



## ORIGINAL ARTICLE

### Institutional and population based analyses on misdiagnosis of appendicitis in Khulna, Bangladesh

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#### Abstract

The aim of the present study was to identify factors associated with misdiagnosis of appendicitis to propose solutions to decrease the misdiagnosis rate of appendicitis. The study conducted an institutional and a population based analyses on misdiagnosis of appendicitis conducted in Khulna district, Bangladesh. The study dealt with 2 groups of patients. Group 1 consisted of the patients treated in Gazi Medical College Hospital (GMCH), Khulna either in out-patient department (OPD) within the last 3 years (from 2014 to 2016), treating doctors suggested appendicectomy and in indoor-patient department (IPD) within the last 5 years (from 2012 to 2016), the diagnosis was done either during operation or admitted as postoperative complications. Patients for Group 2 were selected purposively from the patients who were from different villages of Rupsha and Fakirhat Upazila or from Khulna city previously underwent appendicectomy within the last 5 years (from 2012 to 2016) in different hospitals other than GMCH, Khulna and previous symptoms were still existed. The study revealed that the majority of the patients were female (OPD 81.5%, IPD 68.8% in Group 1 and 83.2% in Group 2). The misdiagnosis rate of appendicitis for the patients attended GMCH OPD and GMCH IPD was 23.0% and 8.9%, respectively. The overall misdiagnosis rate of appendicitis for the patients attended GMCH was 14.0%. In case of the patients attended GMCH OPD, most of them had UTI and chronic cystitis (45.5%). In case of the patients attended GMCH IPD, most of them had non-inflamed appendix (84.4%). The misdiagnosis rate of appendicitis for the patients in Group 2 was 23.2%. Some factors were identified and bearing in mind the factors, all the concerned should be more careful and conscious while making the diagnosis of appendicitis to avoid misdiagnosis and patients' suffering.

**Key words:** Misdiagnosis, appendicitis, factors, institutional and population based analyses.

#### Introduction

Appendicitis is the inflammation of the vermiform appendix, usually which requires its surgical removal (appendicectomy/ appendectomy) for the treatment of the disease due to its life threatening complications. Appendicitis may present many vague symptoms including abdominal pain (beginning

near the belly bottom and spreading to the lower right abdomen), anorexia, nausea, vomiting, constipation, diarrhea, inability to pass gas, abdominal swelling, fever, downward pull like a need for bowel movement, etc.

Appendicitis is the most frequent acute abdomen disease with the lifetime incidence

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of approximately 7%.<sup>1</sup> Appendectomy may be performed as an open (laparotomy) operation or laparoscopically (minimally invasive surgery) and it is the most frequently performed surgical procedure. The adverse outcomes of presumed appendicitis are: perforation, often occurring in the prehospital setting, and misdiagnosis, resulting in removal of a normal appendix. Though the mortality rate is 2 to 4% till now due to this disease and its complications, the rate of misdiagnosis in patients may be upto 40%.<sup>2-7</sup> Despite technologic advances, the diagnosis of appendicitis is still based primarily on the patient's history and the physical examination.<sup>8</sup> This relatively high rate of unnecessary appendectomy is being challenged while there is dramatic expansion of diagnostic testing options for appendicitis during the last decade. Many investigators have demonstrated that in research environments, advanced diagnostic testing using computed tomography (CT), ultrasonography (USG), and laparoscopy decreases the frequency of misdiagnosis.<sup>9-14</sup> However, some other investigators contrary to expectation have reported that the frequency of misdiagnosis leading to unnecessary appendectomy has not changed with the introduction of CT, USG, and laparoscopy, nor has the frequency of perforation decreased.<sup>15,16</sup> They also have suggested that on a population level, diagnosis of appendicitis has not improved with the availability of advanced diagnostic testing.

In the context of our country, the factors leading to misdiagnosis are less understood. Therefore, the aim of our study was to identify factors associated with misdiagnosis of appendicitis to propose solutions to decrease the misdiagnosis rate of appendicitis.

### Materials and Method

An institutional and a population based analyses on misdiagnosis of appendicitis was conducted in Khulna district, Bangladesh.

