A STUDY ON THE INCIDENCE OF APPENDICECTOMY IN THE UNIVERSITY TEACHING HOSPITAL, LUSAKA, ZAMBIA

BY

Dr Muhammad Ehlasamul Haque MBBS

A DISSERTATION SUBMITTED TO THE UNVERSITY OF ZAMBIA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF MEDICINE (SURGERY)

(SCHOOL OF MEDICINE)

THE UNIVERSITY OF ZAMBIA

LUSAKA, 1997

TABLE OF CONTENTS

PAGE

COPYRIGHT DECLARATION

I Dr. Muhammad Ehtasamul Haque, hereby declare that this dissertation represents my own work and that it has never previously been submitted, in part or in full, for a diploma or degree in any other University.

Date ....10.1.98..... Candidate's Signature .....

I have read this dissertation and approved it for examination.

Date .....10/1/98..... Signature .....

SUPERVISOR: PROF. ERZINGATSIAN KRIKOR FRCSI

ASSOCIATE PROFESSOR OF SURGERY AND HEAD,

DEPARTMENT OF SURGERY

SCHOOL OF MEDICINE

UNIVERSITY OF ZAMBIA

APPROVAL

This dissertation of Dr. Muhammad Ehtasamul Haque is approval in partial fulfillment of requirements for the award of the Master of Medicine (Surgery) by the University of Zambia.

EXAMINERS

1. Signature ..... Date 10/1/98

2. Signature ..... Date 22-1-98

3. Signatur ..... Date .....

4. Signature ..... Date .....

APPROVAL

This dissertation of **Dr. Muhammad Ehtasamul Haque** is approved as fulfilling the requirements for the award of the degree of Master of Medicine in Surgery by the University of Zambia.

Subject to examiner's report

Signature:	Date:
.....	31-08-97
.....	22/1/98
.....	22-1-98
.....	.....

ETHICAL CONSIDERATIONS

I. Informed consent was obtained for the study.

ii. Standard management and operative techniques were used, so ethical considerations did not arise.

ACKNOWLEDGEMENTS

I would like to thank my supervisor Prof. Erzingatsian who guided me the preparation, implementation and writing up of this dissertation.

Candidate's Signature.....

SUMMARY (ABSTRACT)

Over a six year period, a total 558 appendectomies were performed in the University Teaching Hospital, Lusaka and St. Frances' Hospital, Katete. Out of 558 appendicectomies, 538 (96.42 percent) were performed in the UTH and 20 (3.58 percent) were in Katete. The incidence of appendicectomy in Lusaka was 73 and in Katete 21 per 1,000,000 population. It comprised 0.80 percent of all operations and 11.10 percent of abdominal operations in the UTH.

The ration of male to female was 1.51 : 1 in the UTH and 2.33 : 1 in Katete. The commonest age group was between 21-30. There was a higher incidence of appendicectomies during the months of October to January. In the University Teaching Hospital acute appendicitis, recurrent appendicitis and incidental appendicitis comprised 83.46, 11.15 and 5.39 percent respectively. Whereas in Katete these figures were 95.5 and 0 respectively. In the UTH, perforation was commonest in the age groups 0-10 and 41-50 years, 46.30 and 48.89 percent of total numbers respectively. In 1996, Schistosoma ova was seen in four out of 122 specimens in the UTH and 2 out of 6 in Katete. Mortality was 0.93 percent in the UTH. There was no death recorded in Katete.

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Appendicectomy is a common operation in developed countries in contrast to Africa. In the developed world there has been a recent trend towards laparoscopic appendicetomy. In order to plan for the possible introduction of such innovative techniques, it is necessary to have accurate data on frequency of operations such as appendicectomy. Accurate data on the prevalence of appendicitis in developing countries is lacking. In particular there is no such information in Zambia. This study addresses the issue.

OBJECTIVE

i. To determine the incidence of appendicectomy from 1991 to 1996 in a central teaching hospital in Lusaka, Zambia and a district hospital in Katete, Zambia.

ii. To determine if there has been a change in the incidence of appendicectomy over a period of six years.

RATIONALE

A study of this nature can give useful information which in turn can help determine the training requirements in the future of postgraduate students in the department of Surgery, UTH Zambia.

LITERATURE REVIEW

Much has been written on appendicitis since it was described by Fitze more than 100 years ago, but epidemiology of this disease remains poorly understood (Addis et al, 1990).

In comparison to the west (UC), the incidence of appendicectomies appear to be less in developing countries. The reasons for these differences are unclear. Appendicectomy is one of the most frequently performed surgical operations in the United States. Approximately 250,000 cases of appendicities occurred annually in the United States, a crude annual incidence of 11 per 10,000 population (Addis et al, 1990). Current reports indicate that appendicectomy represents about one percent of surgical operations in the USA (Sabiston Text Book of surgery, 1991). In contrast the incidence of appendicectomy in North-West Ethiopia is 22 per annum (Kitisso and Messele-1996). In Haiti, is 12 cases per annum (Lepreau 1975); in Deradu Tanzania two cases (Stone-1989) and Buganda, Tanzania it is eight annually (Makwani, 1988). In Bulawayo, Zimbabwe (Oliver-1987) there were 20 cases recorded in one year out of a population of 2.5 million.

