

PREVALENCE AND OUTCOME OF PERFORATED APPENDIX AMONG CASES  
OF OPERATED APPENDICITIS AT JUSH, FROM 2012-2015.

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JIMMA, ETHIOPIA

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**Summery**

**Background:** Appendicitis is recognized worldwide as the commonest surgical emergency and appendectomy is the commonest emergency surgical procedure. Its management becomes more challenging when the patient presents with perforated appendicitis. The difficulty in distinguishing appendicitis from other common causes of abdominal pain and the increase in morbidity and mortality accompanying perforated appendix makes it an important concern for physicians.

Unrecognized perforated appendix leading to life threatening condition is common in developing countries, especially in Sub-saharan countries including Ethiopia. The burden of appendicitis in Ethiopia is not clearly known but some hospital studies have shown that it is an important cause of morbidity and mortality.

**Objective:** purpose of this study is to assess the prevalence and outcome of perforated appendix operated in J USH.

**Method:** Retrospective record review from OR log-books, admission records and cards of subjects who underwent operation and intra-operatively found to have perforated appendix in J USH between September 1/2013 to September 1/2015 was done. Three data collectors were recruited, trained and participated in the data collection. The data were entered and analyzed using SPSS version 20- computer software. Descriptive statistics like frequency, measures of central tendency were computed and presented using tables.

**Results:** Records of 184 patients were available and included in the study. In this study Male constituted the majority 130(70.7%) and female 54(29.3). Out of 54 females 5 of them were pregnant and 49 were not. The age ranges from 5-76 years with mean age of 26.40 years. Most of the cases were from rural 128(69.6%) than urban 56(30.4%). According to this study, there are several variables that are predictive of poor outcome in patients with appendicitis. Late presentation, extremis of ages, pre operative treatment with antibiotics due to wrong diagnosis, presentation with generalized peritonitis and presence of co morbid condition like type two DM and HIV/ AIDS are the most predictive of death.

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## **Acronyms & Abbreviations**

JUSH- Jimma university specialized Hospital

SSI- Surgical site infection

CBC- complete Blood Count

U/A – urine analysis

## Chapter one: Introduction

### 1.1. Background:

Appendicitis is defined as the inflammation of appendix. There is no unifying hypothesis regarding the etiology of acute appendicitis. But the Obstruction of the appendiceal lumen with faecolith , stricture , tumour ,Intestinal parasites ,Lymphoid hyperplasia , etc. seems to be essential for bacterial overgrowth in the lumen and the development of appendiceal gangrene and perforation. While appendicitis is clearly associated with bacterial proliferation within the appendix, no single organism is responsible. A polymicrobial infection with mixed growth of aerobic and anaerobic organisms is usual (1).

Appendicitis is relatively rare in infants, and becomes increasingly common in childhood and early adult life, reaching a peak incidence in the teens and early 20s. After middle age, the risk of developing appendicitis is quite small. The incidence of appendicitis is equal among males and females (1,2,3).

The classical features of acute appendicitis begin with poorly localized colicky abdominal pain. The pain is frequently first noticed in the peri-umbilical region. Central abdominal pain is associated with anorexia, nausea and usually one or two episodes of vomiting that follow the onset of pain. Anorexia is a useful and constant clinical feature, particularly in children. With progressive inflammation of the appendix, the parietal peritoneum in the right iliac fossa becomes irritated, producing more intense, constant and localised somatic pain that begins to predominate. Patients often report



this as an abdominal pain that has shifted and changed in character. Typically, coughing or sudden movement exacerbates the right iliac fossa pain. The cardinal signs are those of an unwell patient with low-grade fever, localized abdominal tenderness, muscle guarding and rebound tenderness. Also palpable mass and tenderness all over the abdomen in cases of complicated appendicitis with appendiceal mass and generalized peritonitis respectively (1,2,4-7).

The diagnosis of appendicitis rests more on thorough clinical examination than on any aspect of investigation. Investigations like CBC ,U/A, ultrasonography, computed tomography (CT), etc. are commonly done to support the diagnosis and/or exclude it. Despite the increased use of ultrasonography, computed tomography (CT), and laparoscopy, the rate of misdiagnosis of appendicitis has remained constant (15.3%), as has the rate of appendiceal rupture(2,4,5.)

Once appendicitis is diagnosed ,surgical treatment is indicated which is surgical removal of the inflamed appendix called appendectomy. Appendectomy for appendicitis is the most commonly performed emergency operation in the world. But some episodes of acute appendicitis apparently subside spontaneously or with antibiotics . The reported associated mortality rate of appendicitis is at least 67% without surgical therapy. Currently, the mortality rate for acute appendicitis with prompt surgical intervention is less than 1% . So the natural history of acute appendicitis without surgical intervention is: resolution in some patients but in others formation of appendiceal mass, perforation with localized abscess or perforation with generalized peritonitis(1,2).

