. vermicularis | 2 | 1.3 |
| Infection by two parasites | 5 | 3.1 |
| E. hisotolytica + E. coli | 2 | 1.3 |
| E. histolytica + G. lambelia | 2 | 1.3 |
| E. histolytica + E. vermicularis | 1 | 0.6 |

The distribution of parasitic infection according to sex revealed insignificant difference between female (22.7%) compared to male (28.7%), P > 0.05, table (2).

**Table (2): Parasitic infection according to sex.**

| Gender | No infected | Parasitic infection | | P value |
|---|---|---|---|---|
| | | Positive (%) | Negative (%) | |
| Female | 66 | 15 (22.7) | 51 (77.3) | > 0.05 [NS] |
| Male | 94 | 27 (28.7) | 67 (71.3) | |
| total | 160 | 42 (26.2) | 118 (73.7) | |

According to the age groups, The highest infection rate (29.2%) was found in the age group (30 years and more), followed by 27.5% in the age group (20-29 years), and the least infection rate (22.4%) was found in the age group (< 20 years). However, the was insignificant differences among these age groups, P > 0.05, table (3).

**Table (3): Parasitic infection rate according to age groups.**

| Age groups (ys) | No infected | Parasitic infection | | P value |
|---|---|---|---|---|
| | | Positive (%) | Negative (%) | |
| < 20 | 49 | 11 (22.4) | 38 (77.5) | > 0.05 [NS] |
| 20-29 | 87 | 24 (27.5) | 63 (72.4) | |
| 30 + | 24 | 7 (29.2) | 17 (70.8) | |
| Total | 160 | 42 (26.2) | 118 (73.7) | |

**Table 4**

| Pathological changes | Without parasitic infection (n=8) | | With parasitic infection (n=17) | | Total (n=25) | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Submucosal necrosis | 8 | 100 | 12 | 70.6 | 20 | 80 |
| Mucosal erosion | 0 | 0 | 11 | 64.7 | 11 | 44 |
| Fibroblastic proliferation | 0 | 0 | 10 | 58.8 | 10 | 40 |
| Inflammatory cell infiltration | 0 | 0 | 8 | 47.1 | 8 | 32 |
| Cavitation of LNs | 8 | 100 | 0 | 0 | 8 | 32 |
| Fibrosis | 8 | 100 | 0 | 0 | 8 | 32 |
| Degeneration | 0 | 0 | 6 | 35.3 | 6 | 24 |
| Liquefative necrosis | 0 | 0 | 4 | 23.5 | 4 | 16 |
| Submucosal edema | 0 | 0 | 3 | 17.6 | 3 | 12 |

The results of histopathological changes showed significant differences between appendices with parasitic infection compared to those without parasitic infection. These changes include mucosal erosion (P< 0.01), fibroblastic proliferation (P< 0.01), inflammatory cell infiltration (P< 0.01), cavitations of lymphatic nodules (P< 0.001) and fibrosis (P< 0.001), table (4).

**Discussion:**

The bind out-pouching nature of appendix and the fact that its lumen is open to the faeces and pathogenic organisms of the colon may contribute in the development of acute appendicitis.

The rate of overall parasitic infection detected in surgically removed appendices in patients with acute appendicitis in Diyala province was 26.1%, which is relatively higher than that found in other provinces; (4.8%) in Al-Musul Teaching Hospital (Majeed and Al-Bakri, 1984) [3], (13.6%) in Al-Musul province (Al-Dabbagh et al., 1994) [4], (6%) in Baghdad Teaching Hospital (Husain, 1995) [5], (4.8%) in Al-Basrah province (Mahdi et al., 1996) [6], and (16.2%) in Al-Najaf provine (Al-Shaddod, 2002) [7].These variation may be influenced by socio-economic status, the prevalence of parasitic infection among general population, sample size included and the sensitivity of detection methods.

Among the protozoal infection, the predominance of *E. histolytica* infection found in the present study was consistent with other studies; 0.1% (Majeed and Al-Bakri, 1984)[3]., 0.2% (Al-Dabbagh et al., 1994) (4) 0.7% (Husain, 1995) [5], 2.8% (Al-Shaddod, 2002) [7], 1% (McCarthy et al., 2002) [14], 0.8% (Ahmed et al., 1994) [8] and 4.8% (Dorfman et al., 2003) [10]. In spite of these variation that may be highly linked to the prevalence of amoebic dysentery in the community; however, these findings support the relationship between acute appendicitis and *E. histolytica* infection.

