

**PREVALENCE, MANAGEMENT OUTCOME AND FACTORS AFFECTING
OUTCOME OF ACUTE APPENDICITIS AT MIZAN-AMAN GENERAL HOSPITAL,
SOUTHWEST ETHIOPIA, 2011-2014**



BY:

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GENERAL HOSPITAL, SOUTHWEST ETHIOPIA, 2011-2014**

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ABSTRACT

Background: Appendicitis is a condition characterized by inflammation of the vermiform appendix. It is classified as a surgical emergency and many cases require removal of the inflamed appendix either by laparotomy or laparoscopy. Untreated, mortality is high, mainly because of rupture leading to peritonitis and shock. However, there is scarcity of information on the prevalence of acute appendicitis in the current study area

Objectives: To determine the prevalence and management outcome of acute appendicitis in Mizan Aman General Hospital, in Southern Nations Nationalities of People's Regional State, Southwest Ethiopia.

Methods: Retrospective review of hospital records of all 182 cases with acute appendicitis surgically managed at Mizan Aman General Hospital was retrieved from April 01, 2011-March 31, 2014. Secondary data was collected using structured check list, checked for its Completeness, entered, edited, cleaned and analyzed by SPSS version 20.0. Descriptive analysis was used to describe socio-demographic variables and logistic regression was carried out to see the effect of independent variables on outcome of acute appendicitis. Significant factors were reported at $p \leq 0.05$. The result was presented using text, tables and graphs.

Results: Hundred and eighty two patients were operated for acute appendicitis. Of whom 120 (65.9%) were male patients and 62 (33.1%) were female patients (Male to female ratio of 1.94:1). The mean and median age was 23.18 ± 11.90 SD and 21 years respectively, where majority of the patients were in the second decades of life. The annual incidence of the disease was uniform, (about 56-67 cases per year) during the study period. Abdominal pain was invariably the main presenting complaint in 182 (100%) and right lower quadrant abdominal tenderness was the dominant physical finding in 106 (58.2%) of these patients. The rate of perforated appendix was 40 (22%). Appendectomy was done for 168 (92.3%) patients of whom the negative appendectomy rate comprised 12.5%. The predominant postoperative complication was postoperative wound infection in 43/58 (66%). The average length of hospital stays was 6.5 days. Death rate of patients due to appendicitis was 0.55%.

Conclusion and Recommendations: Acute appendicitis mainly affects the young population group in the second decades of life and males are more vulnerable and its prevalence was 182/376 (48.3%). The main presenting complaint, physical finding, intraoperative finding, and postoperative complication were abdominal pain, right lower quadrant abdominal tenderness, inflamed appendix, and postoperative wound infection respectively. Therefore, working up on patients with abdominal pain for acute appendicitis and validating this subjective complaint of the patient with proper history taking and physical examination, with relevant laboratory investigations, and thorough perioperative, postoperative care and revising the infection prevention practice in surgical ward will improve the management outcome of the patients

Key words: Acute appendicitis, Appendectomy, prevalence, Mizan- Aman General Hospital

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ACRONYMS

| | |
|------|---|
| ICU | Intensive Care Unit |
| IESO | Integrated Emergence Surgery and Obstetrics |
| RIF | Right Iliac Fossa |
| RLQ | Right Lower Quadrant |
| TAC | Temporary Abdominal Closures |
| TAH | TikurAnbesa Specialized Hospital |
| WBC | White Blood Cell |
| ZHD | Zonal Health Department |
| ZMH | Zewditu Memorial Hospital |
| MAGH | Mizan-Aman General Hospital |
| LOS | Length of Hospital Stay |

CHAPTER ONE

Introduction

1.1 Background

Appendicitis is a condition characterized by inflammation of the vermiform appendix it is classified as a surgical emergency and many cases require removal of the inflamed appendix either by laparotomy or laparoscopy. Untreated, mortality is high, mainly because of rupture leading to peritonitis and shock. [1] It is recognized as a surgical disease when the Harvard University pathologist Reginald Heber Fitz read his analysis of 257 cases of perforating inflammation of the appendix at the 1886 meeting of the Association of American Physicians [2], and it has been recognized as one of the most common causes of the acute abdomen worldwide. The vermiform appendix is a blind muscular tube with mucosal, submucosal, muscular and serosal layers. The relationship of the base of the appendix to the cecum remains constant, whereas the tip can be found in a retrocecal, pelvic, subcecal, preileal, or right pericolic position. These anatomic considerations have significant clinical importance in the context of acute appendicitis. The appendix is an immunologic organ that actively participates in the secretion of immunoglobulins, particularly immunoglobulin A. [3]

With more than 250, 000 appendectomies performed annually, appendicitis is the most common abdomens surgical emergency. Peak incidence on acute appendicitis is to the second and third decades of life. It is relatively rare at the extremes of ages however, perforation is more common in infancy and in the elderly, during which periods mortality rates are highest. Males and females are equally affected, except between puberty and age 25, when males predomination a 3:2 ratio. The incidence of appendicitis has remained stable in the United States over the last 30 year, while the incidence of appendicitis is much lower in under developed countries, especially pants of Africa, and lower socioeconomic groups. [3, 4, 5, 6]

Appendicitis is the most common surgical cause of abdominal pain worldwide. [7, 8] Difference in incidences, sex, age, and seasonal variations has been reported widely, with paucity of information from Nigeria. The incidence is higher among the Caucasians and also in peoples living in the developed world, although this appears to be declining. [9, 10, 11, 12]

Report of increasing incidence in African countries has been reported by some authors in the last few decades. [13, 14, 15, 16]

Changing to western lifestyle, including diets have been held responsible for this [17]. It is generally reported to be more common in males [12, 18, and 19] and usually occurs in the age range of 10-30 years, [12, 20, 21] although Mangete form Port- Harcourt in Nigeria, founded a significantly higher incidence in females. [16] Higher incidences have been reported in the summer months by many authors. [22, 23, 24] Sanda et al, have suggested intense challenge to the mucosa associated lymphoid tissue from allergens in the dust, during the sandstorm of the spring months, the Arabian Peninsula. [25]

At Mizan-Aman General Hospital there is no study conducted on the prevalence and management outcome of acute appendicitis. Thus, the aim of this study is to assess the prevalence and magnitude of acute appendicitis with age, sex, and treatment outcome, contributing to show the burden of the disease for those who are responsible to health care service.

1.2 statement of the problem

Appendicitis is sufficiently common that appendectomy is the most frequently performed urgent abdominal operation and is often the first major procedure performed by a surgeon in training. Notwithstanding advances in modern radiographic imaging and diagnostic laboratory investigations, the diagnosis of appendicitis remains essentially clinical, requiring a mixture of observation, clinical acumen and surgical science. In an age accustomed to early and accurate preoperative diagnosis, acute appendicitis remains an enigmatic challenge and a reminder of the art of surgical diagnosis [26].

A study at Tikur Anbesa Specialized Hospital between the year 1999 to 2000, a total of 147 children's under the age of 13 years admitted for acute appendicitis were analyzed. The mean age was 9.3 years, and appendicitis occurred more commonly among males. Factors independently found to be predictors of perforation by univariate analysis were; age <10 years, duration of illness for over 24 hours, history of treatments elsewhere before arrival to TAH, generalized abdominal tenderness and or rigidity, hypoactive and or absent bowel sound, RLQ mass, Leukocytosis with neutrophilia and presence of complications. However, none of these was retained as significant factors in multiple logistic regression analysis. It is concluded that there are many factors that are associated with perforation but there is no single factor that

independently predicted perforation of appendicitis. Delay in intervention due to late presentation to hospital is an important preventable factor [27].

Similarly, a total of 277 cases of acute appendicitis admitted from January 1st to December 31st 1998 at Zewiditu memorial hospital (ZMM) were reviewed. 16(5.8%) had presented with a RLQ mass, which was managed conservatively while 261 (94.2%) had emergency surgery. At operation, it was found that 184 (70.6%) had simple appendicitis, 45 (17.4%) had perforated, and 25(9.5%) gangrenous appendices. Seven (2.5%) had appendicular abscess with amputated stump left. The male to female ratio was 2.6:1. The patient's age ranged b/n 13 and 75 with the peak occurring b/n 13-30 years. The most common symptoms were abdominal pain, (100%) and Vomiting (76.9%), the commonest signs were localized tenderness in the RLQ (92.4%) with rebound tenderness (70.4%). Digital rectal, examination was done in 127 patients in whom tenderness was elicited in 80 (63%), of them the approach to the appendix in 78.4% of operation was thorough a transverse incision at McBurney's point. In ZMH, appendectomy was found to be the most common emergency operations, accounting for 46.7% of cases and carried a post-operative mortality rate of 1.2 % [28].

A Study at Yirgalem hospital (Ethiopia) showed that from Jan-1997 to December 1999 the disease accounted 27.9 % of the operations for acute abdominal emergencies and 1.1% of the total admissions [29].

In Ethiopia, very little is known about the general magnitude and the relative prevalence of acute appendicitis. This study will be conducted with the aim of assessing the magnitude, prevalence and outcome of surgical management of acute appendicitis in Mizan-Aman General Hospital and compare it with other studies in the country, Sub Saharan Africa and also the developed world. The study is believed to have epidemiological and clinical benefits and would also serve as a base for other studies. Therefore, the aim of this study is to assess the prevalence and magnitude of acute appendicitis with age, sex treatment out come and other epidemiologic factors, thus contributing to show the burden of the disease for who are responsible directly or indirectly in giving health care service and also to contribute practicable recommendations based on the study findings, so that proper planning, implementation and evaluation of the perspective health activities will be conducted in the study area.

1.3 Significance of the study

This study will help to indicate the prevalence and magnitude of appendicitis, treatment outcomes and also association of demographic factors with this disease in the study area.

Since similar studies were not conducted in this health institution (Mizan-Aman General Hospital) the study will provide the current prevalence and magnitude of the disease in study area.

The result of the study will also help the local Health institutions: Regional Hospitals, Health Centers, Zonal Health Departments and Regional Health Bureaus so that proper planning, implementation and evaluation of perspective health service activities will be conducted in the area. It will also help the local health workers as baseline information to provide quality health care service (early diagnosis and treatment) for those patients with acute appendicitis. It can also provide basic information about the prevalence, diagnosis and treatment outcome of acute appendicitis that is going on similar health institutions around selected countries in the world including Ethiopia.

