

**ATHREE YEARS REVIEW OF ASSESSING THE INCIDENCE
AND TREATMENT OUTCOMES OF ACUTE APPENDICITIS
AT METTU KARL HOSPITAL, OROMIA REGIONAL STATE,
SOUTH WESTERN ETHIOPIA.**



BY: DIRIBA AYANA

**THESIS SUBMITTED TO JIMMA UNIVERSITY MEDICAL CENTER
HEALTH SCIENCE INSTITUTE-DEPARTMENT OF SURGERY, JIMMA
UNIVERSITY; IN PARTIAL FULFILLMENT FOR THE REQUIREMENT
FOR THE DEGREE OF MASTERS OF SCIENCE (MSc.) IN
INTEGRATED EMERGENCY OBSTETRICS AND GYNECOLOGY AND
GENERAL SURGERY.**

OCTOBER, 2017

JIMMA ETHIOPIA

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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.

Objectives: To determine the incidence and management outcome of acute appendicitis in Mettu Karl Hospital.

Methods: Retrospective review of hospital records of all 245 cases with acute appendicitis surgically managed in Mettu Karl Hospital. From January 1, 2014 through December 30, 2016 Secondary data collected using structured check list, checked for its Completeness, entered, edited, cleaned and analyzed by SPSS version 16.1. Descriptive analysis used to describe socio-demographic variables and logistic regression carried out to see the effect of independent variables on outcome of acute appendicitis. Significant factors were reported at $p < 0.05$. The result presented using text, tables and graphs.

Results: 245 patients were operated for acute appendicitis. Of whom there were 150(61.2%) males and 95(38.8%) females giving male to female ratio of 1.57:1. Abdominal pain main presenting complaint in 245 (100%) and right lower quadrant abdominal tenderness the dominant physical finding in 201(82%) of these patients. Appendectomy done for 173 (70.6%) patients. The predominant postoperative complication postoperative wound infection in 18/245 (7.4%). The average length of hospital stays 6.5 days. Age of patients has statistically significant association with risk factors of (AOR=4.167, 95% CI: 5.212-3.332 P-value= <0.000), those patients whose ages <30 years were 4.167 times more likely to have affected when compared with patients older than 30 years of age.

Conclusion and Recommendations: Acute appendicitis mainly affects the young population group in the second decades of life and males are more affected.

Patients with fever and RLAQ mass should be assessed carefully preoperatively and post operatively, moreover RLAQ mass better be evaluated and managed non- operatively.

KEY WORDS: Acute appendicitis, Appendectomy, Mettu Karl Hospital.

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ACRONYMS

ICU	Intensive Care Unit IESO
IgA	Immunoglobulin A
MKH	Mettu Karl Hospital
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
LOS	Length of Hospital Stay

1 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. and one as the most common causes as secure acute abdomens pain worldwide correctly diagnosed on acute form of appendicitis is known as rambling appendicitis (1,3).

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, which the incidence of appendicitis is much lower in under developed countries, especially parts of Africa, and lower socioeconomic groups. The mortality rate in the United States decreased eight fold between 1941and 1970 but has remained at <1 per 100,000 since then (4).

Appendicitis is the most common surgical cause of abdominal pain worldwide. (7, 8, 19) 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)

Report of increasing avoidance in African countries has been reported by some authors in the last few decades, changing to western life style and including diets have been held responsible for this (11). It is generally reported to be more common in males, and usually occurs in the age range of 10-30 years, (12,19).although magnate form port- Harcourt in Nigeria , founded a

significantly higher incidence in females and higher incidences have been reported in the summer months by many authors (9,10).

In our country over a five years period, appendectomy comprised 17.32% on emergency abdominal operation at Gondar collage of medical hospital Ethiopia. The mortality rate 4.5% and the annual incidence uniform (nineteen to twenty-two cases per year) (12, 20).

In Mattu Kari referral hospital there is no study done the incidence and magnitude of appendicitis, the aim of this study is to assess for incidence and magnitude of acute appendicitis with age, sex, treatment out come and seasons of the year.

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 (8, 9)

A study at Tikur Anbesa Specialized Hospital between the year 1999 to2000, a total of 147 children's under the age of 13 years admitted for acute appendicitis were analyzed. The mean age 9.3 years, and appendicitis occurred more commonly among males. Factors independently found to be predictors of perforation by univariate analysis were; age <10years ,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 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 were reviewed. 16(5.8%) had presented with a RLQ mass, which managed conservatively while 261 (94.2%) had emergency surgery. At operation, it found that 184 (70.6%) had simple appendicitis, 45 (17.4%) had perforated, and 25(9.5%) gangrenous appendices. Seven (2.5%) had appendice abscess with amputated stump left. The male to female ratio 2.6:1.