Appendicectomy represents a significant component of emergency surgery. In Zambia it causes 16.8 percent of acute abdomen (Umerah and Obadike - 1978); and in Kitwe it is the second commonest abdominal emergency (Davey, 1978); in Ethiopia 17.32 percent of all abdominal operations are appendicectomies and these represent 4.59 percent of all emergency operations. In Calabar, Nigeria, it is the second commonest operations among of acute abdominal emergencies (Archibong et al 1995).

Appendicitis also causes significant morbidity and mortality. In two series from Zambia, it was a cause of generalized peritonitis in 7.62 percent of patient with 'o' mortality (Watters 1988), and in the other report appendicitis was a cause of generalized peritonitis in 23.85 percent of patients (Bem 1991). It may have something to do in immune response in intervening years. In Ethiopia, it was responsible for 45 percent of peritonitis and 4.5 percent of mortality (Kotisso and Messele - 1996) and in Malaysia 18 percent of perforations (Lee and Teoh 1990).

FIBRE: Acute appendicitis is believed to be a rare condition in Africa communities where a high fibre bulky diet is taken (Waker et al, 1973). The incidence of acute appendicitis even in developed countries has shown a marked decline between 1984 and 1972 (Noet 1974). Zambian people mainly eat high fibre maize, which could be an explanation for the low incidence of appendicitis.

RACE: Race is another factor in the causation of appendicitis. White races are 1-5 times more commonly affected than non whites (Addis).

AGE: Age is another factor related to appendicitis. The highest incidence of appendicitis was found in persons aged 10-19 years in the USA (Addis 1996) whereas in Ethiopia it was 15-30 years (Kotisso and Messele 1996).

SEX: Appendicitis is common in males. The ratio of male to female in Ethiopia is 1:6:1 (Kottiso and Messele 1996); and in the USA it is 1:4:1 (Addis 1990).

SEASON: Appendicitis is said to be related to season. In the USA; it is commoner in the summer months and in Kenya the incidence is higher during the months of July and August with a rather low incidence in June and September (Loefler 1983).

URBANIZATION: Urbanization is considered to be responsible for changes in pattern of disease. In Gelfand's (1976) series 22 out 24 patients with appendicitis were urban dwellers. The recent increase in the population as a result of urbanization, could be a factor in the apparently rising incidence of appendicitis in Lusaka.

SCHISTOSOMIASIS: Another aetiological factor in appendicitis is said to be schistosomiasis. Some areas of Zambia are endemic for bilharziasis and the disease is commonly associated with urinary or intestinal tract pathology. Schistomiasis has been reported in almost every organ of the human body. In Mozambique, one in five appendices contained schistosomal ova, the majority were in black races (Barrades -1982).

With regard to Zambia the literature contains little information on the subject. There are only four papers from Zambia which deal with appendicitis:

i. Acute abdomen in the Zambian African (Umerah and Obadike - 1978)

ii. Severe peritoneal sepsis (Watters 1988)

iii. Perforation of the distal ileum in Lusaka (Bem 1991)

iv. Common abdominal emergencies in Kitwe (Davey 1968)

These papers showed that acute appendicitis was the cause of acute abdomen in 16.81 percent of cases (i), 25.24 percent of generalized peritonitis was due to appendicitis (ii), 23.85 percent of all generalist peritonitis were due to perforated appendicitis were due to perforated appendicitis (iii) and it was the second commonest abdominal emergencies in Kitwe, Zambia (iv). But these papers did not show the incidence of appendicectomy in Zambia.

PATIENTS AND METHOD

1. This was a five years retrospective and one year prospective study of appendicectomy which was carried out at the University Teaching Hospital, Lusaka, Zambia. The period of study - 1991 to 1995 was a retrospective one and 1996 was prospective. Prior consent was taken from all patients for the prospective study.

   The Data has been collected from the Departmental mortality - morbidity audit, theater registry, hospital patient records office, histopathology registry and direct patient enquiry. General and Paediatric Surgery departments were also involved in the study.

   Data included the patient's age, sex, date of operation, type of operation, condition of the appendix and histology result.

DEFINITION OF TERMS

The University Teaching Hospital is a referral hospital in the capital city of Lusaka, Zambia. This is also the only teaching hospital in Zambia. The UTH serves an urban population and reflects urban rates of appendicectomy.

St. Francis Hospital is a mission hospital, situated in Katete, eastern Zambia. The hospital serves a rural population and reflects rural rates of appendicectomy.

Total Operations:

Refers to all operations-performed in the Department of surgery including the General Surgical and Paediatric surgical units.

Abdominal Operations:

Was defined as all operations performed within the abdominal cavity.

Recurrent Appendicitis:

Was defined as those patients who presented with recurrent pain in the right iliac fossa. Elective appendicectomy was performed 6-8 weeks later after conservative treatment with antibiotics.