The detection of *E. vermicularis* worm and its eggs in the contents of surgically removed appendices was also reported by other studies. In Venezuela, *E. vermicularis* was found in 11.3% of specimens (Dorfman et al., 2003) [10], In USA, 3.8% (Arca etal., 2004) [12], in Iran, 0.7% (Sarmast et al.,2005) [15].

Although there is no significant difference concerning the relationship between the patient's age and the rate of parasitic infection, the highest infection rate was found among those 30 years and older. However, previous studies yielded discordant results [4,5,7]. Similarly, the patient's sex has insignificant effect on the infection rate as reported by other workers, probably because both sexes are equally exposed to parasitic infection [5,7].

Histopathologically, almost similar results were reported by previous studies, suggesting that parasitic infection may directly induce acute

appendicitis or indirectly through predisposing for bacterial infection. [8, 16, 17].

**References:**

1.VanRooyen, M.; Kirsch, T.; Clem, K.; Holliman, C.J. Gastrointestinal problems. In: Emerging Field Medicine. 1st. Ed. 2002, MaGraw Hill, 186-191.
2.Itskowitz, M.S. & Jones, S.M. ppendicitis. Emerg. Med..2004; 36(10): 10-15.
3.Majeed, A. & Al-Bakri, H. Acute appendicitis in Nineva province. J. Fac. Med. Baghdad, 1984; 26 (1): 71-76.
4.Al-Dabbagh, N.Y.; Al-Izzi, N.S. & Hayatte, Z.G. The role of Enterobius vermicularis in human appendicitis. J. Fac. Med. Baghdad, 1994; 36(3): 465-473.
5.Husain, M.HMicrobial causative agents of appendicitis. M. Sc. Thesis, College of Medicine., University of Baghdad,1995..
6.Mahdi, N.K.; Ahmed, A.H.A. & Al-Fadhil, A.H. Histopathological and parasitological study on appendicitis in Basrah, Iraq. Basrah J. Surg., 1996;2 (2): 42-45.
7.Al-Shaddod, H.A.S. Epidemiological study of parasitic causes of acute appendicitis in Al-Najaf province. M.Sc. thesis. College of Science, AL-Kufa University,2002.
8.Ahmed, R.; Shaikh, H.; Siddiqui, M. & Ahmed, M. Amoebic appendicitis: A rare entity. J. Pak. Med. Assoc., 1994; 44(12): 299-300. (Medline Abst.).
9.Muthuphei, M.N. & Morwamoche, P. The surgical pathology of the appendix in South African blacks. Cent. Afr. J. Med., 1998; 44(1): 9-11.
10.Dorfman, S.; Cardozo, J.; Dorfman, D. & Del Villar, A. The role of parasites in acute appendicitis of pediatric patients. Invest. Clin.,2003; 44 (4): 337-340.
11.Chernysheva, E.S.; Ermakova, G.V. & Berezina, E.Iu. The role of helminthiasis in the etiology of acute appendicitis. Khirurg. (Mosk.),2001; 10: 30-32.
12.Arca, M.J.; Gates, R.L.; Groner, J.I.; Hammond, S. & Caniano, D.A. Clinical manifestations of appendiceal pinworms in children: An institutional experience and a review of the literature. Pediater. Surg. Int., 2004;20(5): 372-375.
13.Baker, F.J. & Silverton, R.E. Introduction to medical laboratory technology, 6th edn. 1985, Butterworths, London: p 408 .
14.McCarthy, J.S.; Peacock, D.; Trown, K.P.; Bade, P.; Petri, W.A. Jr., & Currie, B.J. Endemic invasive amoebiasis in northern Australia. Med. J. Austral., 2002;177(10): 570-573.
15.Sarmast, M.H.; Maraghi, S.; Elahi, A. & Mostofi, N.EAppendicitis and Enerobius vermicularis. Pak. J. Med. Sci.,2005; 21(2): 202-205.
16.Ramdial, P.K.; Madiba, T.E.; Kharwa, S.; Clarke, B. & Zulu, B. Isolated amoebic appendicitis. Virchows Arch.,2002; 441(1): 63-68.
17.Zardawi, I.M.; Kattampallil, J.S. & Rode, J.W. Amoebic appendicitis. Med. J. Austral.,2003; 178 (10): 523-524.