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 done in 127 patients in whom tenderness elicited in 80 (63%), of them the approach to the appendix in 78.4% of operation thorough a transverse incision at McBurney's point. In Zewiditu memorial hospital, appendectomy found to be the most common emergency operations, accounting for 46.7% of cases and carried a post-operative mortality rate of 1.2 % (20). 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 (19).

In Mattu Karl Referral 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 incidence 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 where conducted in the study area.

1.3 Significance of the study

This study will help to indicate the incidence and magnitude of appendicitis, treatment outcomes and also association of demographic factors with this disease in the study area, and will help for the pre-requests of master graduation. The study will provide the current incidence 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 treatment outcome of acute appendicitis that is going on similar health institutions around selected countries in the world including Ethiopia.

2 LITERATURE REVIEW

A study at Nottingham, UK in adult patients (>16 Yrs) undergoing an emergency appendectomy at a University Teaching Hospital between Feb. 2009 and Jan.2010, 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 one death (0.5%) (1).

A 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 made on these 36 cases to assess the natural history, management and outcome in these children. Abdominal pain the commonest symptom but not invariable; being present in only 32 of the 36 children while vomiting present in 28 children. Localized tenderness in the RIF present in 21 children and generalized in 10. In 5 children there a delay in diagnosis in excess of 18 hrs. There no mortality and the wound sepsis rate 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 (3, 22).

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 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. 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 (26).

A 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. 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 > 12x10⁹/L (91.5 vs 84.3%). The overall negative appendectomy rate 10.0%, for children and 19.0% for adults; the perforation rate 19.0% and 13.8% respectively. 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 (6).

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. Sixty (56.6%) patients had perforation at the time of surgery. Complicated appendicitis associated with a longer hospital stay and more post-operative complications (9).

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 3.7 days. Surgical access 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. The overall mortality 2%. In the study the incidence of acute appendicitis among African patients seems to be increasing (2)

Another prospective study at Nigeria (Lagos), 250 cases of acute appendicitis performed to critically analyze the patterns of presentations, management, operative finding and treatment outcomes. There were 133 male 117 females giving a male to female ratio of 1.2:1, the mean age 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 significantly elevated (mean $8\ 538\pm 4166$ per mm³), 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 wound infection (8%), over all complication rate 13.5% and negative appendectomy rate 13.4% (3).

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. 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. RIF pain and tenderness were present in 612 patients (89.22%). The total WBC count 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 43.1% and wound infection (41.5%) the most common. The average stays in hospital 7 days. There were 12 deaths a mortality rate of 1.9% mostly elderly patients (24)

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 managed conservatively while 261 (94.2%) had emergency surgery. At Operation, it 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 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%). In 78.4% of operation thorough a transverse incision at Mc Burney's point. In ZMH, appendectomy found to be the most common emergency operations accounting for 46.7% of cases and carried a post-operative mortality rate of 1.2 % (19).

A retrospective study that 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. All the cases presented with abdominal pain & a shift to the periumbilical abdominal pain to the RLQ found in the majority. RLQ tenderness the leading physical finding. The rate of simple and perforated appendicitis 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 (20).

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3: OBJECTIVES

3.1 General objective

To determine the incidence and treatment outcomes of acute appendicitis in those patients who undergo appendectomy in Mettu karl Hospital, Oromia regional state, south western Ethiopia from January 1, 2014 through December 30, 2016

3.2. Specific objectives

- ✓ To determine the incidence of acute appendicitis in patients who undergo appendectomy in Mettu karl Hospital.
- ✓ To determine the incidence of treatment outcome in patients who undergo appendectomy in Mettu karl Hospital.
- ✓ To identify factors affecting treatment out come at different age groups in patients who undergo appendectomy in Mettu karl Hospital.

4 METHODOLOGY

4.1 Study Area and Period

The study conducted in Mettu Karl hospital from January 1, 2014 to December 30, 2016 Mettu Karl Hospital is one of the zonal hospitals in Oromia regional national state. It is found in the center of capital city of Illu-Ababora Zone, Mettu Town. It is the only governmental hospital in the town located at 620 Km to the south west of Addis Ababa. It is established by Swedish Missionaries and Ras Teferi in 1932. Currently, it provides full health services for the population of Illu-Ababora zone and its surroundings estimated to be 1.5 million people.

The hospital has 138 health professionals of different fields including specialists, general practitioners, health officers, nurses, laboratory technicians and 131 supporting staffs. There are a total of 160 beds in the surgical, medical, gynecology-obstetrics and pediatrics wards of the hospital. Of which 51 beds are found in the surgical ward. Currently, the surgical ward is run by tow senior general surgeon, one integrated emergency surgery specialist and 13 clinical nurses.

4.2 Study Design

A retrospective Facility based cross sectional study design conducted to review pattern and outcome of acute appendicitis in the past three years.