Chronic Appendicitis:

This term was used in the prospective part of the study where it was a histological diagnosis.

Acute Appendicitis:

Patients who presented for the first time with typical features of appendicitis and were then submitted for appendicectomy were all included under this heading. The specimen which showed hyperplasia of lymphoid follicles were included as acute appendicitis.

Generalized Peritonitis:

Patients who had appendicitis and presented with generalized peritonitis.

Incidental Appendicectomy:

For the purpose of this study, those appendices which were found to be normal intraoperatively and histologically, were included under this heading.

Interval Appendicectomy:

Those appendicectomies which were performed for recurrent appendicitis.

Elective Appendicectomy:

For the purpose of this study, interval appendicectomy was included under this heading.

Prevalence:

Number of cases present in a population at a particular time.

Incidence:

Number of new cases which occur in a population over a defined period of time.

Rate:

Number of events in a period of time divided by possible number of events in that same period. In this study, incidence is equal to rate.

Statistics:

Statistical significance is defined as a probability of less than 1 in 20 of an event or rate being the result of chance.

i.e $P < 0.05$

Statistical analysis was confined to the use of basic tables and parametric test (X^2, t test) accepting the conventional level of $P < 0.05$ as significant or unlikely to have arisen by chance.

RESULTS

Table 1: Incidence of Appendicectomy in Lusaka and Katete during the study period

Year	Lusaka (UTH)			Katete		
	Population	Total Appendicectomies	Per 1,000,000	Population	Total Appendicectomies	Per 1,000,000
1991	1049109	55	52	147997	2	14
1992	1100761	63	57	152156	2	13
1993	1174599	68	58	156431	3	19
1994	1242884	105	84	160827	4	25
1995	1314831	113	86	165383	3	18
1996	1432964	134	94	169057	6	135
Total	7324463	538	73	951851	20	21

In 1991 to 1996 in Lusaka there were 538 appendicectomies. During this period the population increased from 1,049,109 to 1,432,964.

The total population years of exposure was 7,324,463. The appendicectomy rate varied 52 to 94 per million. The average rate per 1,000,000 people years of exposure was

$$\frac{538}{7{,}324{,}463} = 73.4$$

Confidence Interval. (Poisson)
66.2 - 78.7

In 1991 to 1996 in Katete were 20 appendicectomies. During this period the population increased from 147,997 to 169,057. The total population years of exposure was 951,851. The

appendicectomy rate varied from 13 to 135 per million. The average rate per 1,000,000 people years of exposure was

$$\frac{20}{951{,}851} = 21$$

Confidence Interval. (Poisson)
12.8 - 32.3

The confidence intervals do not overlap

Formal X^2 testing

$X^2 = 33.59 \quad P < 0.001$

Odds Raho = 3.50 (2.20 < OR < 5.62)

Relative Risk = 3.50 (2.24 < RR < 5.46)

The difference in rates is statistically significant.

Table 2: Number of appendicectomy by sex and year

Year	UTH				Katete			
	Male	%	Female	%	Male	%	Female	%
1991	32	58	23	42	2	100	0	0
1992	40	63	23	37	2	100	0	0
1993	43	63	25	43	1	33.33	2	67.67
1994	60	57	45	43	3	75	1	25
1995	65	57	48	43	2	66.67	1	33.33
1996	84	62	50	38	4	66.67	2	33.33
Total	324	60.22	214	39.78	14	70.00	6	30

Table shows that Appendicectomy appears to be common in males.

Table 3: Number of appendicectomies by age and year

Year	UTH												Katete	
	0 - 10		11 - 20		21 - 30		31 - 40		41 - 50		51 +	Not Satted	11 - 20	21 - 40
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	No.	No.	No.
1991	8	14.55	21	38.18	13	23.64	8	14.55	5	9.09	0	0	0	2
1992	8	12.7	16	25.41	13	20.63	14	22.22	6	9.52	0	2	2	0
1993	6	8.82	10	14.7	23	33.82	19	27.94	3	4.4	3	1	1	2
1994	6	5.7	22	21.0	33	31.43	26	24.76	8	7.62	6	2	1	3
1995	13	11.5	22	19.47	31	27.43	30	26.55	12	10.62	2	5	2	1
1996	13	9.7	24	17.9	48	35.82	31	23.13	11	8.21	7	0	3	3
Total	54	10.04	115	21.38	156	29.0	128	23.79	45	8.36	18	10	9	11

Table 4 shows the age groups 21 - 30 and 31 - 40 to have had the highest number of appendicectomies in UTH during the study period.

Table 4: Number of appendicectomies according to age and sex during study period in UTH

Sex	0 - 10		11 - 20		21 - 30		31 - 40		41 - 50		Above	No age
	No.	%	No.	%	No.	%	No.	%	No.	%	No	No.
Male	27	8.33	66	20.37	90	27.43	76	23.46	31	9.57	12	7
Female	27	12.62	49	22.90	66	30.84	52	24.30	14	6.54	6	3
Total	54	10.04	114	21.38	156	29.0	128	23.79	45	8.36	10	10

Table four shows that the age group 21 - 30 and 31 - 40 for both male and female had the highest number of appendicectomies. Males dominated female in all age groups except the 0 -10 years group.