## 1.2. Statement of the problem :

Appendicitis is one of the leading cause of acute abdomen in all age groups including childhood and appendectomy for appendicitis is the most commonly performed emergency operation in the world(2).

Despite a high prevalence of acute appendicitis as well as perforated appendix reported in several African countries, very few or no research is done about the prevalence and outcome of perforated appendix in the Eastern African country including Ethiopia(6-9) .

If the inflamed appendix is not attended to urgently, it will proceed to gangrene and perforation, and result in peritonitis or abscess formation.

While acute appendicitis is primarily a disease of the younger population, with only 5–10% of cases occurring in elderly persons, the incidence of appendicitis in older patients seems to be increasing with an increase in life expectancy.

Morbidity and mortality rates are greater in older patients who often have delayed and atypical presentations, leading to increased frequency of perforation and intra-abdominal infection (3,4). Factors that increase appendiceal perforation include: extremes of age, late presentation, immunosuppression, diabetes mellitus, faecolith obstruction of the appendix lumen, a free-lying pelvic appendix and previous abdominal surgery that limits the ability of the greater omentum to wall off the spread of peritoneal contamination (1,2,8-10).

Like many resource-poor settings, acutely ill patients in Ethiopia often present late in the disease process and there is frequently limited time for diagnostic studies and lack

of well trained man power prior to definitive therapy.

Particular to appendicitis, there is a knowledge gap regarding level of late presentation and the effect of late presentation on the prognosis of the diseases in low income setting (6, 7, 8 ).

Therefore, the goals of this study is to better elucidate the prevalence and outcome of perforated appendix at J imma University Specialized hospital, J imma , Ethiopia.

### **1.3. Significance of the study**

The result of study will help;

Policy makers to gain insight on the role of health education for improvement of early presentation of patients to hospital when they got serious abdominal illness.

Surgical teams and other health workers a better understanding on the prevalence and outcome of perforated appendix.

The result of this study will help healthcare providers to give more emphasis for patients who have factors that could worsen the outcome of perforated appendix.

The outcome of the study will also use as baseline for other researchers.

## **Chapter Two – Literature Review**

Appendicitis -defined as the inflammation of appendix due to different causes of luminal obstruction and secondarily bacterial proliferation is the leading cause of acute abdomen in all age groups and appendectomy for appendicitis is the most commonly performed emergency operation in the world (1,2). The lifetime rate of appendectomy is 12% for men and 25% for women, with approximately 7% of all people undergoing appendectomy for acute appendicitis during their lifetime (1).

Even though the peak incidence of acute appendicitis is in the teens and early 20s, cases of complicated appendicitis like perforated appendix are becoming more common than before in both extremes of ages.

Appendicitis in the elderly is becoming an increasingly frequent clinical encounter due to the increased life expectancy in the human race over the last half-century. Appendicitis in this age group has, therefore, become relatively more common with an atypical presentation and complication that incurs delay in diagnosis with attendant

morbidity and mortality. In addition, the patient presented with other comorbidities that could detract from a diagnosis of appendicitis to the unwary (2,3,6). Findings from case reports from Department of Surgery, Drumheller Hospital, Canada showed that the increased life expectancy that came about during the late 20th and the first decade of the 21<sup>st</sup> centuries has compelled surgeons and physicians to undertake medical procedures in increasingly older patients. The most common emergent surgical operation, appendicitis, previously regarded as a pediatric operation, is increasingly being seen in older patients (6).

The geriatric patient with appendicitis, however, presents remarkably differently from his pediatric counterpart, largely due to the changes in the body's physiologic reserves and disease manifestation. Thus, stereotyping of the presentations of appendicitis could put elderly patients presenting with it at risk of morbidity and delayed implementation of treatment due to delay in making the diagnosis. The difficulty in establishing the diagnosis early can be attributed to several factors. Elderly patients tend to seek help relatively late from the onset of symptoms. When they do, in a sizable proportion, the presenting features are atypical.

Clinical and laboratory features of inflammation like pain, vomiting, and leukocytosis may be greatly attenuated, presumably due to an ageing immune and neural systems. For this reason, appendectomy should not be delayed in the elderly (3,6,7).

Study done in Mansoura Faculty of Medicine, Mansoura University, Egypt showed also Appendicitis in the elderly continues to be a challenging surgical problem.

Patients continued to present late with atypical presentations. The medical records of elderly patients (aged >60 years) who underwent appendectomy for acute appendicitis at that hospital were reviewed. Variables selected for analysis included age, sex, presenting symptoms, operative approach, operative findings, duration of hospitalization.