4.3 Population

4.3.1 Source Population

All records of patients who were operated for surgical for acute abdomen at Mettu Karl hospital from January 1, 2014 through December 30, 2016.

4.3.2 Study Population

All records of patients who had appendectomy at Mettu Karl hospital with a diagnosis of acute abdomen secondary to acute appendicitis from January 1, 2014 through December 30, 2016.

4.3.3 Inclusion & Exclusion Criteria

Inclusion Criteria:

All records of patients with acute appendicitis

Exclusion Criteria:

All records of patients who have undergone appendectomy of a normal appendix having an initial different diagnosis other than an acute appendicitis.

4.4 Sampling Technique

First, all operative records from major operation registry book in the operation room and all surgical admissions from admission/discharge registry book in the surgical ward were reviewed to identify patients treated with acute appendicitis from January 1, 2014 through December 30, 2016.

Next, using card number of patients treated with acute appendicitis retrieved from the operation room and surgical ward books, patients' card were collected from the card room.

Finally, based on the inclusion and exclusion criteria of the study, 245 cards were selected for analysis.

4.5 study variables

4.5.1 Dependant Variables

Outcome of the patient (favorable or unfavorable)

4.5.2 Independent variable

Age

Gender

Place of birth

Duration of illness

Clinical symptom

Clinical sign

Type of abdominal incision

Intra-operative finding

Procedure done

Length of hospital stay

4.6 data collection Instruments and procedure.

A pre-prepared checklist developed after review of relevant literatures. Data collection procedure started in the operation room and surgical ward of the hospital followed by collecting the relevant cards from the card room. Appropriate information were gathered and entered in to the pre-prepared checklist.

4.7 data Quality control.

Before actual data collection, the checklist tested for validity and reliability making a pilot study on similar records at Jimma University Specialized Hospital. Possible amendments were made to the tool based on the findings of the pilot study. Regular monitoring and appropriate data collection technique were followed during the process of data collection. Finally, crosschecking made between data obtained from operation room books with that of patients' cards.

4.8 Data Processing, Analysis and Interpretation

Data analyzed using SPSS version 16.0 windows soft ware computer program and Descriptive analysis used to describe socio-demographic variables and logistic regression analysis made to obtain odds ratio and the confidence interval of statistical associations to determine the association between dependent and independent variables. Statistical significance declared at $P < 0.05$. The data described and presented using text, tables and graphs.

4.9 operational definitions

- **Atypical or non-specific presentation of acute appendicitis:**

Patients presenting with the following symptoms:

- ✓ Indigestion
- ✓ Bowel irregularity
- ✓ Diarrhea
- ✓ Generalized malaise

Classic presentation of acute appendicitis:

Patients presenting with the following symptoms:

- ✓ Right lower quadrant (right iliac fossa) abdominal pain
- ✓ Anorexia
- ✓ Nausea and/or vomiting

Clinical diagnosis of acute appendicitis: Initial clinical assessment in acute appendicitis without employment of imaging modalities, laparoscopy or any other accessory diagnostic test

- **Normal appendix:** The vermiform appendix without any sign of inflammation, gangrene, abscess or perforation
- **Negative appendectomy:** One, which is performed for a clinical diagnosis of acute appendicitis but where the appendix is found to be normal
- **Postoperative wound infection:** An infection in the tissues of the incision and operative area
- **Surgical acute abdomen:** A sudden, severe abdominal pain that requires prompt surgical exploration of the abdomen
- **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

4.10 Ethical Consideration

The final thesis proposal was submitted to Ethical Clearance Board of Jimma University for possible revision. Letter from the board was submitted to Mettu Karl Hospital administrative office and permission to conduct the research activity was guaranteed. Data collection was started following official permission from Mettu Karl Hospital.

4.11 Dissemination of Results

Having obtained the approval from Jimma University the findings of this research was disseminated to:

- Jimma University College of Public Health and Medical Sciences
- Jimma University College of Public Health and Medical Sciences Surgery Department
- Mettu Karl Hospital
- Peer reviewed Medical Journals

5 RESULTS

Demographic Characteristics Magnitude

Between the years January 1, 2014 through December 30, 2016, a total of 17,647 patients were admitted to Mattu Hospital, out of these 6857 cases were admitted to the surgical ward among them 286 due to acute appendicitis in the past three years. 576 operated for acute non traumatic abdominal emergencies among them 245 due to acute appendicitis.

Two hundred and forty-five (245) patients have undergone operative management for a clinical diagnosis of acute appendicitis, accounting for 85.6% of acute appendicitis, 42.5% of abdominal emergency operations, 3.6% Of all surgical admissions and 1.38% of total hospital admissions.

There were 150(61.2%) males and 95(38.8%) females giving male to female ratio of 1.57:1. The mean age of the study subjects were 23.4 ± 1.01 SD years, ranged from 5 to 50 years and the median age of 21 years.