Table 5: Male to Female Ratio of Appendicectomy UTH, 1991-96

Age Group	Ratio
0 - 10	1
11 - 20	1.4
21 - 30	1.4
31 - 40	1.5
41 - 50	2.2
51 above	2

There is increasing ratio of man to woman with increasing age.

Table 6: Number of appendicectomies according to time of year

Month	UTH	Katete
January	55	0
February	37	2
March	44	1
April	48	2
May	54	2
June	32	4
July	40	2
August	37	0
September	31	3
October	56	0
November	54	1
December	47	2

Table 6 shows that for UTH there is a greater number of appendicectomies during the months of October to Januarry with an isolated peak in May. The Katete figure are difficult to interpret because of the low numbers, nonetheless in contrast to UTH May and September appear to show a higher incidence.

Table 7: Appendicectomy as a Percentage of (a) all operations (b) abdominal operations, UTH

Year	No. Of all operations	No. Of abdominal operations	No. Of appendicectomies	% of appendicectomies	
				all operations	all abdominal operations
1991	11711	653	55	0.47	8.42
1992	11434	565	63	0.55	11.15
1993	10223	833	68	0.67	8.16
1994	10341	886	105	1.015	13.8
1995	11857	999	113	1.01	11.85
1996	11767	912	134	1.014	14.69
Total	67333	4848	538	0.8	11.1

Table 7 shows the total number of all abdominal operations performed during the study period. In the UTH appendicectomy comprised 0.8 percent of all operations11. 10 percent of abdominal operations.

Table 8: Distribution of frequency of different categories of appendicitis in UTH and Katete

Year	Acute Appendicitis		Recurrent appendicitis		Incidental appendicectomies	
	No.	%	No.	%	No.	%
1991	51	92.73	3	5.45	1	1.82
1992	51	80.95	9	14.29	3	4.76
1993	59	86.76	7	8.82	2	2.94
1994	86	81.9	13	11.43	6	5.71
1995	88	77.88	17	5.04	8	7.08
1996	114	85.07	11	8.21	9	6.72
Total	449	83.46	60	11.15	29	5.39

Katete

Year	Acute Appendicitis		Recurrent appendicitis		Incidental appendicectomies	
	No.	%	No.	%	No.	%
1991	2		0		0	
1992	2		0		0	
1993	3		0		0	
1994	4		0		0	
1995	3		0		0	
1996	5		1		0	
Total	19	95	1	5	0	0

Table 9: Distribution of general peritonitis due to appendicitis in UTH

Year	UTH		Katete	
	No.	%	%	No.
1991	18	32.73	0	0
1992	20	31.75	0	0
1993	23	33.82	2	66.67
1994	34	32.28	2	50
1995	35	30.97	2	66.67
1996	41	30.6	3	50
Total	171	31.78	9	45

Table 9 shows the 31.78 percent of appendicectomy patients presented with generalised peritonitis in UTH.

Table 10: Number of perforated appendix in UTH according to age, 1991-96

Age	0 - 10	11 - 20	21 - 30	31 - 41	41 - 50	51+
Male	11	23	30	21	16	4
Female	14	18	17	9	6	2
Total	25	41	47	30	22	6

Table 10 shows that the highest incidence of perforation for males and females is between the age of 21 - 30 and 11 - 20, respectively.

Table 11: Frequency of perforated appendix according to age, 1991-96

Item	UTH						Katete		
	0 - 10	11 - 20	21 - 30	31 - 40	41 - 50	50 +	11 - 20	21 - 30	31+
Perforation	25	41	47	30	22	6	5	1	2
Appendicitis	54	115	156	128	46	18	9	8	3
Percentage with perforation	46.3	35.65	23.44	23.44	48.89	33.33	55.56	12.5	66.67

Table 11 shows increased frequency of perforations in the age groups 0 - 10 and 41 - 50 in the UTH. Whereas these groups are 11 - 20 and 31 above in Katete.

Table 12: Mortality in UTH

Year	UTH		Katete	
	No.	%	No.	%
1991	0	0	0	0
1992	0	0	0	0
1993	3	4.41	0	0
1994	0	0	0	0
1995	2	1.77	0	0
1996	0	0	0	0
Total	5	0.93	0	0

Table 13: Histopathically confirmed Appendicitis,1996, UTH

Diagnosis	No.	%
Acute appendicitis	103	89.76
Chronic appendicitis	11	9.65
Hyperplasia of lymphoid folliculitis	8	6.3
Other fibre fatty tissue-1 appendicular tissue not seen-1	2	1.58
Normal appendix	3	2.3
Specimen lost	7	_

Katete

Diagnosis	No.	%
Aucte appendicitis	05	83.33
Chroninic appendicitis	01	16.66

Out of 134 specimens of appendix, 7 were lost and two were other tissue. A total of 125 appendices were examined histologically. In UTH, histologically confirmed appendicitis was recorded in 122 cases and normal appendices were found in 3. In the 122 appendices, acute appendicitis comprised 90.98 percent (111) and chronic appendicitis comprised 9.62 percent (11). Out of the 122 cases, 4 showed schistosoma ova. Three of these were acutely inflamed and one case showed schistosoma granulomatosis. In St. Francis hospital; schistosoma ova were seen in two out of six specimens, one of whichwas acute appendicitis and the other chronic appendicitis.