Patients were compared to a control group, less than 31 years admitted during the same period. Accordingly, Twenty-three patients' records aged > 60 years with acute

appendicitis were compared to a group of 40 patients aged < 30 years (7).

All young patients group had an uneventful postoperative recovery only two cases (5%) had wound infection. There was one death in the elderly group thus mortality rate was 4.3%.

These two groups of patients showed also significant differences in relation to the stage of disease at operation and postoperative complications. Elderly group of patients had perforated appendix in 16 cases (69.5%) while in group II patients eight cases (20%) had perforated appendix. Elderly people often present to hospitals in an advanced stage of the disease.

In young people, the perforation rate of acute appendicitis is less than 20% while this can be 70% or even as high as 90% in elderly people. The reasons behind this could be explained by late presentation, age-specific physiological alteration, atypical presentation and delay in diagnosis. In the series, elderly group of patients had perforated appendix in 16 cases (69.5%) while in group II patients eight cases (20%) had perforated appendix at a rate which is similar to what is found in literatures (13).

The overall complication rate of 15.9% in the series is a little bit lower than previous reports of 28–60% (6,7).

The mortality rate in elderly patients with acute appendicitis is between 4% and 10%. Death is often directly related to intra-abdominal sepsis and in most cases to septic complications from perforation augmented by associated severe comorbidities.

In the series, the mortality rate was 4.3% due to septic complications and multiple organ failure (13).

In conclusion, acute appendicitis in the elderly remains a challenge for practicing surgeons and continues to be associated with high morbidity and mortality. With increasing life expectancy, more such cases are likely to be encountered in the future.

Results might improve with earlier consideration of the use of CT abdomen in the diagnosis of elderly patients with abdominal pain, followed by prompt surgical operation (3,6,13).

On other hands, there is also increased finding of complicated cases of appendicitis

like perforation with generalized peritonitis in under ten children. Clinical profile and risk factors associated with perforation of appendix in children under 13 years of age was studied at Department of Paediatrics and Child Health, Addis Ababa University ,Faculty of Medicine(6).

Accordingly a total of 147 cases were analyzed . The mean age was 9.3 years and appendicitis occurred more commonly among males. At operation , perforated appendix was found in 54.4% and phlegmonous appendix in the rest (45.6%). The rate of perforation is more common in those patients below ten years of age; 97 out of 147 patients were below ten years of age had perforated appendicitis as compared to those above ten years which is 53 only ( $p < 0.05$ ). The rate of perforation in this series is similar with an earlier report from the same hospital (6 ),from Yirgalem Hospital (9 ) and from Gonder (7).

But Sudanese study showed a perforation rate of 13.2% which is lower than that observed in our country (10 ).

Factors independently found to be predictors of perforation by univariate analysis were : age <10 years, duration of illness for over 24 hours, history of treatment elsewhere before arrival to the Hospital , generalized abdominal tenderness, rebound tenderness, and /or rigidity, hypoactive and/or absent bowel sound, RLQ mass, leukocytosis with neutrophilia and presence of complication(6) .Of these factors delay in intervention due to late presentation to hospital is an important preventable factor.Complication occurred in 25-30% of children with appendicitis primarily among those with perforation.

The complication includes wound infection(8.16 %) ,intra- abdominal abscess(9.52%),intestinal obstruction(2.72%) and entero- cutaneous fistula(1.36%). Out of 147 cases ,24(16.33%) patients had complication and 21 of them were in the group with perforation suggesting that the occurrence of complication is highly predictive of a perforated appendix( $p < 0.05$ ). There was one death (0.68%) (4).

A Prospective Randomized Controlled Study of Peritoneal Drains in the management of

Perforated Appendicitis without Peritonitis was undertaken in Dept. of Surgery, College of Health Sciences, University of Nairobi, Kenya. Of the 216 patients diagnosed with acute appendicitis, 117 patients had simple acute appendicitis without perforation and were therefore excluded from the study (12).

Ninety seven patients had various stages of advanced appendicular pathology. Seven had generalized peritonitis and were also excluded. The remaining 90 patients constituted our study population. These were equally randomized to two groups. Forty five had the closed system of tube drainage provided (without suction) while the remaining 45 had no drain inserted.

All of the 90 patients included in the study had histological confirmation of an inflamed perforated appendix. Postoperatively, 18 patients had wound sepsis and 6 patients had other complications including faecal fistula, abdominal abscess, and paralytic ileus. Out of those with wound sepsis, the majority (83%) were in the drain group. All patients with other complications belonged to the drain group. The patients in the drain group had significantly longer duration of antibiotic use and hospital stay (12).