The study will also use as aspiring board for those who need to conduct similar study in the Region and Mizan-Aman General Hospital.

CHAPTER TWO

LITRATURE REVIEW

A study at Nottingham, UK in adult patients (>16 Yrs) undergoing an emergency appendectomy at a University Teaching Hospital between Feb. 2004 and Jan.2005, a total of 199 patients with a median age of 31 years (range, 16 -89 years) were identified. Of these 29% of patients experienced a postoperative complication, 4% of patients were admitted to the surgical high dependency unit or ICU postoperatively and there was one death (0.5%). Comparison between patients with histological proven appendicitis (82%) and those patients having a negative appendectomy (18%) showed no significant difference in the rate of complication as defined. However, patients with positive histology were more likely to experience a septic complication and despite this patients with a negative appendectomy were more likely to be readmitted, predominantly with persistent abdominal pain. It is concluded that appendectomy is associated with significant morbidity in patients with an inflamed appendix, were more likely to experience aseptic complication but re-admission was more common in patients with a histopathologically normal appendix because of unresolved abdominal pain [30].

Another study in UK, showed that during a 10 years period they operated on 816 children's with diagnosis of acute appendicitis of these, 36(4.5%) were under 5 years of age. A retrospective analysis was made on these 36 cases to assess the natural history, management and outcome in these children. Abdominal pain was the commonest symptom but was not invariable; being present in only 32 of the 36 children while vomiting was present in 28 children. Localized tenderness in the RIF was present in 21 children and generalized in 10. In 5 children there was a delay in diagnosis in excess of 18 hrs. The overall operation rate was 50% accessed macroscopically and was inversely proportional to the children's age. There was no mortality and the wound sepsis rate was 16.6%. The low incidences of acute appendicitis in very young children means that it is often overlooked. A high index of suspicion may contribute to earlier diagnosis and there by reduced mortality [31].

A study on acute appendicitis in Newyork1047, USA, examines the incidence and epidemiological factors of acute appendicitis in various ethnic groups in an urban minority community. The chart of 278 consecutive patients who underwent appendectomy at the Bronx

Lebanon Hospital center, Bronx, New York between January 1988 and December 1990 were reviewed. Thirty eight patients who had an interval appendectomy were excluded. The remaining 239 Patients, all who had acute appendicitis, constituted the study population. The incidence of appendicitis for each ethnic group was calculated as a percentage of the total emergency surgical admissions for that group. Acute appendicitis constituted 3.1% of all emergency admissions to the surgical service over the period studied and represented 4.5% of surgical service admission from emergency department in Hispanics, 1.9% in Africa Americans, 1.5% in whites and 21% in Asians. This difference was significant except some comparisons involving whites. There were no significant differences in the pathological findings regarding the diseased appendix in different racial groups. This finding was statistically significant. High WBC counts indicated inflammation of the appendix, but had no predictive value, for the type of pathology. Surgical findings were similar in all groups [32].

Appendicitis complicating pregnancy studied by Mohamedian at Clarksburg WVa showed that nine pregnant patients had appendectomy. Seven patients had acute appendicitis; pyuria and symptoms suggesting UTI, delayed diagnosis in one whose appendix perforated. Abdominal pain and nausea with or without vomiting were presenting symptoms in all of the patients. Tenderness in the RLQ was present in eight patients including two with a normal appendix, had leukocytosis with a left shift. There was no fetal or maternal loss. In addition, reviewed more than 900 other cases of appendectomy during pregnancy, were reported in the literature since 1960. Among 713 previously reported cases of confirmed appendicitis, rupture had occurred in 25%. There were five maternal Mortalities (deaths), in the groups of patients with perforation. Perinatal mortality was 4.8% among patients with acute inflammation only and 19.4% in those with perforated appendicitis; the diagnosis rest on clinical documents, and prompt surgical intervention was the key to good outcome [33].

Another study on acute appendicitis by Lee, et al, a retrospective review of 210 consecutive cases of pediatric appendectomy and 744 adults cases for suspected acute appendicitis from January 1995 to December 2000. Pediatrics patients were defined as being 13 years and younger. Pediatric patients were similar to adult patients with respect to duration of pain before presentation. However, pediatrics patients required less time for emergency room evaluation (4.0 ± 2.7 hours Vs 5.7 ± 4.9 hours). In children and adults, a history of classic, migrating pain had the

highest predictive value (94.2 vs 89.6%), followed by a WBC count $\geq 12 \times 10^9/L$ (91.5Vs 84.3%). The overall negative appendectomy rate was 10.0%, for children and 19.0% for adults; the perforation rate was 19.0% and 13.8% respectively. The perforation rate in children was not associated with a delay in presentation. Mortality and morbidity including wound infection rate and intra-abdominal abscess rate were similar contrary to the traditional teaching; diagnosing acute appendicitis in children is similar to that in adults. A history of migrating pain together with physical findings and leukocytosis remain accurate diagnostic clues for children and adults, perforation rate and morbidity in children is similar to those in adults, and the outcomes of acute appendicitis in children were not associated with a delay in presentation or delay in diagnosis [34].

A study on acute appendicitis at Guthrie medical center, Pennsylvania; A Starling 31% rate of perforated appendicitis in 1984 prompted a 5 year review at the Guthrie medical center. An increase over the previous rates of 13% and 0% in 1964 and 1944 was confirmed in this study. Perforation accompanied 18.3% cases of appendicitis. Diagnostic accuracy in 295 cases undergoing operation was 81.4%. Groups at risk for perforation were patients in the 1st decade of life (34.3% with perforations) and those 50 years of age (48% perforated). perforation rates were generally inversely related to accuracy was poorest in women in the second to fourth decade or those in the mid-portion of the menstrual cycle. When the appendix was not perforated, complication occurred in 8.7% of patients while 29.5% with a perforation had complication the mean hospital stay was prolonged by 2.5 days if the appendix was perforated. An increased awareness of the risks by both the public and physicians is essential to reduce the number of perforations [35].

Another study in California, in 1984, 24,794 appendectomy and abscess drainage procedures were performed for acute appendicitis in California hospital. Analysis of hospital discharge abstracts revealed age-and sex- specific incidence rates and in hospital case fatality rates for acute appendicitis lower than the previously reported. In persons aged 60 years and older, the fatality rate for non-perforated appendicitis with appendectomy was 0.7% and for perforated appendicitis with appendectomy and abscess was 2.4%. Surgery was delayed beyond the day of admission in 21% of persons aged 40-59 years, 29% of persons aged 60-79 years and 47% of persons aged 80 years and over the proportion of cases with perforation increased from 22% to

75% between ages 20-80years. The population incidence of perforated appendicitis changed little after age 20 years, while the incidence of non-perforating cases declined sharply. The high proportion of appendicitis cases with perforation among the elderly may be due to the decreased incidence of non-perforating appendicitis as previously proposed. Most elderly in California receive timely surgery for appendicitis and tolerate it better than previously reported. Diminished tolerance for intra-abdominal infection may be the primary determinate of the increase in case fatality with age [36].

Similar study on appendicitis in preschool children at King Khalid university hospital, Saudi Arabia between January 2001 and December 2007, there were 66 boys and 40 girls. Sixty four children (60.3%) had complicated appendicitis, 38 (35.3%) had acute appendicitis and 4(3.7%) had normal appendix. Although classic symptoms were present in the majority of patients, atypical symptoms were found in some children. The duration of symptoms in patients with complicated appendicitis was more (5.2 Vs 2.1 days). A diagnosis other than appendicitis was suspected in 47 patients (73.4%). Sixty (56.6%) patients had perforation at the time of surgery. Complicated appendicitis was associated with a longer hospital stay and more post-operative complications [37].

A study by department of surgery at Turkey shows that acute appendicitis, the most common cause of surgical emergency, shows different pathogenesis, clinical courses and outcome in the elderly. In this study operative and hospital records of patients with appendicitis were retrospectively reviewed. Patients, who were 50 years of age or older were the main constituents of the study, demographic features, preoperative clinical diagnosis, abdominal interventions and postoperative morbidity and mortality, were analyzed as the main criteria. A total of 109 older patients constituted 4.3%, of appendectomy cases. Besides RLQ transverse incisions, surgery was performed via vertical incision in 2.8% of cases. With a diagnosis of acute abdomen in the elderly, the perforation rate was significantly higher than in pediatrics and adults, the proportion of the elderly among perforated cases was significantly increased when compared to non-perforated cases. Post-operative morbidity was noted in 35.8% of elderly patients, in 73.8 % of perforated, and in 11.9% non-perforated cases, the mortality rate was 5.5% in the elderly group, 11.9% in patients with perforated and 1.5% in patients with non-perforated appendicitis. No mortality was noted in patients younger than 50 years. The precise diagnosis of appendicitis is

relatively low in the elderly. Despite the uncommon occurrence of appendicitis, the perforation rate is still unfavorable. Post-operative morbidity and mortality is unacceptably high, adversely affects clinical diagnosis, the stage of disease and the outcome of patients. [38]

Another similar study at New Delhi, India, a total of 348 cases of acute suppurative appendices removed because of clinical suspicion of acute appendicitis. Male to female ratio 2.6:1 with highest number of cases in the age group 21-30 years;282 specimens out of 348 showed that features consistent with acute appendicitis with an overall higher occurrence in male statistically significant association was obtained between perforation and male sex, older age, and acute suppurative appendicitis [39].

A study to analyze clinical, paraclinical and of acute appendicitis therapeutic aspects of cases at National University Hospital at Bangui in Central African Republic, from September 15, 1990 to February 15, 1992,285 patients under went laparotomy to treat acute appendicitis- carried out a study of clinical and there therapeutic aspects of 57 patients with complete case histories (20% of patients undergoing surgery).The appendices were sent to laboratory of pathological anatomy of the faculty of medicine at Marseille, France, for analysis. The frequency of appendectomy among patients undergoing visceral surgery by laparotomy with no acute traumatic abdominal syndrome was 42.3 %. The incidence of appendectomy for city of Bangui in 1991 was 36.5% per 100,000 inhabitants. These cases of appendicitis were diagnosed essentially on clinical grounds, Leukocyte count exceeded 10,000 per mm³ in 30% of patients, these to histological examinations revealed the presence of parasites in 10 cases. The frequency of negative appendectomy on principle was 12.7% and parenteral treatment was prescribed systematically following surgery. The mean duration of hospital stay was 6.7 days. No early post-operative complications resulting in the death of the patient were observed; however, two late post-operative complications resulting in the death in the patients were observed, giving a mortality rate of 3.5%. These complications were one case of peritonitis and one case of Occlusive syndrome with septic shock [40].