There were two groups of patients in this study. Group 1 consisted of the patients treated in Gazi Medical College Hospital (GMCH), Khulna either in out-patient depart-

ment (OPD) within the last 3 years (from 2014 to 2016), treating doctors suggested appendectomy and in indoor-patient department (IPD) within the last 5 years (from 2012 to 2016), the diagnosis was done either during operation or admitted as post-operative complications. Patients for Group 2 were selected purposively from the patients who were from different villages of Rupsha and Fakirhat Upazila or from Khulna city previously underwent appendectomy within the last 5 years (from 2012 to 2016) in different hospitals other than GMCH, Khulna and previous symptoms were still existed.

Data were collected, compiled and entered in spreadsheet (Microsoft Excel) and analyzed using appropriate statistical tools. Results were reported as percentage (%).

### Results

The number of patients (Group 1) attended GMCH, Khulna, OPD within the last 3 years (from 2014 to 2016) and IPD within the last 5 years (from 2012 to 2016) was 621 and 1081, respectfully. The number of patients (Group 2) attended elsewhere other than GMCH, Khulna, previously underwent appendectomy within the last 5 years (from 2012 to 2016) but previous symptoms were still existed was 656 (Rupsha- 296, Fakirhat- 328 and others- 32).

Table 1 shows the gender distribution of the patients in Group 1 and Group 2. Majority of the patients were female (OPD 81.5%, IPD 68.8% in Group 1 and 83.2% in Group 2).

Table 2 shows the distribution of the patients in Group 1 with diagnosis of appendicitis. The misdiagnosis rate of appendicitis for the patients attended GMCH OPD and GMCH IPD was 23.0% and 8.9%, respectfully. The overall misdiagnosis rate of appendicitis for the patients attended GMCH was 14.0%.

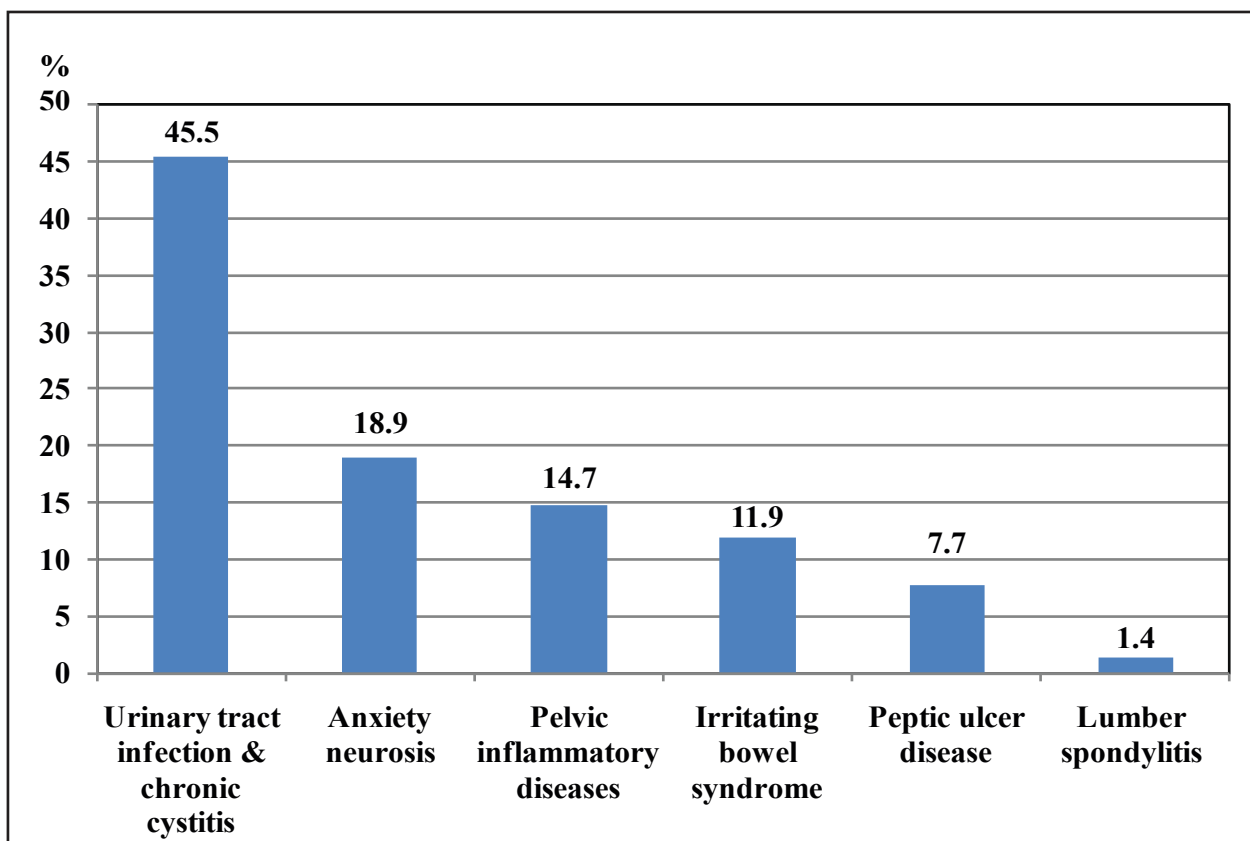
Fig. 1 presents the updated disease profiles of the patients misdiagnosed for appendicitis in Group 1 who attended GMCH OPD. The most of the patients had UTI and chronic cystitis (45.5%). Fig. 2 shows the updated disease profiles of the patients misdiagnosed