All 90 patients in the study received parenteral antibiotics covering anaerobic as well as aerobic gram positive and gram negative organism. Parenteral antibiotics were stopped once pyrexia resolved and the patients were feeding well. Forty six patients used intravenous antibiotics for up to 3 days postoperatively; 24 patients for 4 days, 20 patients for 5 days or more. 85% of those who were on antibiotics for longer than 5 days in the hospital had drains while 15% did not have drains. In addition all patients were discharged home on oral antibiotics for a period of 5 days. Overall, patients in the drain group had longer use of in-hospital antibiotics (12).

There was significant difference in length of hospital stay. Patients in the drain group had an average of 6.1 days in hospital, and they continued the use of antibiotics. It was a common observation that on removal of the drain, there was a self limiting serous exudation from the drain site and pain in most of the patients.

Sometimes a sterile dressing was placed on the site for an extra day or so. If the treating team discharged the patient in this state, most patients would not leave and the nursing team would continue with the antibiotics. This practice; though not contested, contributed to the length of hospital stay in patients with drains without



other septic complications. Patients who stay longer in the hospital have longer delay to return to work or school. The study reveals high odds ratio for increased hospital stay and use of in-hospital antibiotics suggesting that use of drains in these patients adds to the patient's disease burden and delays their return to normal activities. Perforated appendicitis and its complications is common among patients with acute appendicitis in our set up, contributing 43% of patients with appendicitis in the past one year. More males than females were involved and the majority were in the young age group. Passive prophylactic drains inserted into the peritoneal cavity after operation for perforated appendix do not function as intended since the volumes of effluent drained are negligible. The use of peritoneal drainage post appendectomy in advanced appendicitis, where a perforation associated inflammatory turbid exudates; or a localized abscess, or appendicular phlegmon, are found; is associated with higher post operative septic complications, prolonged use of antibiotics and longer hospital stay. The findings suggest that use of a prophylactic drain post appendectomy increases patient morbidity and cost of healthcare (12).

Quantifying the disparity in outcome between urban and rural patients with acute appendicitis was assessed in Department of Surgery, Nelson R Mandela School of Medicine, Durban, South Africa. To compare outcomes of urban and rural patients and to determine whether there are disparities in outcome, a prospective study was conducted including all patients who presented with acute appendicitis from both urban and rural areas. Accordingly, total of 500 patients were included, with 200 patients in the rural group and 300 in the urban group. Those from the rural group had a significantly longer duration of symptoms prior to presentation. All septic parameters were significantly worse in the rural group. Significantly more patients from the rural group required a laparotomy (77% v. 51% urban;  $p < 0.001$ ) (13).

Inflamed, non-perforated appendicitis was more commonly seen in the urban group (52.3% v. 21% rural;  $p < 0.001$ ), while perforated appendicitis was much more common in the rural group (79% v. 47.7% urban;  $p < 0.001$ ) (13).

Perforation associated with generalised, four-quadrant intra-abdominal contamination

was significantly higher in the rural group than the urban group (60.5% v. 21% respectively;  $p < 0.05$ ). Significantly more patients from the rural group required an open abdomen (46% v. 12% urban;  $p < 0.001$ ) and  $\geq 1$  re-laparotomies to control severe intra-abdominal sepsis (60.5% v. 23.3% urban;  $p < 0.001$ ). So rural origin was identified as an independent indicator of poor outcome. Possible reasons may include difficulty in accessing the health system or delay in transfer to a regional hospital (13).

The overall complication rate was significantly higher in the rural group (35% v. 11% urban;  $p < 0.001$ ). Considered separately, each of the following was significantly higher in the rural group (rural v. urban, respectively): hospital-acquired pneumonia (21.5% v. 5%;  $p < 0.001$ ), renal failure (14% v. 0.7%;  $p < 0.001$ ), wound sepsis (22.5% v. 6.7%;  $p < 0.001$ ) and other miscellaneous conditions (5.5% v. 0.3%;  $p < 0.001$ ). The overall mortality was significantly higher among rural-based patients than urban-based patients (3.5% v. 0.3%, respectively;  $p = 0.008$ )(13). This survey identifies rural origin as an independent risk factor for appendicular rupture and a poor clinical course. Rural patients have major delays between the onset of symptoms and definitive surgery compared with urban patients (13).

The exact reasons for these delays require further investigation. Health-seeking behaviour is complex and is influenced by rural poverty and remoteness as well as cultural issues such as the reliance on traditional healers as a primary source of care and health advice.

However, failure of clinical recognition once contact with the health system has been made followed by delays in transfer for surgery to the regional hospital are failings of the health system (13).

## Chapter Three: Objectives

### 3.1. General objective

- To assess prevalence and outcome of perforated appendix among cases of operated appendicitis in JUSH, Southwest Ethiopia

### 3.2. Specific objectives

- To determine prevalence of perforated appendix among cases of operated appendicitis in JUSH.
- To identify factors associated with perforated appendix among cases of operated appendicitis in JUSH .
- To assess outcome of perforated appendix
- To determine rate of complication

## **Chapter four: Methods and Materials**

### **4.1 Study Area and period**

The data extraction from patient's records who were operated for appendicitis from September 1/2013 to September1/2015 was conducted from October 1-30/2015 in Jimma University specialized Hospital.