The age category included 0 - 10 years 45(18.4%), 29(11.8%)male and 16(6.5%)female patients, 11-20 years 107(43.7%),62(25.3%)male and 45(18.4%)female patients, 21-30 years 69 (28.1%),43(17.5%)male and 26(10.6%)female patients, 31-40 years 16(6.5%),11(4.4%)male and 5(2.1%)female patients, 41-50 years 4(1.6%)male patients and >50 years 4 (1.5%), 1(0.4%)male and 3(1.2%)female patients.

The age and sex distribution of these patients is shown in (table 5.1)

Table 5.1: Age sex and address distribution of patients operated for a clinical diagnosis of acute appendicitis at MKRH from January 1, 2014 through December 30, 2016 (n=245)

age	Gender						Address			
	Male		female		Total		Mattu	Outof Mattu	Total	
	n _o	%	n _o	%	n _o	%	n _o	n _o	n _o	%
0-10	28	11.8	16	6.6	45	18.4	32	13	45	18.4
11-20	62	25.3	45	18.4	107	43.7	55	52	107	43.7
21-30	43	17.6	26	10.6	69	28.2	43	26	69	28.2
31-40	11	4.5	5	2	16	6.5	11	5	16	6.5
41-50	4	1.6	0	0	4	1.6	0	4	4	1.6
>50yr	1	0.4	2	1.2	4	1.6	2	2	4	1.6
Total	150	61.2	95	38.8	245	100	143	102	245	100%

Pattern of Clinical Features

With regard to address of these patients, one hundred forty three(143) of the study subjects (58.4%) were Mattu town and 111 (45.3%) of them presented before 24hr,

while the remaining 102(41.6%) were from rural areas 75(30.6%) of them presented before 24hr.(Figure 5.2)

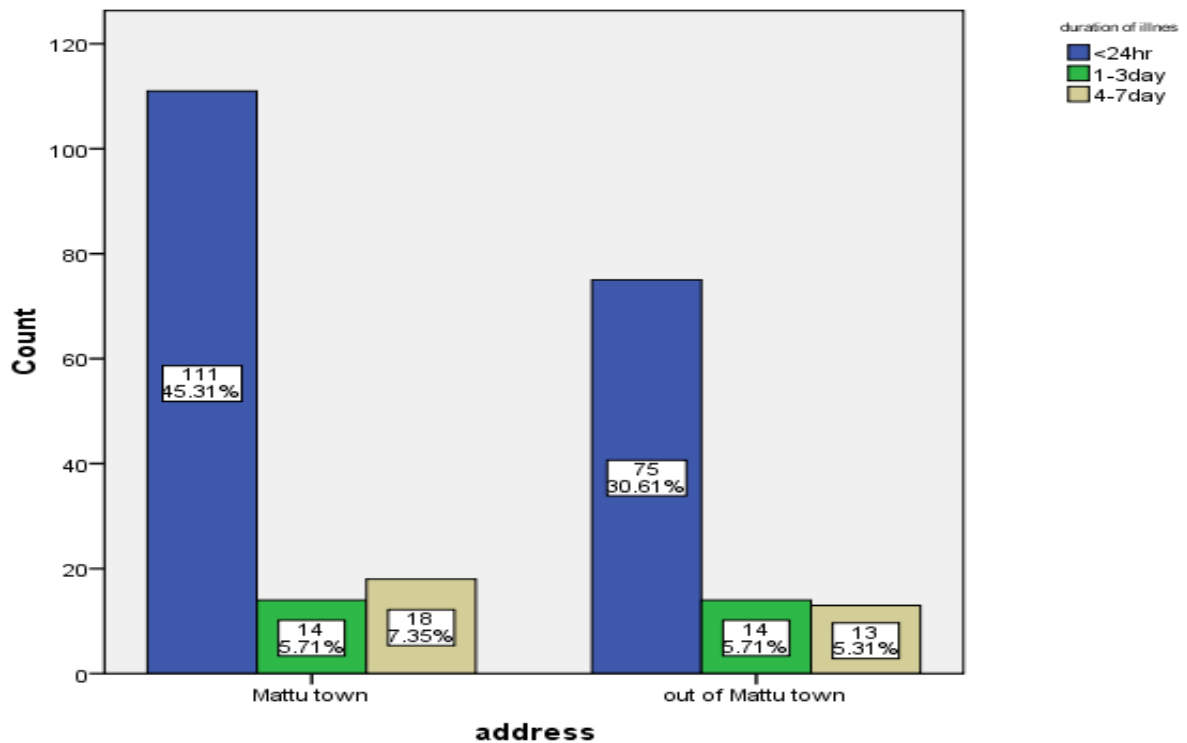


Figure 5.1: Address and time before admitted to Hospital distribution of patients operated for a clinical diagnosis of acute appendicitis at MKRH from January 1, 2014 through December 30, 2016 (n=245)

Clinical Symptoms: Abdominal pain invariably the main presenting complaint of the patients 245(100%). An initial periumbilical pain which latter shifted to the RLQ of the abdomen observed in 239 (97.6%) patients . one hundred forty-eight (60.4%) patients presented with

vomiting. Loss of appetite noticed in 182 (74.3%) patients. and nausea were also the other presenting complaints of the patients, 189 (77.1%).