A prospective audit from September 2010 to September 2011 at Endale hospital in South Africa showed that a total of 200 patients with a provisional diagnosis of acute appendicitis were operated at Endale hospital. There were 128 male (64%) in this cohort. The mean duration of

illness prior to seeking medical intervention was 3.7 days. Surgical access was by a midline laparotomy in 62.5% and by a Lanzes incision in 35.5%, two percent of patients underwent a laparoscopic appendectomy.

The operative findings were as follows; macroscopic inflammation of the appendix without perforation in 35.5% and perforation of the appendix in 57. Of the perforated appendices, 44% were associated with localized intra-abdominal contamination and 55% had generalized four-quadrant soiling. Thirty percent required TAC with planned repeat operation; major complication includes hospital acquired pneumonia in 12.5%, wound dehiscence in 7%, and renal failure in 3%. Post operatively 89.5% were admitted directly to the general ward, while 11% required admission to the ICU. The overall mortality was 2%. In the study the incidence of acute appendicitis among African patients seems to be increasing [41].

Another prospective study at Nigeria (Lagos), 250 cases of acute appendicitis was performed to critically analyze the patterns of presentations, management, operative finding and treatment out comes. There were 133 male 117 females giving a male to female ratio of 1.2:1, the mean age was 25.7 ± 10.5 years with the majority of cases (42.8%) occurring in the third decades of life, abdominal pain (100%), fever (48.4%), vomiting (47.8%) were the commonest symptoms. Commonly elicited signs include RIF direct tenderness (direct, 74.4%), rebound tenderness (59.2%), localized tenderness (59.2%), localized guarding (42.8%), and right rectal wall tenderness (43.2%). The mean WBC count was significantly elevated (mean $8\ 538 \pm 4166$ per mm^3), 63% of all appendices were retrocecal in position. Two hundred and forty-five patients (98%) with a diagnosis of acute appendicitis had appendectomy. The commonest post-operative complication was wound infection (8%), over all complication rate was 13.5% and negative appendectomy rate was 13.4% [42].

Retrospective 7 years studies at Kumasi Ghana, between January 1988 and December 2004, six hundred and thirty eight patients were studied. There were 408 men 230 women; a male to female ratio of 1.7:1. The mean age was 32.4 ± 15.0 .SD years. All patients were admitted with abdominal pain that were initially located at the umbilicus in 38.0% and diffused in 31.8%. Vomiting 85.7% fever 73.0% and anorexia 49% were the most frequent associated symptoms. The mean duration of illness was 74 hours. RIF pain and tenderness were present in 612 patients

(89.22%). The total WBC count was significantly raised, six hundred and thirty eight appendectomies were performed, 39% of appendices were perforated at operation and 25.9 % of the removed had no histological evidences of inflammation. The complication rate was 43.1% and wound infection (41.5%) was the most common. The average stay in hospital was 7 days. There were 12 deaths a mortality rate of 1.9% mostly elderly patients [43].

Another similar study at Nigeria in 5 years period investigating acute appendicitis 603 consecutive patients with the disease were studied in detail of this number 64.3% were females and 35.7% male giving female ; male ratio of 1.8:1. The patients were aged 4-65 years with a median age 22.1 years; females with a median age of 25.4 years. patients presented to hospital late ;3-5 days (median days) from the onset of symptoms, the strikingly most common of these was abdominal pain seen in all patients, and tenderness , local or with rebound was uniformly elicited. Supportive lab and radiological service were not regularly available; however, when WBC count was obtainable Leukocytosis with left shift was a useful finding. At operation 70% of patients had on acutely inflamed appendix, 20% gangrenous or perforated appendicitis and 3% an appendix abscess, appendix mass was palpable in 7% patients and those were treated conservatively. Wound infection complicated surgery in 3% patients; there were no operative deaths. Acute appendicitis was the 2nd most common surgical abdominal emergency during the period under study [44].

In Ethiopia, a total of 277 cases of acute appendicitis admitted from January 1st to December 31st 1998 at Zewiditu Memorial hospital (ZMM) were reviewed. 16(5.8%) had presented with a RLQ mass, which was managed conservatively while 261 (94.2%) had emergency surgery. At Operation, it was found that 184 (70.6%) had simple appendicitis, 45 (17.4%) had perforated, and 25(9.5%) gangrenous appendices. Seven (2.5%) had appendicular abscess with amputated stump left. The male to female ratio was 2.6:1. The patient's age ranged between 13 and 75 with the peak occurring between 13-30 years. The most common symptoms were abdominal pain, (100%) and Vomiting (76.9%) the commonest signs were localized tenderness in the RLAQ (92.4%) with rebound tenderness (70.4%). Digital rectal examination was done in 127 patients in whom tenderness was elicited in 80 (63%), of them the approach to the appendix in 78.4% of operation was thorough a transverse incision at Mc Burney's point. In ZMH, appendectomy was

found to be the most common emergency operations accounting for 46.7% of cases and carried a post-operative mortality rate of 1.2 % [28].

A retrospective study that was done on 200 cases of acute appendicitis surgically managed at Yirgalem hospital from January 1997 to December 1999. During this period the disease accounted for 27.9% of the operation for acute abdominal emergencies, and for 1.1% of total hospital admissions. There were 159 male and 41 females giving a male to female ratio of 3.9:1. The mean duration of illness at presentation and hospital stay were 3.4 ± 1.7 and 7.1 ± 5.3 days, respectively. All the cases presented with abdominal pain & a shift to the periumbilical abdominal pain to the RLQ was found in the majority. RLQ tenderness was the leading physical finding. The rate of simple and perforated appendicitis was 45.5% and 44% respectively. Thirty two percent of the patients had post-operative wound infection, out of 200 patients operated up on for acute appendicitis 8(4%) died [29].

2.1 Conceptual Framework

This conceptual framework is developed based on review of different literatures and textbooks. The arrows in the framework indicate the association between the boxed factors and the outcome variable of the study.

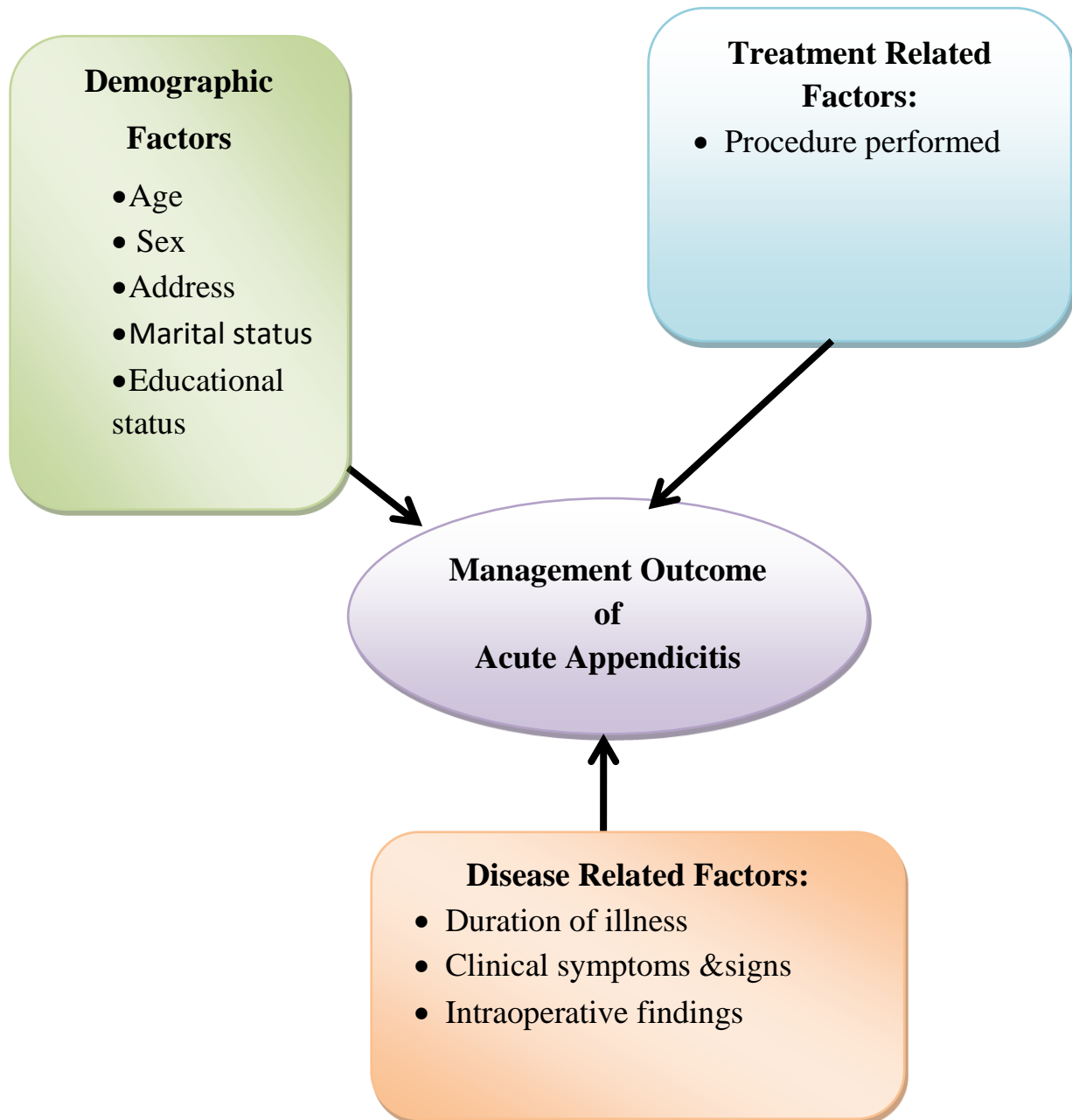


Figure 2.1: Conceptual framework: Factors affecting management outcome of acute appendicitis

Chapter Three

3. Objectives

3.1 General objective

To determine the prevalence, management outcome and factors affecting outcome of acute appendicitis in those patients who undergo appendectomy in Mizan Aman General Hospital in the study period.