Jimma zone comprises Jimma town and its nearby woredas. It is located in South West of Ethiopia, Oromia regional state, with estimated population of 2,486,155. The town is located 350 Kilometers from the capital, Addis Ababa.

Jimma University is one of the largest Universities in the countries which runs both undergraduate and graduate programmes in several disciplines.

Jimma University Specialized Hospital (JUSH) is one of teaching hospitals in the country.

The hospital gives health service at inpatient and outpatient level as a referral Hospital for about 15 million population in the South West of the country.

The hospital has Internal Medicine, Pediatrics, OB/GYN, Surgery, Dental, Radiology, Ophthalmology, Anesthesiology and Psychiatry departments.

The department of surgery has emergency surgical OPD with 6 beds, two Cold surgical OPD and three wards for inpatient treatment (Surgical A,B, and C) with total 123 beds and about 3240 annual admission (includes both Emergency and Elective admission).

The department has Referral clinic which gives an outpatient service for General Surgical patients twice a week and for Orthopedic surgical patients once a week .

Also the Department owns Minor OR with 2 tables for minor surgery and Major OR

with 3 tables which give service for both Elective and Emergency major Operation.

## **4.2 Study design**

A retrospective record review was conducted from October 1-30/2015

## **4.3 Population**

### **4.3.1 Source population**

All appendicitis cases operated in J USH were the source population

### **4.3.2 Study population**

All appendicitis cases operated in J USH during the study period of September 1/2013-September 1/2015.

## **4.4 Inclusion and exclusion criteria**

### **4.4.1 Inclusion criteria**

All cases of operated appendicitis with intra operative confirmation of inflammation and/or perforated appendix during the study period will be included.

### **4.4.2 Exclusion criteria**

Patients with appendicitis who were not operated for any reason.

Incomplete record were also be excluded from the study.

## **4.5. Sample size and Sampling technique**

All operated appendicitis cases during the study period were included.

## **4.5 study variables**

### **Dependent variable**

Perforated appendicitis (yes or No)

## **Independent variables**

Age, sex, address, duration of illness, preoperative treatment, underlying medical illness, previous abdominal surgery, presence of faecolith .

### **4.7. Operational definition**

Duration of illness-time interval between the onset of symptoms of the disease and operative intervention

Late presentation- cases of patients who came to the hospital after 48 hours of onset of illness.

### **4.8 Data collection procedure and tool**

#### **4.8.1 Data collection**

First, the theatre operation and ward admission records were reviewed to develop lists of appendicitis cases or patients presented and operated during the study period. Then, using the patient's card number on the operation or admission record, patient's card was sought from the hospital's card office or room. Finally, data was collected (extracted) from patient's card, operation record and admission record using checklist developed for this purpose.

#### **4.8.2 Data collectors**

Data collection was undertaken by one 1<sup>st</sup> year surgical resident, one medical intern and one BSC nurse after they were trained for one day about clinical presentation,

complication and outcome of appendicitis, objective of the study, variables on the questionnaire and its implication. Then, they were assigned to fill the data collection check list. All data collection activities were supervised by trained surgical residents and primary investigator.

#### **4.9. Data quality control**

Adequate training was provided for data collectors, and the compilation format was prepared in simple English to maintain clarity and easier understanding by those data collectors.

Data was checked for completeness and some representative cards were cross-checked by supervisor and/or principal investigator for appropriateness.

#### **4.10. Data processing and analysis**

The collected data was checked, edited, coded and entered into SPSS version 20.0 software to be analyzed. SPSS data was checked for error and missing value. Descriptive statistics like measure of central tendency and proportion were computed. Finally the Results was presented in written form, tabulation & figurative presentations from which conclusion and recommendation were made. Results were also compared with other studies & discussed.

#### **4.11 Dissemination plan**

After research completion and finalizing the report, the finding of the study will be disseminated to all relevant stakeholders through Presentation and publication. Copies of the research will be submitted to Jimma University, JUSH, from which data were collected, the ministry of health and other concerned institutions and stake holders for possible applications of the study. The extract of the result will be presented on annual research conferences and published on scientific journals and research proceeding

## 4.12 Ethical consideration

The research proposal was submitted to Jimma University Ethical Review Board to obtain ethical clearance, and then data collection was initiated after a letter of permission was obtained from the above responsible office to the head of each surgical ward, Operation room head and Record office. The information gathered about the patient was kept confidential.