Clinical Signs: During physical examination, abdominal tenderness one of the major findings in the study patients, Two hundred one (82 %) of them had tenderness over the RLQ (McBurney’s point) of the abdomen and 21(8.6%) of the patients had generalized abdominal tenderness. Fifteen (6.1%) patients were presented with RLQ mass, and Fever were also the other presenting sign 188(76.7%).

Laboratory investigation: WBC Count: Total WBC count determined for 245 (100%) patients out of which a raised WBC count (>10,000 cells/mm³) noted in 236 (96.3%).(Table 5.2)

Table 5.2: Clinical findings of patients operated for a clinical diagnosis of acute appendicitis at MKRH from January 1, 2014 through December 30, 2016 (n=245)

Variables	Number	%
Symptoms		
Abdominal pain	245	100
Loss of appetite	182	74.3
Vomiting	148	60.4
Nausea	189	77.1
Associated symptoms/others**	35	14.3
Sign and laboratory investigation		
Fever	187	76.3
Generalized abdominal tenderness	22	9
RLQ tenderness	229	93.5
RLQ mass	12	4.9
Raised WBC	236	96.3

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

Management Profile

Intraoperative Findings and Surgical Intervention:

Different types of abdominal incisions were employed during operative management of the patients. Rocky Davis/RLQ transverse/Lanz incision the commonest 188(76.7%) incision followed by lower abdominal mid-line incision in 38 (15.5%), and gridiron incision in 12(4.9%).

The intraoperative findings of these patients included an inflamed appendix in 121 (49.4%) patients followed by gangrenous appendix 75 (30.6%), perforated appendix 26(10.6%), appendiceal abscess 12 (4.9%), appendiceal mass 5 (2.04%), and the appendix found normal in 6(2.45%) patients. (Table 5.3)

Table 5.3.: Type of abdominal incision and Intra abdominal finding distribution of patients operated for a clinical diagnosis of acute appendicitis at MKRH from January 1, 2014 through December 30, 2016 (n=245)

		Intera abdominal finding							Total
		inflamed appendix	gangrenous	Perforated appendix	appendiceal abscess	normal appendix	appendiceal mass		
Type of abdominal incision	Gridiron	no	8	3	1	0	0	0	12
		%	6.6%	4.0%	3.8%	.0%	.0%	.0%	4.9%
	Lanz incision (Rocky Davis)	no	113	63	6	0	5	1	188
		%	93.4%	84.0%	23.1%	.0%	83.3%	20.0%	76.7%
	lower midline	no	0	4	18	12	1	3	38
		%	.0%	5.3%	69.2%	100.0%	16.7%	60.0%	15.5%
	Gridiron+ low midline	no	0	5	1	0	0	1	7
		%	.0%	6.7%	3.8%	.0%	.0%	20.0%	2.9%
	Total	no	121	75	26	12	6	5	245
		%	49.4%	30.6%	10.6%	4.9%	2.04%	2.5%	100.0%

Management Outcome of Acute Appendicitis

Postoperative Complication: two hundred tent (85.7%) of the patients had favorable outcome where they have improved and discharged from the hospital and developed no postoperative complication, but 35 (14.31%) of them had unfavorable outcome where they have improved but developed one or more postoperative complication(s) and one death .Postoperative wound infection the predominant postoperative complication in 18 (7.4%), patients and paralytic illus found in 6 (2.5%) patients. Peritonitis 1(0.4%) and fecal fistula 3(1.2%), death 1(0.4%), and iatrogenic bowl injury 2(0.8%) were observed (.table 5.40

Table 5.4: Post operative complication vs Procedure performed for patients operated for a clinical diagnosis of acute appendicitis at MKRH from January 1, 2014 through December 30, 2016 (n=245)