3.2 specific objectives

- ❖ To determine the prevalence of acute appendicitis
- ❖ To determine the management outcome of appendicitis
- ❖ To identify factors affecting management outcome of appendicitis

CHAPTER FOUR

METHODS

4.1 The study area and period

The study was conducted at Mizan Aman General Hospital from April 01-30, 2014 G.C, in Aman town, SNNPR, Southwest Ethiopia, which is 574 kilometers from Addis Ababa. The Zone has 33 Health Centers which are government owned, and Mizan Aman General Hospital which is used as general hospital and owned and run by the Government (MizanAman Town Health Administration Office). The total population of the Bench Maji Zone was 760,314; of which 381,449 were males and 378,865 were females [45]. The hospital gives a general service for different parts of the Zone. The MAGH was established in 1986 G.C and it is the only general hospital in the Zone that serves for many peoples. It had 136 beds. Out of this 26 were found in surgical ward. Some of the services which given by this department were in patient service, emergency and elective minor and major surgical operations and blood transfusion. The total number of staff in the hospital was 251. Out of these 120 of them were health professionals including specialists, General practitioners, Health officers, Nurses, Lab technician. Numbers of health professionals in the surgical ward were a surgeon, and 13 clinical nurses [46].

4.2 study design

Facility based cross sectional study on the records review in all patients who had appendectomy at MizanAman General Hospital in the study period was conducted.

4.3 populations

4.3.1 Source of population

Records of all patients who were operated for surgical acute abdomen at MizanAman General Hospital from April 01, 2011- March 31, 2014

4.3.2 Study population

Selected records of 182 patients who have had appendectomy at Mizan Aman General Hospital from April 01, 2011- March 30, 2014

4.4 Sample size and sampling technique

4.4.1 Sample size

Since the study was retrospective review, all 182 patients operated for acute appendicitis during the period from April 01, 2011 to March 31, 2014 were included.

4.4.2 Sampling technique

The records of all patients who had emergency appendectomy was retrieved and analyzed.

4.4.3 Inclusion & Exclusion Criteria

Inclusion Criteria:

Patients, who have gotten operative management for acute appendicitis at MAGH from April 01, 2011 to March 31, 2014, were included in the study.

Exclusion Criteria:

All records of patients, who have undergone appendectomy of a normal appendix having an initial different diagnosis other than an acute appendicitis, were excluded from the study.

4.5 Variables

- **Dependent variables**
 - Outcome of acute appendicitis
 - Prevalence of acute appendicitis

- **Independent variables**
 - Age
 - Sex
 - Address
 - Ethnicity
 - Educational status
 - Marital status

- Length of hospital stay
- Duration of illness
- Clinical signs
- Clinical Symptoms
- Types of abdominal incision
- Intra-operative finding
- Procedure done

4.6 Data collection processes

4.6.1 Data collection instruments

Data collection tools were adopted from similar studies. Those tools include a special patient Performa which includes socio-demographic characteristics, signs and symptoms, physical findings, outcomes, complications encountered, and other relevant items related to disease. The structured checklist was documented from each patient card and surgery registration books.

4.6.2 Data collection procedures

The data collected by four graduated clinical nurses (Diploma) who were not employed in any health institution and were spend their full time in data collection. Training was given for two days for data collectors regarding the purpose of the study and the procedures to be followed for data collection and the principal investigator supervised them. The data collection was held from April 1-30 at Mizan Aman General Hospital.

4.7 Data processing and analysis

The quantitative data entered in to SPSS version 20.0, the frequency distribution of variables was examined to check for data entry errors (e.g. unrecognized of missing codes, out of range values). Descriptive analysis was used to describe socio-demographic variables and logistic regression analysis was made to obtain odds ratio and the confidence interval of statistical associations to determine the association between dependent and independent variables

.Statistical significance was declared at $P < 0.05$. The data was described and presented using text, tables and graphs.

4.8 Data quality assurance

The following measure was undertaken so as to control the quality of the data. The data collectors were trained. Before data collection started patients cards and surgery registration books was collected and cross matched. The checklist was pretested on selected 10 patients' documents and checked to avoid printing errors before data collection started. The name of the data collectors was recorded so as to enhance the responsibility to any incomplete data. Data collectors submitted the collected data to supervisor in daily basis and the supervisor checked the completeness of the data.

4.9 Ethical clearance

The ethical issue of this study was approved by the ethical committee of the Jimma University, Collage of Public Health and Medical Sciences, and official permission to undertake the study was obtained from Jimma University and MizanAman General Hospital. The supportive staffs (i.e. Card room workers and surgical staffs) were informed about the purpose of the study and verbal consent was obtained.

4.10 Limitation of the study

Improper registration of patient's relevant information on registration books

Since the study was facility based review, to draw inferences to the wider community can be difficult.

4.11 Operational definitions

❖ Classic presentation of acute appendicitis:

- Patients presenting with the following symptoms:
 - Right lower quadrant (right iliac fossa) abdominal pain
 - Anorexia
 - Nausea and/or vomiting

❖ Leukocytosis – laboratory finding of $WBC >10,000/mm^3$

- ❖ Negative appendicectomy is defined as one which is performed for a clinical diagnosis of acute appendicitis but where the appendix is found to be grossly normal.

Favorable outcome:

- ❖ Patients with a clinical diagnosis of acute appendicitis improved and discharged from the hospital and developed no postoperative complication

Length of Hospital stay:

- ❖ Number of days elapsed while the patient is in the hospital

Unfavorable outcome:

- ❖ Patients with a clinical diagnosis of acute appendicitis who improved but developed one or more postoperative complication(s), e.g. wound infection, intestinal obstruction, or
- ❖ Patients with a clinical diagnosis of acute appendicitis who have died in the intra- or post-operative period

Outcome:

- ❖ Condition of the patient at discharge (either improved and developed no postoperative complication or improved but developed one or more complication(s), or dead

4.12 Dissemination of result

The result of the study will be presented to Jimma University community as part of IEOS thesis; and it will be disseminated to Jimma University College of Public Health and Medical Sciences, department of INTEGRATED EMERGENCY OBS/GNYAND SURGERY, Zone and district health offices, to the targeted health facility and to NGOs working on this area. Further attempt will be made to publish it on national scientific journals.

CHAPTER FIVE

Results

5.1 Demographic characteristics Magnitude

Between the years April 1, 2011 to March 31, 2014, a total of 17,077 patients were admitted to MAG Hospital, out of these 5852 cases were admitted to the surgical ward of the hospital in the past three years, 376 of them were operated up on for acute non traumatic abdominal emergencies. One hundred and eighty two patients have undergone operative management for a clinical diagnosis of acute appendicitis. One hundred eighty two of the cases were acute appendicitis accounting for 48.4% of abdominal emergency operations, 3.1% Of all surgical admissions and 1.07% of total hospital admissions. The annual incidence of the disease was (about 56 -67cases per year) during the study period.

There were 120(65.9%) males and 62(34.1%) females giving male to female ratio of 1.94:1. One hundred and two cases (56%) were single while the remaining 80 (44%) were married. Seventy eight (42.9%) of the cases were protestant religion followers, while seventy six (41.8%), twenty eight (15.3%) were orthodox and Muslim religion followers. Regarding ethnic group of the patients, Amhara, Bench, Kefa and Others accounted 93(51.1%), 53(29.1%), 19(10.4%) and17 (9.3%) respectively.

The mean age of the study subjects was 23.18 ± 11.90 SD years, ranged from 2 to 80 years with interquartile range of 21 years and the median age of 21years. The age category included 0 - 10 years 13(7.1%) patients, 11-20 years 77(42.3%) patients, 21-30 years 58 (31.9%) patients, 31-40 years 20(11.0%) patients, 41-50 years6(3.3%) patients and >50 years 8 (4.4%) patients. The age and sex distribution of these patients is shown in figure 5.1.

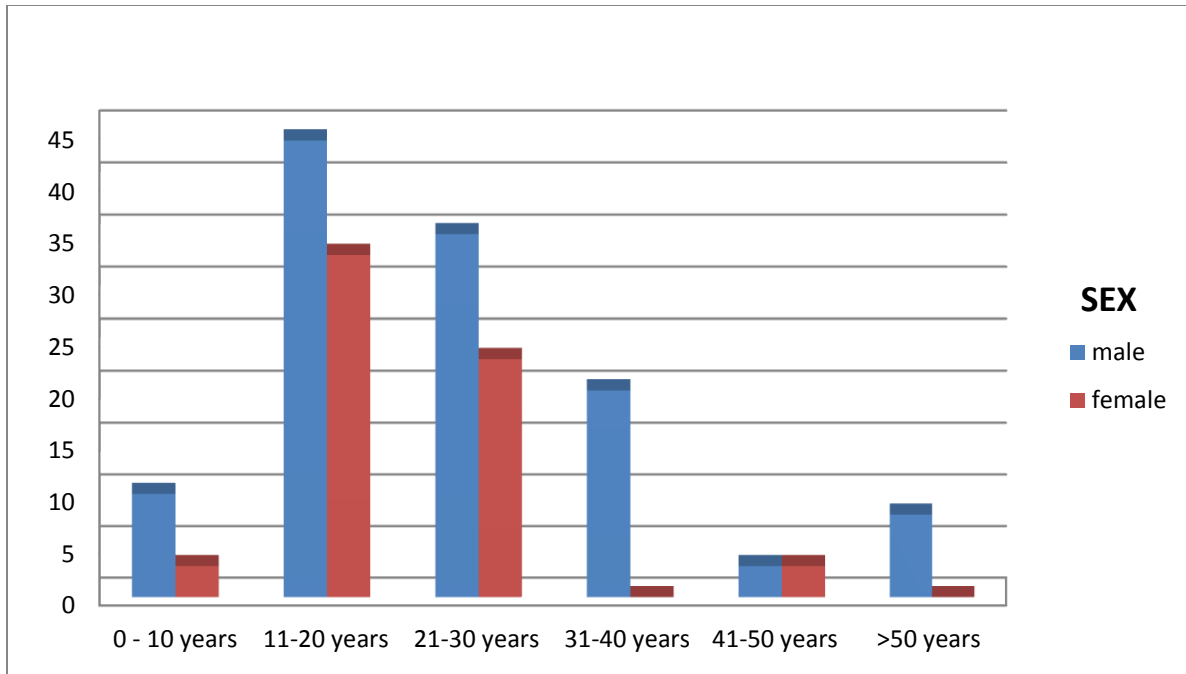


Figure 5.1: Age and sex distribution of patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014 (n=182)

With regard to address of these patients, ninety-four of the study subjects (51.6%) were MizanAman town dwellers while the remaining 88(48.4%) were from rural areas.(**Figure 5.2**).