## Chapter five: Results and Discussion

### Results

There were a total of 246 cases of appendicitis operated in the Hospital during the study period from September 1/2012- september1 /2015. From this, records of 184 patients were available and included in the study. In this study Male constituted the majority 130(70.7%) and female 54(29.3) . Out of 54 females 5 of them were pregnant and 49 were not. The age ranges from 5- 76 years with mean age of 26.40 years. Most of the cases were from rural 128(69.6%) than urban 56(30.4%).

Table 1. Pattern of appendicitis according to age & sex

|              |        | sex  |        | Total |
|--------------|--------|------|--------|-------|
|              |        | male | female |       |
| Age in years | 1- 10  | 14   | 16     | 30    |
|              | 11- 60 | 106  | 36     | 142   |
|              | >60    | 10   | 2      | 12    |
| Total        |        | 130  | 54     | 184   |



**Table 2: Age distribution of complications among the study Groups.**

|               |         | Complications |             |     |                            | Total |
|---------------|---------|---------------|-------------|-----|----------------------------|-------|
|               |         | pneumonia     | atelectasis | SSI | intra-abdominal collection |       |
| Age in a year | 1 - 10  | 4             | 4           | 4   | 2                          | 14    |
|               | 11 - 60 | 7             | 1           | 21  | 1                          | 30    |
|               | 61 - 76 | 3             | 0           | 1   | 5                          | 9     |
| Total         |         | 14            | 5           | 26  | 8                          | 53    |

Out of 184 cases 26(14.1%) had history of previous abdominal surgery but for the rest 158(85.9%) this was their first surgery. The time taken by the patients between onset of symptom and presentation to hospital was less than or equal to 48 hours in 79(42.9%) cases, and greater than 48 hours in 105(57.1%) cases. The leading pre-operative diagnosis was simple acute appendicitis 104(56.5%) followed by appendiceal abscess 29(15.8%), the rest are perforated appendix and generalized peritonitis secondary to appendicitis accounting for 28(15.2%) and 23(12.5%) respectively

**Table 3: Pre-operative diagnosis as per duration of illness**

|                             |        | pre-operative diagnosis |                    |                     |                     | Total |
|-----------------------------|--------|-------------------------|--------------------|---------------------|---------------------|-------|
|                             |        | Generalized peritonitis | Acute appendicitis | Appendiceal abscess | Perforated appendix |       |
| Duration of illness in hour | ≤/ <48 | 0                       | 76                 | 3                   | 0                   | 79    |
|                             | >48    | 23                      | 28                 | 26                  | 28                  | 105   |
| Total                       |        | 23                      | 104                | 29                  | 28                  | 184   |

More than half of the cases 99(53.8%) had taken pre-operative treatment with antibiotics. 91.8% of the cases took prophylactic antibiotics. Intra operative finding includes inflamed appendix 90 (48.9%), perforated appendix 42(22.8%), appendiceal abscess 29(15.8%) and generalized peritonitis secondary to appendicitis 23(12.5%). The majority of the patients 182(98.9%) had taken post operative treatment with antibiotics. One hundred sixty five cases were stayed in the hospital for less than or equal to seven days the rest nineteen stayed for more than seven days.

Out of one hundred eighty four cases, fifty three cases developed complication. From this the leading complication were surgical site infection 26 cases, followed by pneumonia 14 cases, intra- abdominal collection 8 cases and atelectasis 5 cases. Ten (5.4%) cases died during the post-operative period while the rest 174(94.6%) were discharge improved.

**Table 3: Outcome distribution as per complications**

|                      |                             | Outcome             |           | Total     |
|----------------------|-----------------------------|---------------------|-----------|-----------|
|                      |                             | discharged improved | died      |           |
| <b>Complications</b> | Pneumonia                   | 14                  | 0         | 14        |
|                      | Atelectasis                 | 3                   | 2         | 5         |
|                      | SSI                         | 25                  | 1         | 26        |
|                      | Intra- abdominal collection | 1                   | 7         | 8         |
| <b>Total</b>         |                             | <b>43</b>           | <b>10</b> | <b>53</b> |

**Table 4: Distribution of Duration of illness vs complications**

|                               |       | complications |              |     |                            | Total |
|-------------------------------|-------|---------------|--------------|-----|----------------------------|-------|
|                               |       | pneumonia     | Atelectasias | SSI | intra-abdominal collection |       |
| Duration of illness in a hour | </=48 | 3             | 0            | 4   | 0                          | 7     |
|                               | >48   | 11            | 5            | 22  | 8                          | 46    |
| Total                         |       | 14            | 5            | 26  | 8                          | 53    |