			Procedure performed					Total
			appendectom y	abscess drainage	negative appendectomy	negative laparatomy	peritoneal lavege	
Post operative complication	No complication	n %	163 94.2%	35 72.9%	3 100.0%	1 33.3%	8 44.4%	210 85.7%
	Surgical wound infection	n %	7 4.0%	5 10.4%	0 .0%	1 33.3%	5 27.8%	18 7.3%
	fistula	n %	0 .0%	2 4.2%	0 .0%	0 .0%	1 5.6%	3 1.2%
	incisional hernia	n %	0 .0%	1 2.1%	0 .0%	0 .0%	0 .0%	1 .4%
	bowl adhesion	n %	0 .0%	1 2.1%	0 .0%	0 .0%	2 11.1%	3 1.2%
	death	n %	0 .0%	1 2.1%	0 .0%	0 .0%	0 .0%	1 .4%

	iatrogenic small bowel injury	no %	1 .6%	1 2.1%	0 .0%	0 .0%	0 .0%	2 .8%
	peritonitis	no %	0 .0%	1 2.1%	0 .0%	0 .0%	0 .0%	1 .4%
	paralytic ileus	no %	2 1.2%	1 2.1%	0 .0%	1 33.3%	2 11.1%	6 2.4%
Total	no %	173 100.0%	48 100.0%	3 100.0%	3 100.0%	18 100.0%	245 100.0%	

Length of Hospital Stay: The length of hospital stay of the patients ranged from 3 to 18 days, 184(75.1%) discharged within three days while 13 (5.3%) stay more than seven days ,the average length of hospital stays 6.5 days Figure 5.6).

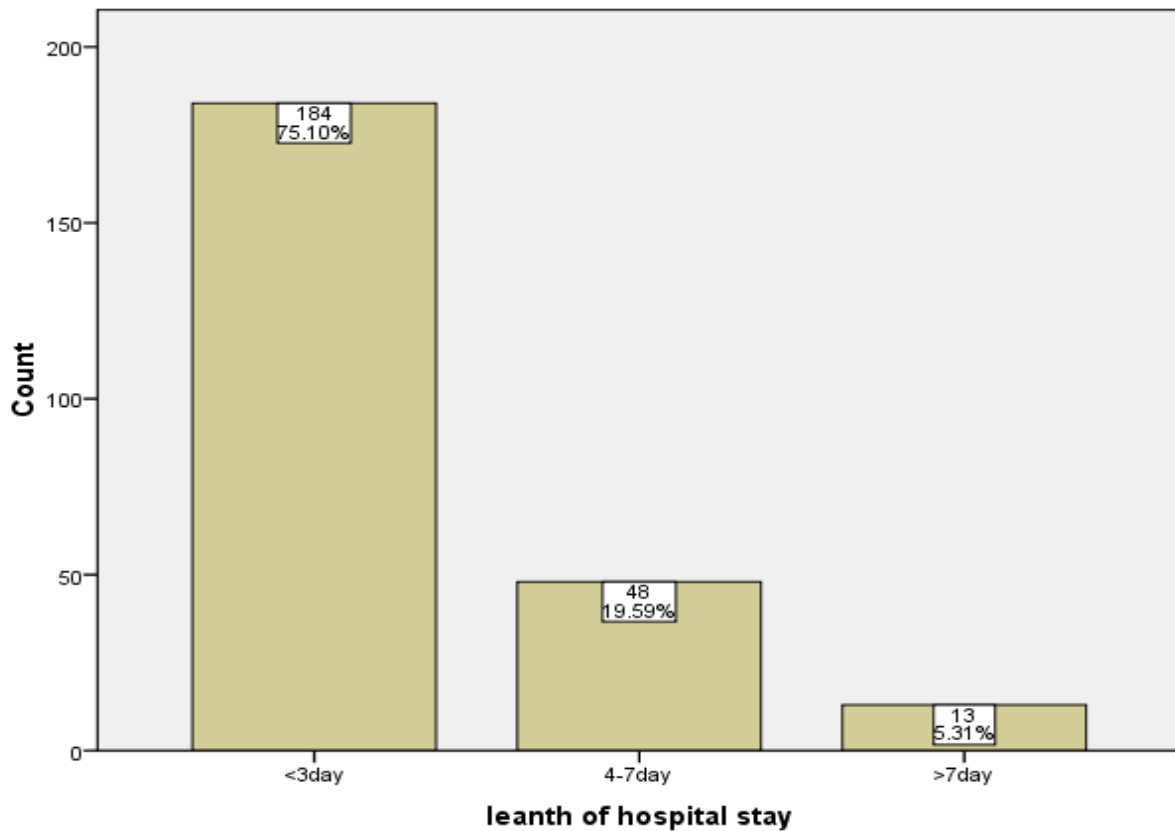


Figure 5.2: Length of Hospital stay of patients operated for a clinical diagnosis of acute appendicitis at MKRH from January 1, 2014 through December 30, 2016 (n=245)

Factors Affecting Management Outcome of Acute Appendicitis

To identify the factors associated with management outcome of acute appendicitis by a binary logistic regression performed on a dichotomous dependent variable. Therefore; variables with P-value of ≤ 0.05 like, Age, sex, residency duration of illness and duration of hospital stay were selected as candidates and entered multiple logistic regression analysis at preliminary binary logistic regression analysis then multiple logistic regression.