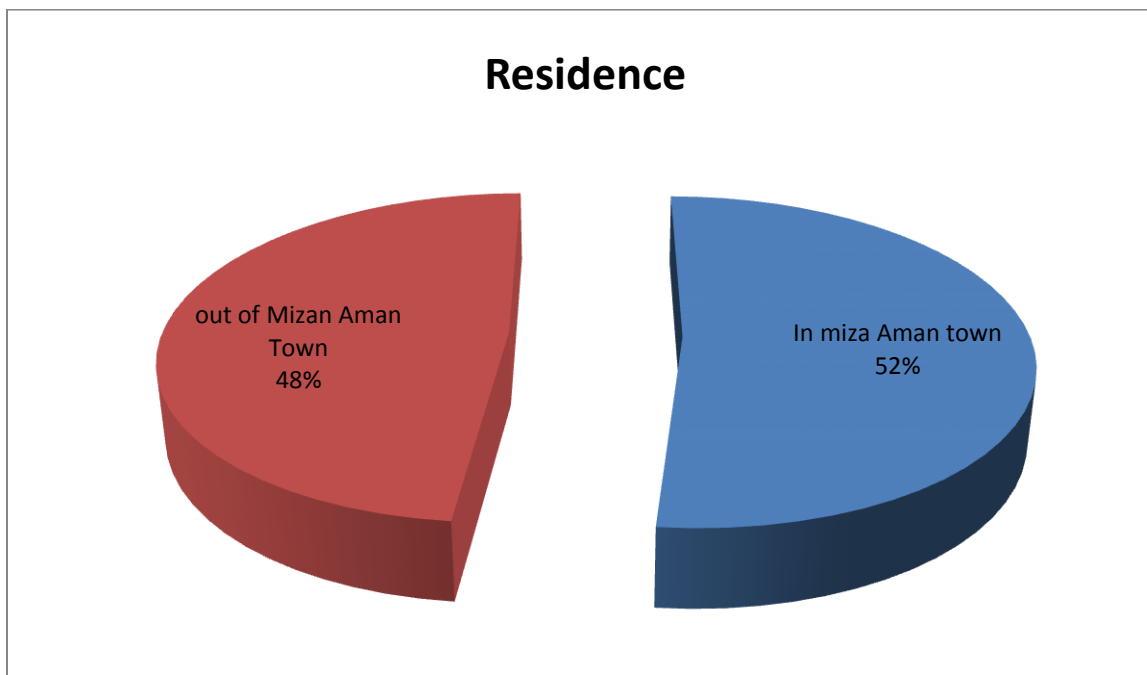


Figure 5.2: Address of patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

5.2 Pattern of Clinical Features

Duration of Illness:

One hundred and forty seven (86.5%) of the patients arrived the hospital after 24 hours of the onset of their illness of whom 107 (72.8%) were from out of Mizan-Aman town and the rest 40 (27.2%) were from out of Mizan-Aman town. Only 23 (13.5%) patients arrived within 24 hours (Table 5.1).

Table 5.1: Durations of illness by address of patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

| Duration of illness prior to admission | Address | | | | Total | |
|--|--------------------|------|------------------------|------|-------|-----|
| | In MIZAN AMAN Town | | Out of MIZAN AMAN Town | | No. | % |
| | No. | % | No. | % | | |
| <= 24 Hours | 62 | 34 | 18 | 9.9 | 80 | 44 |
| > 24 Hours | 32 | 17.6 | 70 | 38.4 | 102 | 56 |
| Total | 94 | 51.6 | 88 | 48.4 | 182 | 100 |

Clinical Symptoms:

Abdominal pain was invariably the main presenting complaint of the patients 182(100%). An initial periumbilical pain which latter shifted to the RLQ of the abdomen was observed in 106 (58.2%) patients. The remaining patients were presented with abdominal pain in unspecified sites 23 (12.6%). Ninety seven (53.3%) patients presented with vomiting. Loss of appetite was noticed in 150 (82.4%) patients. Fever and nausea were also the other presenting complaints of the patients, 95 (51.2%) and 116 (63.7%) respectively. (Table 5.2)

Clinical Signs:

During physical examination, abdominal tenderness was one of the major findings in the study patients. Hundred and forty three (78.6%) of them had tenderness over the RLQ (McBurney's point) of the abdomen. The rest 39(21.4%) of the patients had generalized abdominal tenderness. Fourteen (7.7%) patients were presented with RLQ mass.

WBC Count:

Total WBC count was determined for only 60 (33%) patients out of which a raised WBC count (>10,000 cells/mm³) was noted in 52 (86.6%).

Table 5.2: Clinical findings of patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

| Clinical Symptoms | Frequency | % |
|---|------------|-------------|
| Abdominal pain | 182 | 100 |
| Loss of appetite | 150 | 82.4 |
| Nausea | 116 | 63.7 |
| Periumbilical abdominal pain shifting to the RLQ | 106 | 58.6 |
| Vomiting | 97 | 53.3 |
| Fever | 95 | 52.2 |
| Abdominal pain in unspecified site | 23 | 12.6 |
| Diarrhea | 12 | 6.6 |
| Others** | 8 | 4.4 |
| Clinical Signs | | |
| RLQ (McBurney's point) tenderness | 143 | 78.6 |
| Generalized abdominal tenderness | 39 | 21.4 |
| RLQ abdominal mass | 14 | 7.7 |

Others** Include: Dysuria, hematuria, constipation, frequency of urination.

5.3 Management Profile

5.3.1 Intraoperative Findings and Surgical Intervention:

Different types of abdominal incisions were employed during operative management of the patients. Rocky Davis/RLQ transverse/Lanz incision was the commonest 163 (89.6%) incision followed by lower abdominal mid-line incision in 12 (6.6%), and gridiron incision in 7 (3.8%).

The intraoperative findings of these patients included an inflamed appendix in 78 (42.9%) patients followed by perforated appendix 40(22%), gangrenous appendix 29 (15.9%),

appendiceal mass 8 (4.4%), appendiceal abscess 6 (3.3%), and the appendix was found normal in 21 (11.5%) patients. (Figure 5.3)

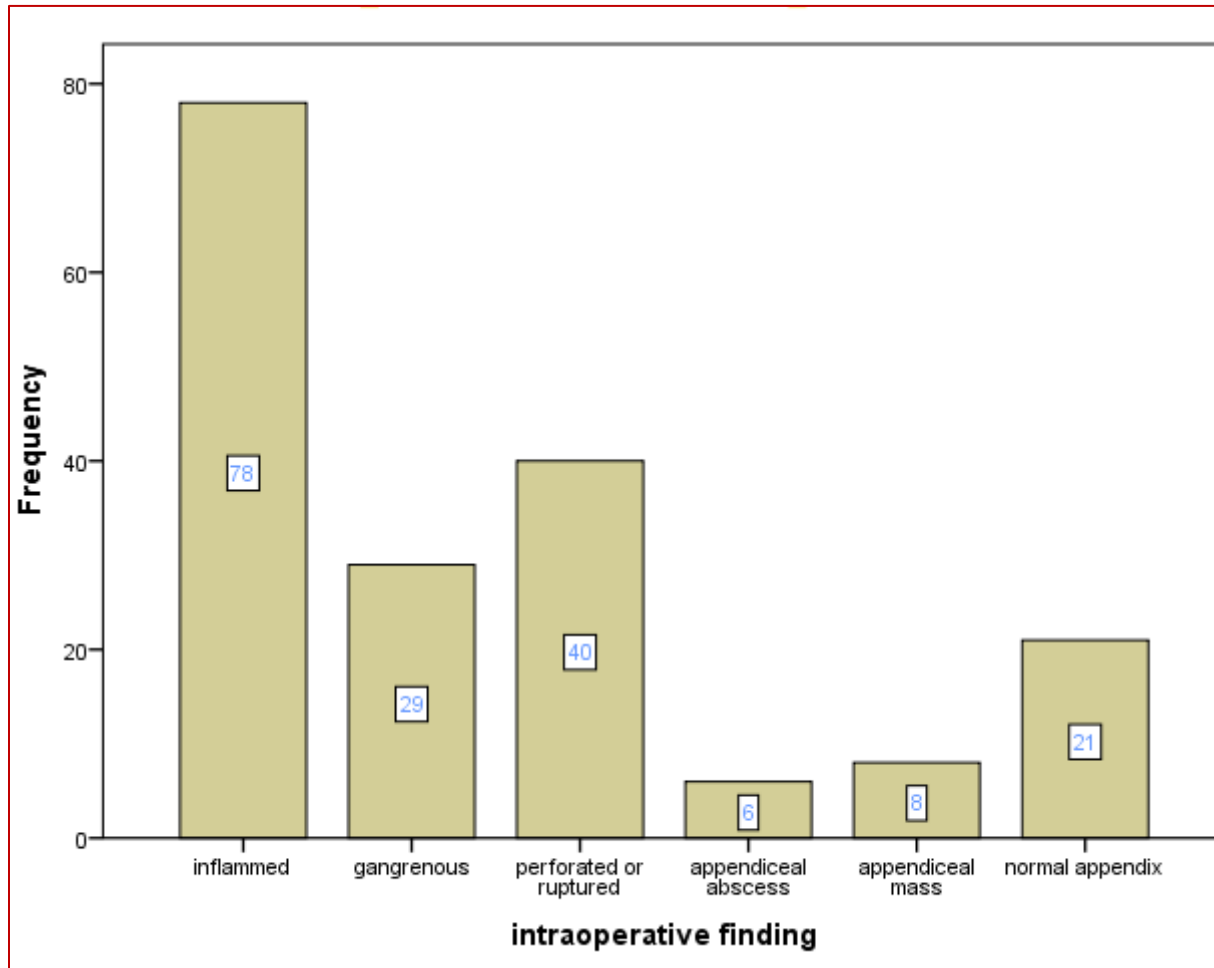


Figure 5.3: Intraoperative findings patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

Figure 5.4 shows the type of operative procedure performed for the patients. A total of 168 (92.3%) patients have undergone appendectomy. Of which 147(87.5%) patients have undergone appendectomy for acute appendicitis whereas 21 (12.5%) of them have undergone a negative or prophylactic appendectomy.