**Table 5: Outcome as per duration of illness**

|                               |           | outcome             |      | Total |
|-------------------------------|-----------|---------------------|------|-------|
|                               |           | discharged improved | died |       |
| Duration of illness in a hour | =/< 48hrs | 79                  | 0    | 79    |
|                               | >48 hrs   | 95                  | 10   | 105   |
| Total                         |           | 174                 | 10   | 184   |

**Table 6: Distribution of age vs out come**

|               |         | outcome             |      | Total |
|---------------|---------|---------------------|------|-------|
|               |         | discharged improved | died |       |
| age in a year | 1 - 10  | 26                  | 4    | 30    |
|               | 11 - 60 | 141                 | 1    | 142   |
|               | 61- 76  | 7                   | 5    | 12    |
| Total         |         | 174                 | 10   | 184   |

**Table 7: P-value and X2 of variables associated with outcome.**

| Variable            |        | Outcome  |      | X2     | p-value | Df |
|---------------------|--------|----------|------|--------|---------|----|
|                     |        | Improved | Died |        |         |    |
| sex                 | male   | 123      | 7    | 0.002  | 0.963   | 1  |
|                     | female | 51       | 3    |        |         |    |
| pregnancy           | yes    | 5        | 0    | 0.324  | 0.569   | 1  |
|                     | No     | 46       | 3    |        |         |    |
| Age                 | 1-10   | 26       | 4    | 40.476 | 0.000   | 2  |
|                     | 11-60  | 141      | 1    |        |         |    |
|                     | >60    | 7        | 5    |        |         |    |
| Duration of illness | =/ <48 | 79       | 0    | 7.956  | 0.005   | 1  |
|                     | >48    | 95       | 10   |        |         |    |
| complication        | yes    | 43       | 10   | 26.137 | 0.000   | 1  |
|                     | No     | 131      | 0    |        |         |    |

|                                |                         |     |    |        |       |   |
|--------------------------------|-------------------------|-----|----|--------|-------|---|
| <b>Pre-op antibiotics</b>      | Yes                     | 89  | 10 | 9.079  | 0.003 | 1 |
|                                | No                      | 85  | 0  |        |       |   |
| <b>Intra-operative finding</b> | Inflamed appendix       | 90  | 0  | 58.413 | 0.001 | 3 |
|                                | Perforated appendix     | 41  | 1  |        |       |   |
|                                | Appendiceal abscess     | 29  | 0  |        |       |   |
|                                | Generalized peritonitis | 14  | 9  |        |       |   |
| <b>Co-morbidity</b>            | DM                      | 4   | 3  | 24.954 | 0.001 | 2 |
|                                | HIV/AIDS                | 2   | 1  |        |       |   |
|                                | No comorbidity illness  | 168 | 6  |        |       |   |

## **Discussion**

Appendicitis is recognized worldwide as the commonest surgical emergency. Prompt decision and urgent surgical intervention prevents complication and death. The present study analyzed the three years prevalence and outcome of perforated appendix at Jimma University specialized hospital. There were a total of 246 cases of appendicitis operated in the Hospital during the study period from September 1/2012- september1 /2015. From this, records of 184 patients were available and included in the study.

In this study Male constituted the majority 130(70.7%) and female 54(29.3). Out of 54

females 5 of them were pregnant and 49 were not. The age ranges from 5-76 years with mean age of 26.40 years. Most of the cases were from rural 128(69.6%) than urban 56(30.4%).

Appendicitis is found in all age groups which is in agreement with other studies. In the study by Saunda RB and Omar E in Septuagenarian (3) the age distribution ranges from 3 to 78 years and the mean was 17.2 years. Similarly study done in our country by Zelalem A (6) in Yirgalem Hospital southern part of Ethiopia shows that the age range was 4 to 69 years, the mean being 8 years. According to this study appendicitis is found to have highest incidence in males (70.7%) which is consistent with many studies (3,4 and7) showing male predominance for which no apparent explanation could be given.

Out of 184 cases 26(14.1%) had history of previous abdominal surgery but for the rest 158(85.9%) this was their first surgery. The time taken by the patients between onset of symptom and presentation to hospital was less than or equal to 48 hours in 79(42.9%) cases, and greater than 48 hours in 105(57.1%) cases similar with study done in Ethiopia by Birhanu K.(7) where the majority(68.2%) of patients came to the Hospital within 48 hours of onset of symptoms. Other studies done in other part of Africa also showed similar results (3,9 and 11).

The leading pre-operative diagnosis in this study was simple acute appendicitis 104(56.5%) followed by appendiceal abscess 29(15.8%), the rest are perforated appendix and generalized peritonitis secondary to appendicitis accounting for 28(15.2%) and 23(12.5%) respectively which showed higher rate of perforation and peritonitis in this study comparing to other studies(1,2 4 and 6).