**Table 1. Gender distribution of the patients in Group 1 and Group 2**

	Patients attended in Gazi Medical College Hospital (Group 1)						Patients attended elsewhere (Group 2)	
	OPD patients		IPD patients		Total patients		n	%
	n	%	n	%	n	%		
Male	115	18.5	337	31.2	452	26.6	110	16.8
Female	506	81.5	744	68.8	1250	73.4	546	83.2
Total	621	100.0	1081	100.0	1702	100.0	656	100.0

**Table 2. Distribution of the patients in Group 1 with diagnosis of appendicitis**

	OPD patients		IPD patients		Total patients	
	n	%	n	%	n	%
With correct diagnosis	478	77.0	985	91.1	1463	86.0
With misdiagnosis	143	23.0	96	8.9	239	14.0
Total	621	100.0	1081	100.0	1702	100.0



**Fig. 1. Updated disease profiles of the patients misdiagnosed for appendicitis in Group 1, attended OPD.**

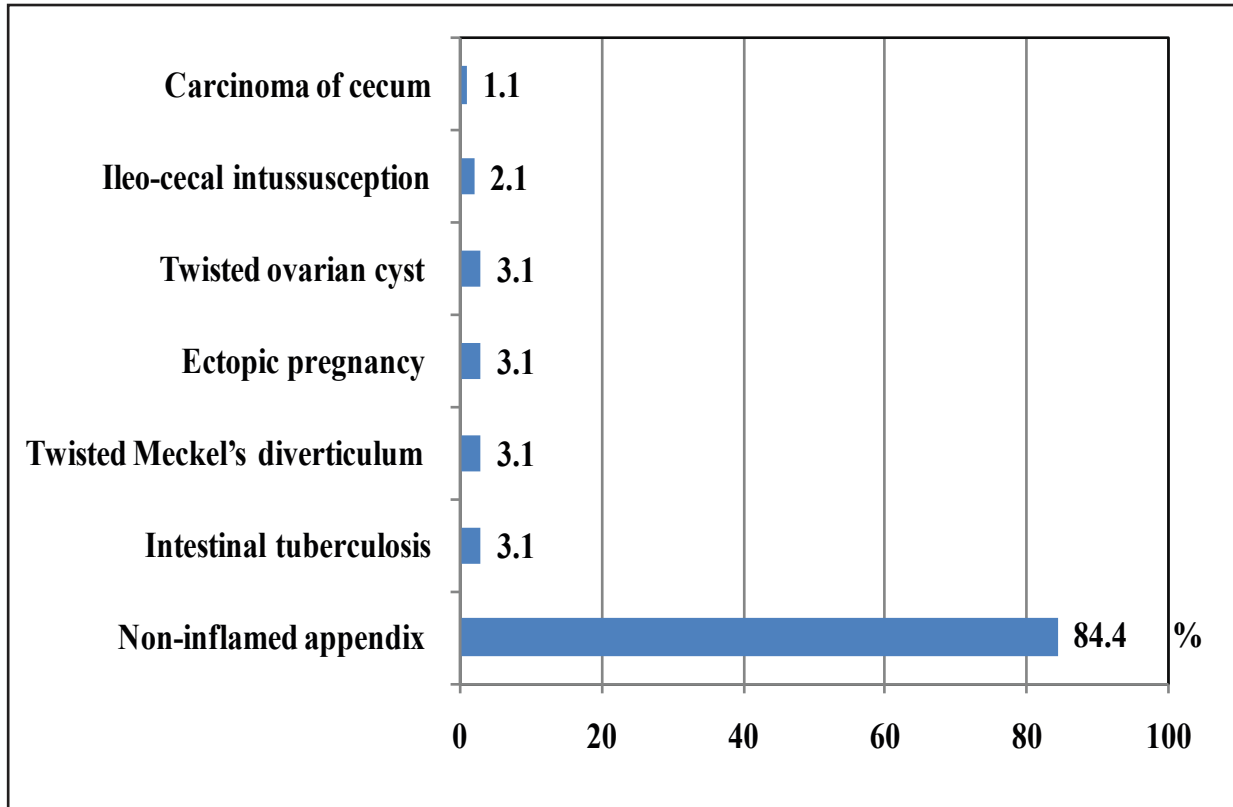


Fig. 2. Updated disease profiles of the patients misdiagnosed for appendicitis in Group 1, attended IPD.

Table 3. Distribution of the patients in Group 2 with diagnosis of appendicitis

	Patients in Group 2	
	n	%
With correct diagnosis	503	76.7
With misdiagnosis	153	23.3
Total	656	100.0

for appendicitis in Group 1 who attended IPD. The most of the patients had non-inflamed appendix (84.4%).

Table 3 presents the distribution of the patients in Group 2 with diagnosis of appendicitis. The misdiagnosis rate of appendicitis for the patients in Group 2 was 23.2%.

### Discussion

The present study of institutional and population based analyses on misdiagnosis

of appendicitis conducted in Khulna district, Bangladesh revealed that the majority of the patients were female (OPD 81.5%, IPD 68.8% in Group 1 and 83.2% in Group 2). The misdiagnosis rate of appendicitis for the patients attended GMCH OPD and GMCH IPD was 23.0% and 8.9%, respectively. The overall misdiagnosis rate of appendicitis for the patients attended GMCH was 14.0%. The misdiagnosis rate of appendicitis for the patients in Group 2 was 23.2%. A male preponderance exists, with a male to female ratio of 1.1 to 3:1; the overall lifetime risk is 9% for males and 6% for females. A difference in diagnostic error rate ranges from 12% to 23% for men and 24% to 42% for women.<sup>17-20</sup> Difficulties of diagnosis of atypical cases result from variation of the anatomical position of the appendix, appendicitis occurring at extremes of age and in females during child bearing age.<sup>21</sup>

In case of the patients attended GMCH OPD, most of them had UTI and chronic cystitis (45.5%). In case of the patients attended