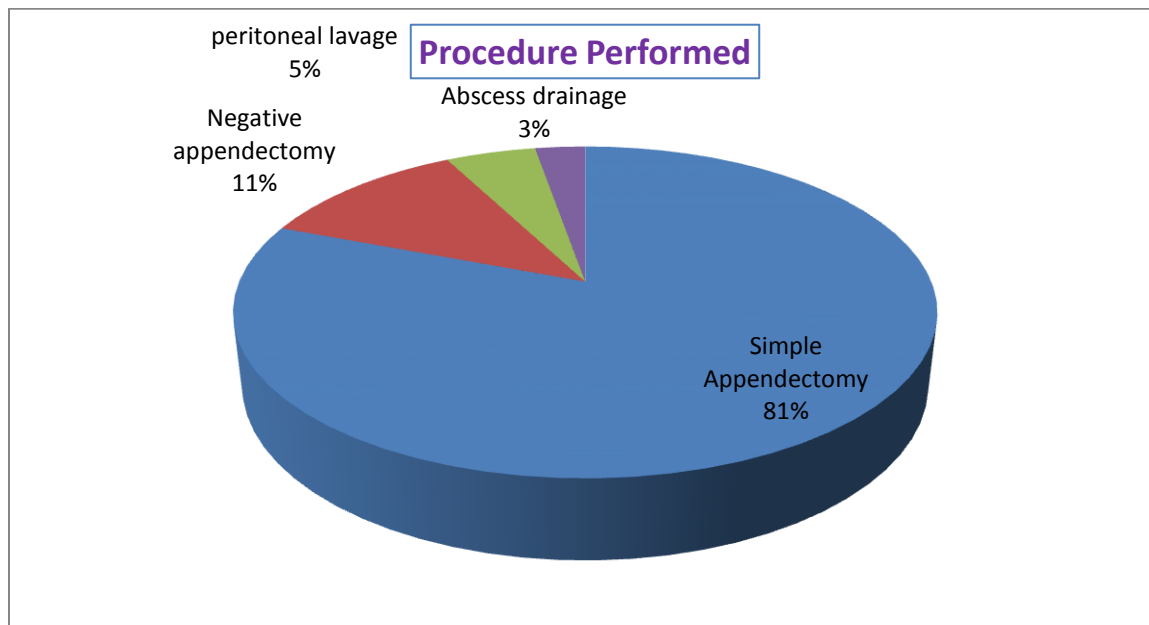


Figure 5.4: Operative procedures performed for patients with a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

5.3.2 Management Outcome of Acute Appendicitis

Postoperative Complication:

One hundred and twenty four (68.1%) of the patients had favorable outcome where they have improved and discharged from the hospital and developed no postoperative complication, but 58 (31.9%) of them had unfavorable outcome where they have improved but developed one or more postoperative complication(s) and one death. Postoperative wound infection was the predominant postoperative complication in 43/58 (66%) patients and paralytic ileus was found in 8/58 (12%) patients. Pneumonia 7/58(11%), peritonitis 4/58(6%)and faecal fistula 2/58(2%) were other complication(s) observed. There was a death recorded for two years old female child which complicated perforated appendix and gave the mortality rate of 0.55%.

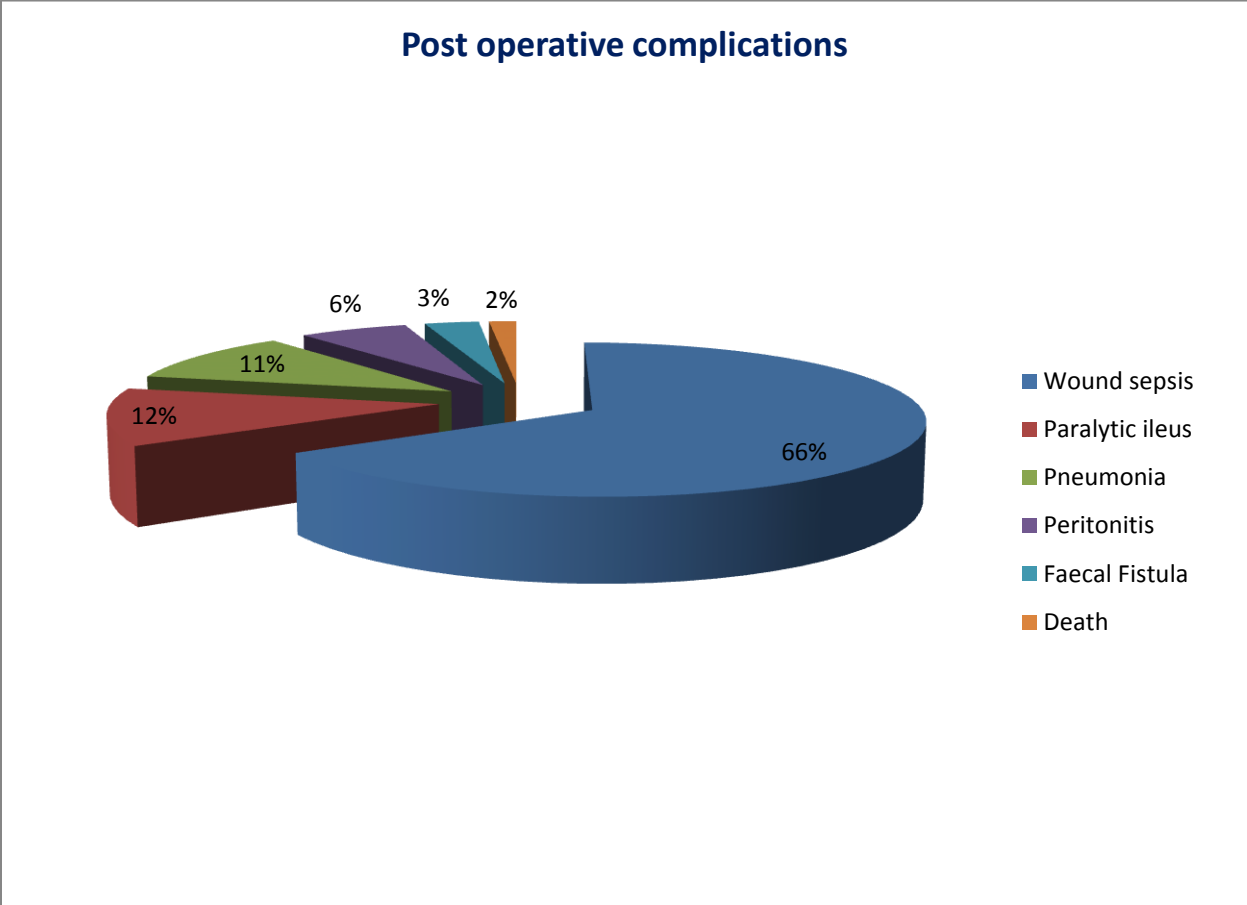


Figure 5.5: Postoperative complications found in patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

Length of Hospital Stay:

The length of hospital stay of the patients ranged from 3 to 18 days having an average length of stay of 10.5 days (Figure 5.6).

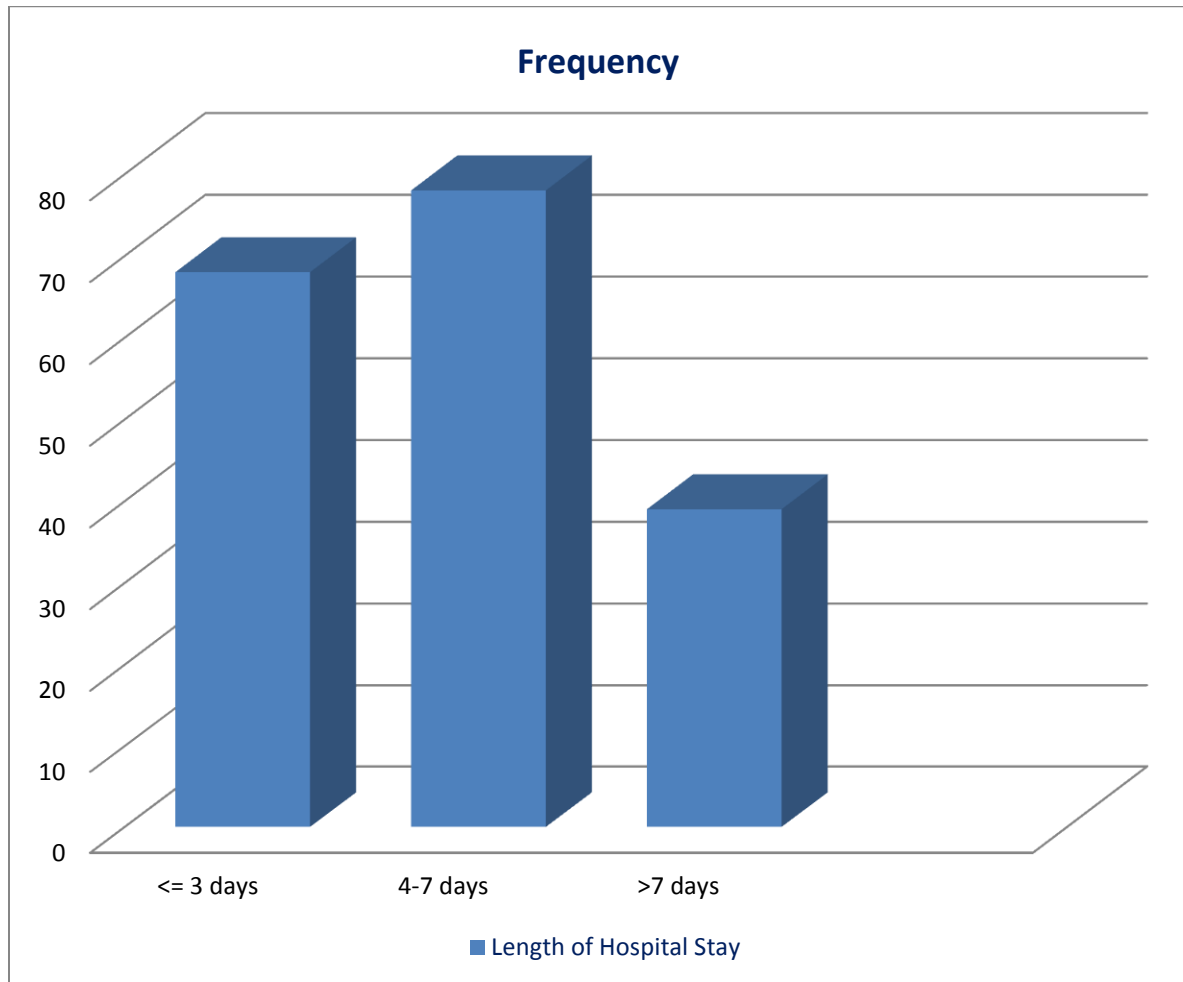


Figure 5.6: Length of hospital stay of patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