More than half of the cases 99(53.8%) had taken pre-operative treatment with antibiotics for diagnosis other than appendix at Health Center and/ or District Hospital which is in contrast to other studies where misdiagnosis was less than 20%(1,2, 3,6, and 8).

Intra operative finding includes inflamed appendix 90 (48.9%), perforated appendix 42(22.8%), appendiceal abscess 29(15.8%) and generalized peritonitis secondary to appendicitis 23(12.5%),which showed higher rate of perforation and peritonitis in this study comparing to other studies(1,2 4 and 6).

Almost all patients 182(98.9%) had taken post operative treatment with antibiotics which was also routine in other studies (1,2,3,5,7 and 11).

Out of one hundred eighty four cases, fifty three cases (26.5%) developed complication which is higher than complication observed in other studies done in the country and abroad (3, 5, 6) . From this the leading complication were surgical site infection 26 cases, followed by pneumonia 14 cases, intra- abdominal collection 8 cases and atelectasis 5 cases. Eighty six point eight percent (86.8%) of complication occurred in those patients who came late (after 48 hours of onset of symptoms) and in the two extremes of age (less than 10 years and greater than sixty years of age), similar finding according to the study done by Birhanu K. in Black Lion Hospital, Ethiopia (7). Ten (5.4%) cases died during the post- operative period while the rest 174(94.6%) were discharge improved. The mortality rate observed in this study is almost similar with that of study done by Zelalem A.(5.2%) which was done in Yirgalem Hospital , southern Ethiopia (6). But it is higher than the mortality observed in other studies done in the country as well as other parts of Africa (1,2,3,4 and 9). All the death occurred in patients who came after 48 hours of illness and 90% occurred in the two extremes of age (40 % in under 10 years and 50 % in patients older than 60 years) making late presentation and extremes of age independent risk factor for death. The same is true according to the finding of Sauda RB,Omar E, study done in septuagenarian (3).

There is significant association between age, duration of illness, pre operative treatment with antibiotics, intra operative finding, co- morbidity and outcome according to this study. Age has strong association with outcome (X- square 40.476, P- value of 0.000 and Df 2).This is in consistent with study done in Sudan by Ahmed M (10). Duration of illness has also strong association with out come (X- square 7.956, P- value 0.005 and Df 1). In this study all the mortality were in patients who came late (after 48 hours) which was also observed in other studies done in the country (3,4,5,6). Pre operative treatment with antibiotics due to misdiagnosis at Health center and / District Hospital is other variable significantly associated with outcome (X- square 9.079, P- value 0.003 and Df 1) In this study intra operative finding observed were inflamed appendix 90 (48.9%), perforated appendix 42(22.8%), appendiceal abscess 29(15.8%) and generalized peritonitis secondary to appendicitis and there was significant statistical association between intra operative findings and outcome( X- square 58.413, P- value 0.003 and Df

1). The majority of deaths were in patients presented with generalized peritonitis secondary to perforated appendix, cases also observed in other studies (8, 9, 12).

The major co-morbidity observed in patients who were undergone operation for cases of appendicitis were type II DM and HIV/AIDS with strong association on outcome of the patients (X-square 24.954, P-value 0.001 and Df 2). Three out of the ten deaths occurred in those with co-morbid disease.

## **Chapter six : Conclusion and Recommendation**

### **Conclusion**

Acute appendicitis is common in our locality, the presentation and outcome is not



different from the observation of other researchers in the developing world, but late presentation, higher rates of complications and deaths are observed in our area. According to this study, there are several variables that are predictive of poor outcome in patients with appendicitis.

Late presentation, extremes of ages, pre operative treatment with antibiotics due to wrong diagnosis, presentation with generalized peritonitis and presence of co morbid condition like type two DM and HIV/ AIDS are the most predictive of death (  $p < 0.05$  for each).

The exact reasons for these delays require further investigation. Health-seeking behaviour is complex and is influenced by rural poverty and remoteness as well as cultural issues such as the reliance on traditional healers as a primary source of care and health advice.

However, failure of clinical recognition once contact with the health system has been made followed by delays in transfer for surgery to the regional hospital are failings of the health system. Intervention is urgently needed to improve the outcomes of acute appendicitis.

## **Recommendations**

I strongly recommend the following to the concerned bodies:

All health professionals working at health centers, private clinics and/or primary hospitals to have high index of suspicion of acute appendicitis in all patients presented with acute abdominal pain and to refer them urgently for surgeons opinion if the diagnosis of acute appendicitis is likely.

Jimma University, college of Medical and Health science in collaboration with jimma zonal health Bureaus to arrange training on how to approach to patients with suspected appendicitis for health workers practicing in the health centers and primary hospitals.

Oromia health Bureaus in collaboration with Jimma zonal health bureaus to increase health seeking behavior of the population by creating awareness through using social medias like FM Radio.

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