GMCH IPD, most of them had non-inflamed appendix (84.4%). The clinical diagnosis of acute appendicitis relies upon a detailed history and thorough physical examination and the differential diagnosis is that of the acute abdomen as it can mimic the presentation of most abdominal emergencies.<sup>22</sup> Considering differential diagnosis, both obstetrical and gynecological conditions can present with abdominal pain and mimic appendicitis. Non-obstetrical/ non-gynecological conditions include gastroenteritis, urinary tract infections, pyelonephritis, cholecystitis, cholelithiasis, pancreatitis, nephrolithiasis, hernia, bowel obstruction, carcinoma of the large bowel, mesenteric adenitis, and rectus hematoma, pulmonary embolism, right-lower-lobe pneumonia, and sickle cell disease. Gynecologic and obstetric conditions include ovarian cyst, adnexal torsion, salpingitis, abruptio placenta, chorioamnionitis, degenerative fibroid, ectopic pregnancy, preeclampsia, round ligament syndrome, and preterm labour.<sup>23,24</sup>

Among the causes which leads doctors to misdiagnosis may be a) low socioeconomic status of the patients, b) poor investigation facilities, c) expensive investigation facilities, d) misinformation to the patients and their attendants, e) malpractice by doctors, etc. No single evaluation can substitute for the diagnostic accuracy of the experienced physician. The decision to obtain USG or CT scan studies depends on institutional preference and the available user expertise, although patient age, sex, and body habitus are important influencing factors. Physicians have a duty to use the requisite care and skills of a competent physician who practices in the same medical community; in other words, they are held to a certain minimum standard of care in performing the procedure. Their staff is also held to similar standards, and a physician along with nurses and anyone else involved in a medical procedure or in the care of a patient can be held liable in a medical malpractice action. Hospitals can also be held responsible if they hired the surgeon and staff that committed a preventable medical error. Therefore, bearing in mind the

factors, all the concerned should be more careful and conscious while making the diagnosis of appendicitis to avoid misdiagnosis and patients' suffering.

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