5.3.3 Factors Affecting Management Outcome of Acute Appendicitis

Measures of association were performed to test the association between each independent variable with the dependent variable, management outcome of acute appendicitis. (Table 5.4)

Table 5.3: Measures of association between factor and outcome of patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

| Variables | Management out come | | | COR 95% CI | P value | |
|---------------------|---------------------|------------|--------------|------------|--------------------|-------|
| | Total (N=182) | Favorabl e | Unfavorabl e | | | |
| Age | 1-10 | 13 | 9 | 4 | 1 | |
| | 11-20 | 77 | 44 | 33 | 1.688(0.478-5.957) | 0.416 |
| | 21-30 | 58 | 53 | 5 | 0.212(0.048-0.944) | 0.042 |
| | 31-40 | 20 | 7 | 13 | 4.179(0.938-18.61) | 0.061 |
| | 41- 50 | 6 | 3 | 3 | 2.250(0.308-16.41) | 0.042 |
| | > 50 | 8 | 0 | 8 | 0.000 | 0.999 |
| Sex | Male | 120 | 81 | 39 | 1.09(0.562-2.111) | 0.799 |
| | Female | 62 | 43 | 19 | 1 | |
| Address | In Mizan town | 94 | 76 | 18 | 0.284(0.146-0.552) | 0.000 |
| | Out of Mian | 88 | 48 | 40 | 1 | |
| Education al status | Literate | 137 | 102 | 35 | 0.328(0.163-0.661) | 0.002 |
| | Illiterate | 45 | 22 | 23 | 1 | |
| Marital status | Married | 80 | 50 | 30 | 1 | |
| | Unmarried | 102 | 74 | 28 | 0.631(0.331-1.181) | 0.150 |

| | | | | | | |
|-----------------------|----------|-----|-----|----|--------------------|-------|
| Duration of illness | <=24 hrs | 80 | 67 | 13 | 0.246(0.121-0.500) | 0.000 |
| | >24 hrs. | 102 | 57 | 45 | 1 | |
| Clinical Sign (Fever) | Yes | 95 | 54 | 41 | 1 | |
| | No | 87 | 70 | 17 | 0.320(0.164-0.624) | 0.001 |
| RLQ mass | Yes | 14 | 3 | 11 | 1 | |
| | No | 168 | 121 | 47 | 0.106(0.028-0.397) | 0.001 |
| Perforated appendix | Yes | 38 | 28 | 10 | 1 | |
| | No | 144 | 114 | 30 | 0.082(0.036-0.187) | 0.000 |
| LOS | <=3 days | 68 | 67 | 1 | 0.006(0.001-0.047) | 0.000 |
| | 4-7 days | 78 | 47 | 31 | 0.254(0.107-0.599) | 0.002 |
| | >7 day | 36 | 10 | 26 | 1 | |

From the table 5.4 the following statistical associations were obtained and interpreted depending on the study variables

- Study subjects who could not read and write developed post-operative complications of appendicitis 79% times higher when compared with their counterparty. [AOR=0.212(0.061-0.733)], $p \leq 0.014$.
- Patients with clinical symptom of fever possessed independently 91% times higher rate of developing complications post operatively [AOR= 0.092(0.027-0.313)] and $p \leq 0.001$.
- Perforated appendix independently affected the management outcome of appendicitis. Patients who had ruptured/ perforated appendicitis possessed 95% times higher risk to develop post-operative complications [AOR= 0.051(0.013-0.203)], $P \leq 0.001$.

- Patients who stayed longer than three days with in the hospital after operative management developed complication 99% times higher than those who discharged earlier.[AOR=0.013(0.001-0.127)], $p \leq 0.0001$.
- Study subjects who had RLAQ mass before operative management developed post-operative complications 96.7% higher when compared with patients without RLAQ mass. [AOR = 0.033 (0.005- 0.224)], $P \leq 0.001$

Table5.4 Measures of association between predictors and management outcome of patients operated for a clinical diagnosis of acute appendicitis at MAGH from April 1, 2011 to March 31, 2014(N=182)

| predictors | | Management outcome | | COR [95% CI] | AOR [95% CI] |
|--------------------|---------------|--------------------|-----------------|--------------------|--------------------|
| | | Favorabl e | Unfavorabl e | | |
| Educational status | Illiterate | 22 | 23 | 1 | 1 |
| | Literate | 102 | 35 | 0.328(0.163-0.661) | 0.212(0.061-0.733) |
| Fever | Yes | 54 | 41 | 1 | 1 |
| | No | 70 | 17 | 0.320(0.164-0.624) | 0.092(0.027-0.313) |
| RLQ mass | Yes | 3 | 11 | 1 | 1 |
| | No | 121 | 47 | 0.106(0.028-0.397) | 0.033(0.005-0.224) |
| Perforation | yes | 28 | 10 | 1 | 1 |
| | No | 114 | 30 | 0.082(0.036-0.187) | 0.051(0.013-0.203) |
| LOS | ≤ 3 days | 67 | 1 | 0.006(0.001-0.047) | 0.013(0.001-0.127) |
| | 4 – 7 days | 47 | 31 | 0.254(0.107-0.599) | 0.182(0.013-2.576) |
| | >7 days | 10 | 26 | 1 | 1 |

CHAPTER SIX

Discussion

Acute appendicitis is a common condition of acute abdomen in the developed world and its prevalence is lower in Africa. However, the disease is becoming common problem which contributes major surgical acute abdominal emergencies in Africa as well. [3,9,19]In the current study area there were 376 major operations performed for cases of surgical acute abdomen in the past three years of the study period. One hundred and eighty two (48.4%) operations were performed for patients with a clinical diagnosis of acute appendicitis. This magnitude was higher than the study conducted at ZMH and Yergalem Hospital, 46.7% and 27.9% respectively. [28, 29]

The analysis has shown that majority of patients with a clinical diagnosis of acute appendicitis were found to be in the second decades of life. This age pattern is in line with histological nature of the vermiform appendix in different studies. Histologically, the mucosa of the vermiform appendix has aggregations of lymphoid tissue, proliferation of which may block the lumen of the appendix. The peak incidence of appendicitis in childhood, adolescent and early adulthood coincides with the period of maximal lymphoid development the time in which an acute appendicitis supervene. This finding is in consistent with different literatures (1, 3, 11-13, 16, 27).

Although in a certain study an almost even sex distribution of acute appendicitis was reported (19), the male preponderance observed in this series is in agreement with many studies (7, 8, and 11). In different studies it was concluded that the male preponderance was a coincidental finding whereas another study pointed out as no apparent explanation could be given for this finding (8, 29). Therefore, it is highly recommended to have tie-breaking studies to reach at a scientific conclusion of why males are more affected than females.

The profile of residency of the patients with acute appendicitis has shown a different trend as that of previous study at Kijabe hospital, Kenya, where majority (95%) of them were from rural districts. However, in the study at Zewditu Memorial Hospital, Addis Ababa, Ethiopia, more than half of the patients were from Addis Ababa [17, 27].

The clinical symptoms of the patients showed a similar pattern as previous reports. As has been mentioned in many studies, abdominal pain was the most common symptom. Typical feature of a periumbilical pain shifting to the right lower quadrant of the abdomen was in agreement with the very patho-physiologic nature of the disease. In addition, studies conducted by A. Bekele, MD et al, Fashina IB, et al showed similar results. Loss of appetite was the next most common clinical presentation of patients followed by vomiting and fever. This finding has also been reported previously. [1, 8, 11, 28,30]

The physical findings are comparably the same as previous works. Tenderness over the right lower quadrant of the abdomen was the dominant physical finding as that of the findings of Singhal RA, and others. [11, 21, 25, 39] Determination of the total WBC counts together with a thorough history and proper physical examination helps to reach at a more accurate diagnosis of acute appendicitis. In this series about 86.6% patients had a raised WBC count [$>10,000/\text{mm}^3$] which is higher when compared with the results of different studies where 50% and 69.5% of the patients had a raised WBC count. Similarly, A. Bekele, MD et al have reported a raised WBC count on over two thirds of their study subjects. In the current study, a WBC count was determined only for 33% of all patients. A significant figure could have been obtained if WBC count was determined for at least majority of the patients. Though the role of a raised WBC count in the diagnosis of acute appendicitis has remained controversial, it helps in suspecting appendicitis in about 30% of cases [1, 3, 12, 23, and 28].

Being the treatment of choice, urgent removal of the appendix is achieved via an open method or through a laparoscopy. Rocky Davis/ RLQ transverse/Lanz incision was the commonest open method employed for appendectomy in this series whereas, lower mid line and gridiron incisions were the commonest in other studies. In the current study Rocky Davis / RLQ transverse / Lanz incision was preferred over the others probably because in this type of incision the exposure is better, extension, when needed, is easier and it is aesthetically more acceptable [1, 2, 3, 12, 28].