- Age of patients has statistically significant association with risk factors of (AOR=4.167, 95% CI: 5.212-3.332 P-value= <0.000), those patients whose ages <30 years were 4.167 times more likely to have affected when compared with patients older than 30 years of age
- Duration of presentation to hospital after illness >24 hrs and duration of hospital stay > 3 days are determinant factor for management outcome that are found to have statistically significant association (COR= $.133$ 95% CI p 0.000 and AOR 9.81at 95% CI =2.74 -2.091 showing that >24 hrs .133 and >3 days 9.81 times more likely to develop unfavorable management outcome respectively.
- Study subjects who had RLAQ mass before operative management developed post-operative complications 0.92 higher when compared with patients without RLAQ mass. [AOR = .092 (0.03- 2.79)], $P < 0.000$
- Gangrenous, Perforated and appendiceal abscess appendix independently affected the management outcome of appendicitis. Patients who had gangrenous appendix 1.354, perforated appendicitis 1.786 and appendiceal abscess 4.167 times higher risk to develop post-operative complications with [AOR= 1.354(2.187—8.386)], $P < 0.000$;(AOR=1.786(2.768-1.152) $P < 0.000$ and (AOR=4.167(5.212-3.332) $P < 0.00$) respectively.

Table: 5.5, Measurements of factors associated with different variables and outcome of patients operated for acute appendicitis in at MKRH from January 1, 2014 through December 30, 2016 (n=245)

variables	Labels	Outcome		COR at 95%CI	P- Value	AOR at 95%CI	P- Value
		Good	Bad				
Age	0-10	39	6	2.485E8	.999	3.393(5.277-2.182)	.000
	11-20yr	91	16	2.840E8	.999	1.354(2.187-8.386)	.000
	21-30yr	59	10	2.738E8	.999	1.786(2.768-1.152)	.000
	31-40yr	12	4	5.385E8	.999	4.167(5.212-3.332)	.000
	41-50yr	3	1	5.385E8	.999	2.299E-9(2.299E-9_2.299E-9)	
	>50yrs	4	0	.00	.999	1	
RLQ mass	Yes	9	3	.092(-.031-.279)	.000	.092(.031-.279)	.000
	No	199	34		.009	1	1
Intra op finding	Inflamed appendix	114	6	3.172E8	.999	3.172E(5.069E9-1.985E7)	.000
	gangrenous	65	10	2.485E8)	.999	2.325E(3.567E9-1.515E7)	.000
	perforated	12	14	1.885E9	.999	1.444E9(2.358E10-8.840E9)	.000
	Appendiceal abscess	8	4	8.078E8	.999	8.422E(9.014E10-7.869E8)	.000
	Normal appendix	4	3	8.078E8	.999	4.211E(4.211E9-4.21E9)	.
	Appendiceal mass	5	0	.000	.999	1	1
Length of hospital stay	<3day	181	3	.000	.998	9.810E9(2.740E9-3.513E10)	.000
	4-7day	27	20	.000	.998	2.091E8(2.091E8-2.091E8)	
	>7day	0	14	1.615E9	.998	1	1

6: DISCUSSION

In the current study area there were 576 major operations performed for cases of surgical acute abdomen in the past three years of the study period. Two hundred forty five (42.5%) operations were performed for patients with a clinical diagnosis of acute appendicitis. This magnitude lower than the study conducted at ZMH and higher than Yirgalem Hospital, 46.7% and 27.9% respectively (19, 20).

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. This finding is in consistent with different literatures (1, 3, 19, and 20).

The male predominance observed in this series is in agreement with many studies . In different studies it concluded that the male predominance a coincidental finding whereas another study pointed out as no apparent explanation could be given for this finding (8, 12). 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 58.4% were from Mattu town and 41.6.6% were from rural areas 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 Zewiditu Memorial Hospital, Addis Ababa, Ethiopia, more than half of the patients were from Addis Ababa (17, 20).

The clinical symptoms of the patients showed a similar pattern as previous reports as has been mentioned in many studies, abdominal pain the most common symptom. Typical feature of a periumbilical pain shifting to the right lower quadrant of the abdomen in agreement with the very patho-physiologic nature of the disease. Studies conducted by A. Bekele, MD et al, Fashina IB, et al showed similar results. Loss of appetite the next most common clinical presentation of patients followed by vomiting and fever. This finding has also been reported previously (1, 3, and 20).

The physical findings are comparably the same as previous works. Tenderness over the right lower quadrant of the abdomen the dominant physical finding as that of the findings of Singhal RA, and others (11, 21, and 25)

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 96.3% 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 determined for all 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 (12, 23, and 27).

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 76.5% commonest open method and midline 15.5% employed for appendectomy in this series whereas, were the commonest in other studies a midline laparotomy in 62.5% and by a Lanzes incision in 35.5%.. In the current study Rocky Davis / RLQ transverse / Lanz incision 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, and 27).