The commonest intraoperative finding of inflamed appendix (43.5%) is in agreement with findings of previous studies [14, 31]. However, few numbers of previous studies reported higher rates of intra-operative findings of inflamed appendix [11, 12, 25, and 32]. The 22% rate of perforated appendix seen in this study correlates with the rates seen in studies done in the United

States (19.2% in males and 17.8% in females). [16, 20, 26] Higher rates of perforation (54.4%, 44.0%, 34.0%, 25.9%, 23.2%, 22.7%, and 21.0%) were observed in different studies (8, 11, 14, 28, 29, 31, 32). The high rate of perforation in the current study, as compared to reports of lower rate, could be attributed to delayed presentation, which is a similar finding as the previous studies [18, 20, 27-29, 31]. Majority, (97%) of the study subjects with perforated appendix sought medical help after 24 hours of the onset of their illness.

The other possible explanation for a higher rate of perforated appendix is the age factor. Perforation rate is related being highest in the elderly and the very young which is thought to reflect both increased diagnostic difficulty and the less timely surgical intervention for persons in these extreme age groups. In this series, 52.5% perforations were observed in those cases of age group between 11-20 years (not statistically significant), which showed concordance finding with previous studies [16, 18, 26, 27].

Some of the grave complications of untreated appendicitis are the progression to gangrenous appendicitis and the formation of appendiceal abscess following specially a perforated appendix [2, 4, 5]. Six (3.3%) of the cases in this series had an intra-operative finding of appendiceal abscess, which is a higher rate (2.5%) as compared to the paper works at ZMM but similar rate (3%) as compared to the works of Oguntola AS. et al [28, 44]. In addition, there were 12.9% cases with gangrenous appendicitis, which is the same finding as previous studies (28, 12). In the series by Subedi N. et al., a lower rate (3.5%) of gangrenous appendicitis was found [25].

The explanation used for higher rate of perforation could also explain the relatively higher rates of appendiceal abscess and gangrenous appendicitis in this series. Accordingly, there is a direct correlation between these two variables and duration of illness prior to admission to hospital.

Accurate preoperative diagnosis is always not possible. Therefore, a certain rate of negative appendectomy is acceptable by many surgeons [1, 3, and 25]. This very nature of the disease was observed with 11.5% negative appendectomy rate in this series. The rate was the lowest as compared to previous studies (30). Either this could possibly be due to under diagnosis of patients for acute appendicitis, which raises a question on the diagnostic intelligence and

experience of the clinicians, or it could be due to non-operative management of those patients who were once diagnosed to have acute appendicitis.

The patterns of postoperative complications and the length of hospital stay were found to be in line with the findings of other investigators [1, 8, 11, 18, 22, 28, 30-32, 35]. The overall postoperative complication rate (31.9%) was the same as compared to 32.5% and lower than 34.9% rates in South West Nigeria [21]. Of overall postoperative complications, 66.7% postoperative wound infection rate is found to be the highest in comparison to as low as 10.9% and as high as 50.9% rates in previous studies [11, 14, 26, 28-32, 35]. This highest postoperative wound infection rate is probably because most of the patients presented lately after they have reached at a more complicated clinical stage of the disease. In the series, it was found that of those patients with postoperative wound infection, 40% of the patients were found to have perforated appendix intra-operatively. The other possible explanation for the highest wound infection rate in this series is the duration of illness prior to presentation to the hospital. The study has shown that of those patients who developed postoperative wound infection, 72% sought medical help 24 hours later the onset of their illness (not statistically significant).

The overall mean postoperative length of hospital stay (6.5 days) is comparably the lower from that of previous studies [14, 22, 26, 29, and 31]. However, it is as high as compared to that of the study at Durban, South Africa (6.5 days) [41]. It is observed that the mean postoperative length of hospital stay was highly influenced by the clinical stage of the disease ($P = 0.000$). In this series, it was remarkably longest for those patients with perforated appendicitis (9.6 days) which is a similar finding as Addis et al but the highest from reports of Al-Omran et al (6.2 days) (9, 12).

The other influencing factor of length of postoperative hospital stay was the degree of postoperative complication. It was found that patients with one or more postoperative complications had longer days of hospital stay as compared to those without postoperative complication (10.4 days with complication vs. 6.6 days without complication, $P = 0.003$). As explained by Willmore W. S. et al, particularly in the presence of postoperative wound infection, the length of hospital stay remarkably increased. In the current study, the mean postoperative length of hospital stay for those patients who developed postoperative wound infection was 11

days (17), same as in Ei Obeid, Western Sudan and Asir, Saudi Arabia. [13, 25, 32, 37] There was mortality recorded to two years old female child in this series who diagnosed lately with ruptured appendicitis complicated by peritonitis. The mortality rate (0.55%) differed from other studies with higher rates. [8, 11-15, 19, 26, 28, 29] This is due probably to the better health care services given to the patients such as improved perioperative routines and postoperative care [19].

Chapter Seven: Conclusions and Recommendations

7.1 Conclusions

- The incidence of acute appendicitis was higher in this series.
- Majority of patients with acute appendicitis were in the second and third decades of life.
- Males are more affected.
- Almost two-thirds of the patients presented lately after 24 hours of onset of their illness.
- Abdominal pain is invariably the main presenting complaint.
- Late presentation and being young age are associated with gangrenous appendicitis, appendiceal perforation, and appendiceal abscess formation.
- The mortality rate was 1/182(0.55%) in this series.
- Patients educational status, clinical symptom (fever), clinical sign (RLQ mass), perforation of the appendix and length of hospital stay independently affected the management outcome of acute appendicitis in this study.

7.2 Recommendations

- Based on the study findings the following recommendations were forwarded:
 - When patients who are in their second and third decades of life present with abdominal pain, they need to be assessed thoroughly for acute appendicitis.
 - The treating clinicians need to have high index of suspicion of acute appendicitis for male patients.
 - The clinicians need to record all the intraoperative findings on medical charts of the patients.
 - Further studies should be conducted on the large scale of sample size in the future to assess the magnitude of acute appendicitis in the area
 - Patients with fever and RLAQ mass should be assessed carefully preoperatively and post operatively, moreover RLAQ mass better be evaluated and managed non- operatively.
 - Surgical ward and operation theater staffs should revise their infection prevention practice and adhere to universal infection prevention protocol.
 - Early referral of patients with sign and symptom of abdominal pain, anorexia and RLQ abdominal tenderness and linkages between peripheral health facilities and the hospital should be strengthened

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Annex

Checklist

Jimma University College of Public Health and Medical Sciences Department of Integrated Emergency Surgery (Obstetrics, Gynecology and General Surgery), checklist for research activity on Prevalence & Management Outcome of Acute Appendicitis at MizanAman General Hospital, Southern People's Regional State, South Western Ethiopia

Part I: Demographic Pattern

| Ques No. | Questions | Coding Category |
|----------|----------------|---------------------------|
| 101 | Age in years | 1. 0 – 10 |
| | | 2. 11 – 20 |
| | | 3. 21 – 30 |
| | | 4. 31 – 40 |
| | | 5. 41 – 50 |
| | | 6. >50 |
| 102 | Sex | 1. Male |
| | | 2. Female |
| 103 | Address | 1. In Mizan-Aman town |
| | | 2. Out of Mizan-Aman town |
| 104 | Marital status | 1. Married |
| | | 2. Unmarried |
| 105 | Ethnicity | 1. Bench |
| | | 2. Amhara |
| | | 3. Keffa |
| | | 4. Others |
| 106 | Education | 1. literate |
| | | 2. Illeterate |
| 107 | Religion | 1. Orthodox |
| | | 2. Muslim |
| | | 3. Protestant |

Part II: Pattern of Clinical Profile

| Ques. No. | Questions | Coding Category |
|-----------|--|---|
| 201 | Duration of illness prior to admission | 1. ≤24 Hours |
| | | 2. > 24 Hours |
| 202 | Abdominal pain location | 1. Periumbilical pain shifting to the RLQ |
| | | 2. RLQ |
| | | 3. Unspecified sites |
| 203 | Decreased or loss of appetite | 1. Yes |
| | | 2. No |
| 204 | Vomiting | 1. Yes |
| | | 2. No |
| 205 | Nausea | 1. Yes |
| | | 2. No |
| 206 | Fever | 1. Yes |
| | | 2. No |
| 207 | Associated symptoms | 1. Diarrhea |
| | | 2. Other(s) |
| 208 | Abdominal tenderness location | 1. RLQ (McBurney's point) |
| | | 2. Unspecified |
| | | 3. Generalized |
| 209 | RLQ mass | 1. Yes |
| | | 2. No |
| 2010 | Raised white blood cells count | 1. Yes |

| | | |
|------|-----------------------------------|--------|
| | (> 10,000 cells/mm ³) | 2.No |
| 2011 | Wound infection | 1. Yes |
| | | 2.No |
| 2012 | Paralytic ileus | 1. Yes |
| | | 2.No |
| 2013 | peritonitis | 1. Yes |
| | | 2.No |
| 2014 | Chest infections | 1. Yes |
| | | 2.No |
| 2015 | Faecal fistula | 1. Yes |
| | | 2.No |

Part III: Management Profile

| Ques No. | Questions | Coding Category |
|----------|----------------------------|--|
| 301 | Type of abdominal incision | 1. Rockey Davis/ RLQ transverse/ Lanz |
| | | 2. Grid iron |
| | | 3. Lower midline |
| | | 4. Others* |
| 302 | Intraoperative findings | 1. Inflamed/ Phlegmonous appendix |
| | | 2. Gangrenous appendix |
| | | 3. Perforated/ Ruptured appendix |
| | | 4. Appendiceal abscess |
| | | 5. Appendiceal mass |
| | | 6. Normal appendix |
| 303 | Procedure performed | 1. Appendectomy |
| | | 2. Abscess drainage |
| | | 3. Negative /Prophylactic appendectomy |
| | | 4. Negative laparotomy |

| | | |
|-----|------------------------------|--|
| | | 5. Peritoneal lavage |
| 304 | Post-operative complications | 1. Surgical wound infection / Wound dehiscence |
| | | 2. Fistula |
| | | 3. chest infections |
| | | 4. Bowel adhesions |
| | | 5. No complication |
| 305 | Length of hospital stay | 1. ≤ 3 days |
| | | 2. 4 – 7 days |
| | | 3. > 7 days |
| 306 | Outcome of patient | 4. 1. Alive |
| | | 5. 2. Dead |

*Others include paramedian, Pfannenstiel, midline, transverse sub-umbilical

Declaration

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been fully acknowledged.

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The thesis has been submitted for examination with my approval as university advisor.

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Date _____