The commonest intraoperative finding of inflamed appendix (49.4%) is in agreement with findings of previous studies (14, 20). However, few numbers of previous studies reported higher rates of intra-operative findings of inflamed appendix (11, 12, and 21). The 10.6% 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%, and 21.0%) were observed in different studies (11, 14,).

Majority, 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 (16, 25). Some of the serious complications of untreated appendicitis are the progression to gangrenous appendicitis and the formation of appendiceal abscess following specially a perforated appendix (2, 4). twelve (4.9%) 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 (19). In addition, there were 30.6% cases with gangrenous appendicitis, which is higher with previous studies (20, 12). 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 (3, 25). This very nature of the disease observed with 1.22% negative appendectomy rate in this series. The rate the lowest as compared to previous studies (21). 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, and 22). The overall postoperative complication rate (14.31%) lower than 34.9% rates in South West Nigeria (21). Of overall postoperative complications, 7.4% postoperative wound infection rate is found to be lower in comparison to 10.9% and as 50.9% rates in previous studies (11, 14, and 25). 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 found that

of those patients with postoperative wound infection, 10.6% 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, 24.1% 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, 25). It is observed that the mean postoperative length of hospital stay highly influenced by the clinical stage of the disease ($P = 0.000$). In this series, it 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 the degree of postoperative complication. It 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, $P = 0.000$). As explained by Wilmore 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 11days same as in Ei Obeid, Western Sudan and Asir, Saudi Arabia (13, 25).

There mortality recorded to twelve years old female child in this series who diagnosed lately with ruptured appendicitis complicated by anesthesia, the mortality rate (0.4%) which lower than other studies 2%. (8, 11-15, 19 and 27). This is due probably to the better health care services given to the patients such as improved preoperative routines and postoperative care.

7: CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

- The incidence of acute appendicitis 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 before 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.
- 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.
- 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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QUESTIONERS

This is special patient Performa to be filled by trained data collectors from patients card, operation note registration books; that contains details on patient demographics, clinical features, supportive diagnostic tools, operative findings and out comes, of those patients undergoing appendectomy at Mattu Karl Referral hospital from from January 1, 2014 through December 30,2016

1.1 BACKBRAUND IN FORMATIONS

Hospital card number

01-sex 1. Male 2. Female

02. Age

1. 0-10 2. 11-20 3. 21-30 4. 31-40

5. 41-50 6 >50

03. Address 1. Mattu Town 2.Aout of Mattu town

1.2 Specific information

01. Duration of illness before Mattu Karl Referral hospital

1. <24hrs ---- 2. 24-48hrs 3.>48 hrs

02 .Time gaps between admission and operations performed

1 <24hrs days 2.24-48hrs 3.>48hrs

03 Duration of hospital stays

1. 3-4days 2. 5-7days 3.>7days

04. Symptoms

1. Abdominal pain (Peri -umbilical)

4. Nausea

2. Vomiting

8. Mass in abdomen

3. Anorexia

6. Associated symptom -----

05signs

1. Generalized abdominal tenderness

2. localized tenderness over the right iliac fossa

3. Fever >37.0c

06, peritonitis

1. Localized

2.Generalized

07. Right iliac fossa mass 1. Yes

2. No

08. Type of incision (laparotomy)

1. Gridiron Incision

2. Lanz incision (Rocky Davis)

3. Sub umbilical midline incision

4. Long midline Incision

5. Gridiron + sub umbilical mid line

6. Lanz + sub umbilical

09 operative findings

1. Normal appendix /Negative

2. Inflamed appendix

3. Perforated

4. Gangrenous

5. appendial abscess

6. Fecolith

10. Complications

1. Wound sepsis

4. chest infection

2. Post-operative ileus (prolonged)

5. Iatrogenic small bowel injury

3. Peritonitis

6. Wound dehiscence

7. Retro peritoneal necrotizing fasciitis

8. Faecal fistula

9. Death

11. Supportive lab investigation

1. WBC count. Write the number _____ .2. U/S . 3. X-ray

4. C-reactive protein

12. Outcome

1. Improved and developed no postoperative complication

2. Improved but developed one or more complication(s), or dead

Name of data collector-----

Signature-----

Date-----

Approval Letter

Assurance of Principal Investigator:

I, the undersigned agrees to accept responsibility for the scientific, ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of College of Public Health and Medical Sciences in effect at the time of grant is forwarded as the result of this application.

Name of the student: Diriba Ayana

Signature _____ Date _____

Approval of the Advisors:

1. Dr. Yonas Yilma

Signature _____ Date _____

2. Mr. Yasin Negash

Signature _____ Date _____

External evaluator:

1. Dr. Dawit

Signature _____ Date _____

2. Mr. Tilahun

Signature _____ Date _____