Figure 1

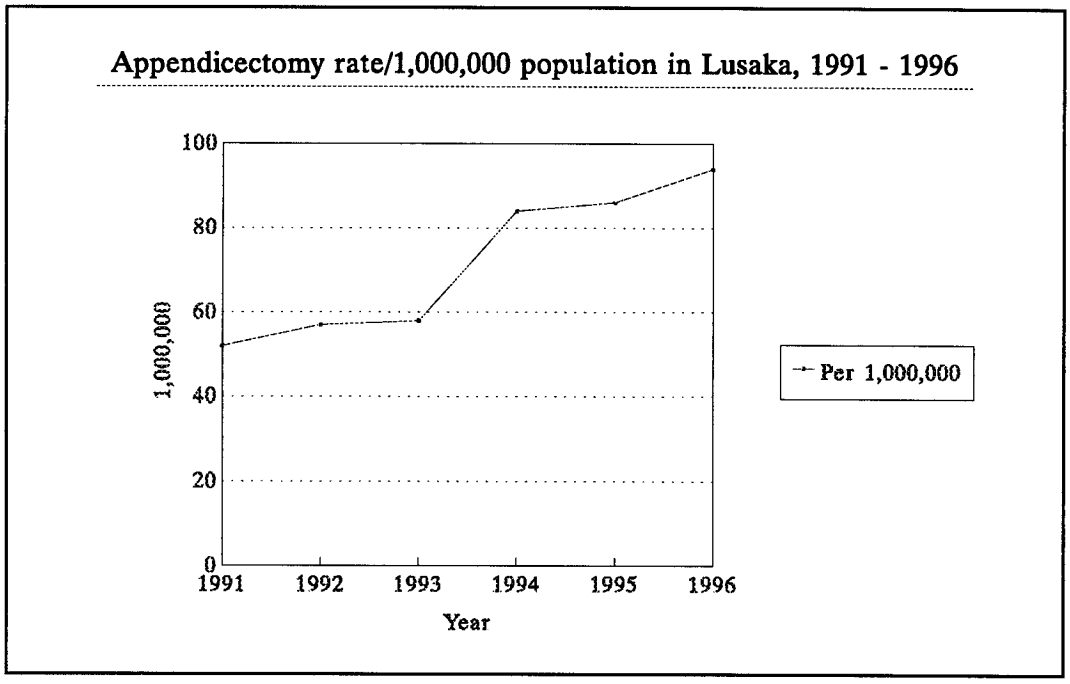


Figure 2:

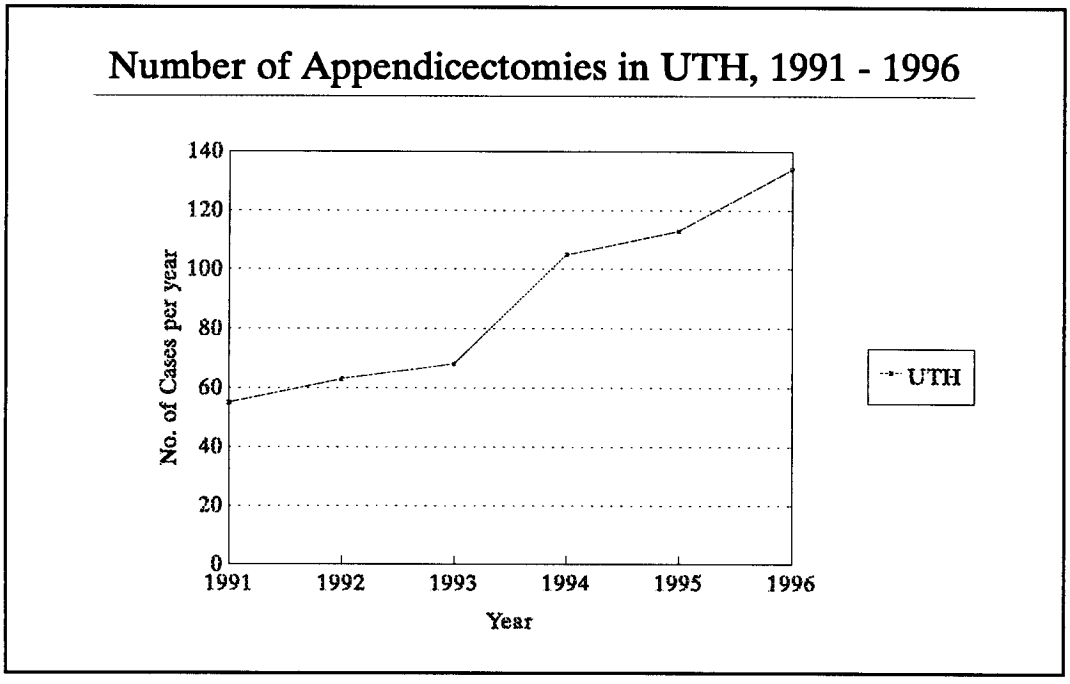


Figure 3

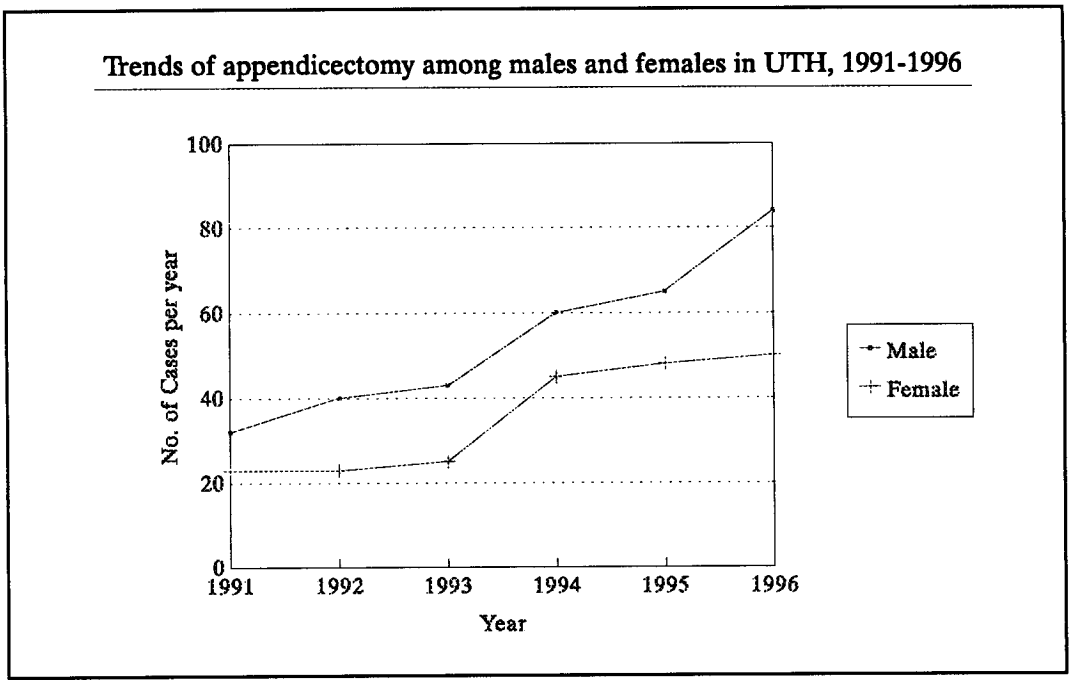


Figure 4:

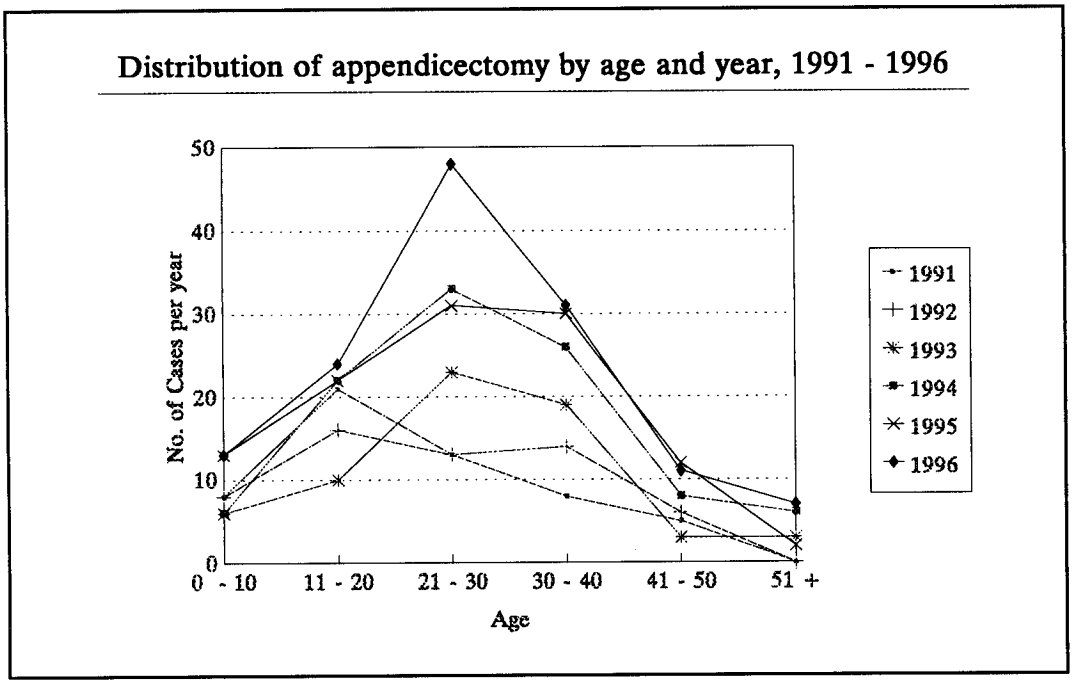


Figure 5

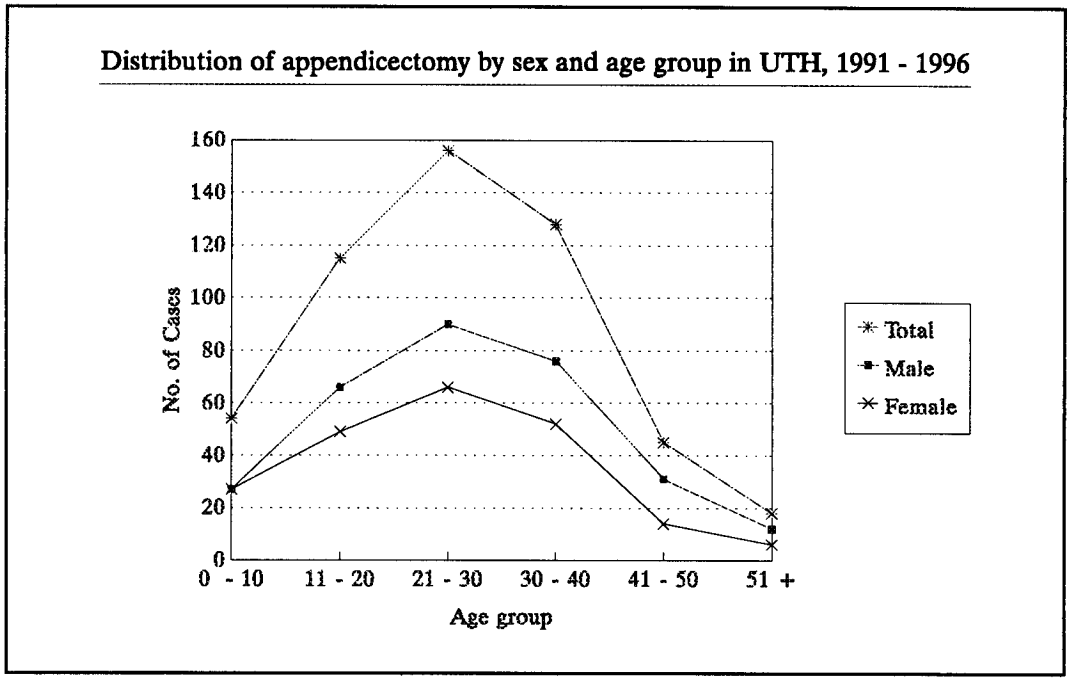


Figure 6

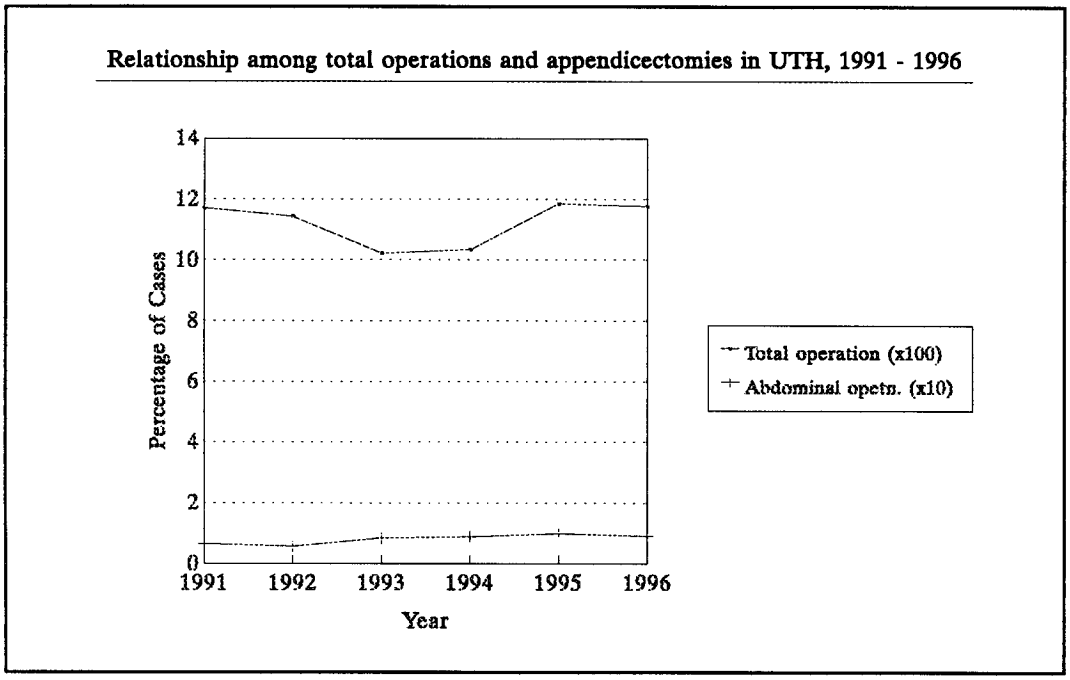


Figure 7:

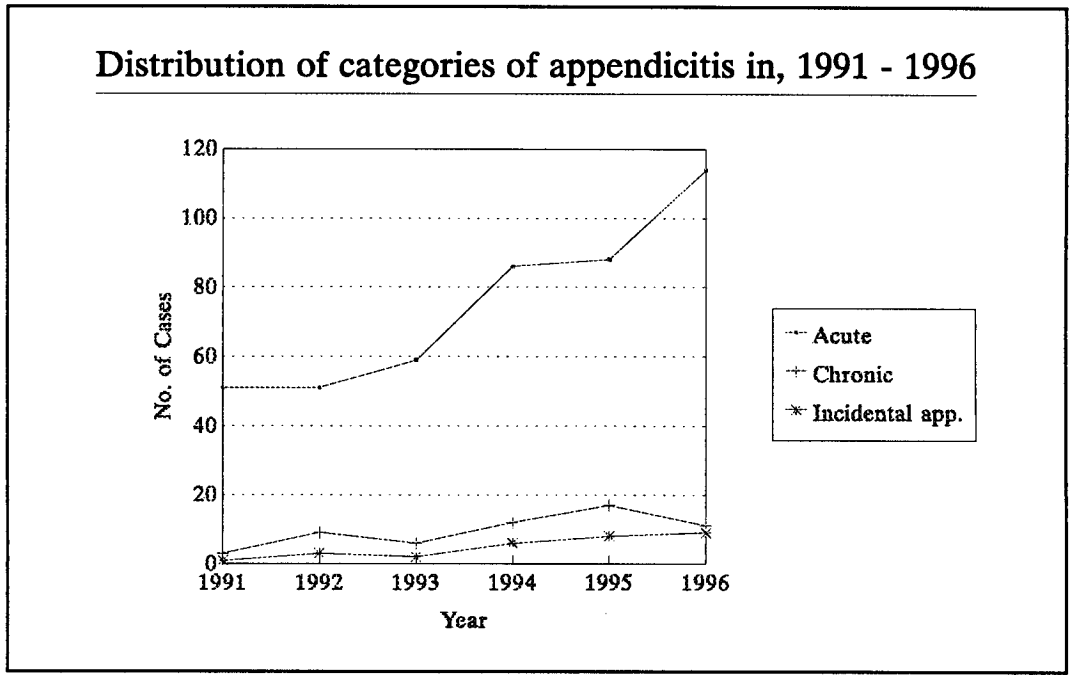


Figure 8:

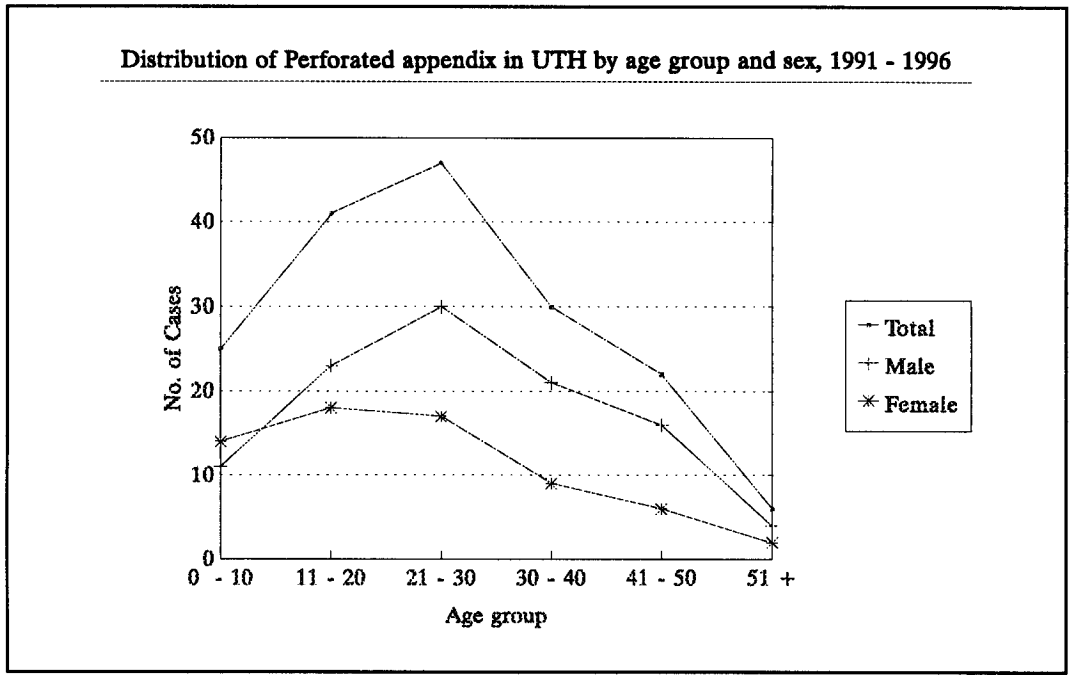


Figure 9:

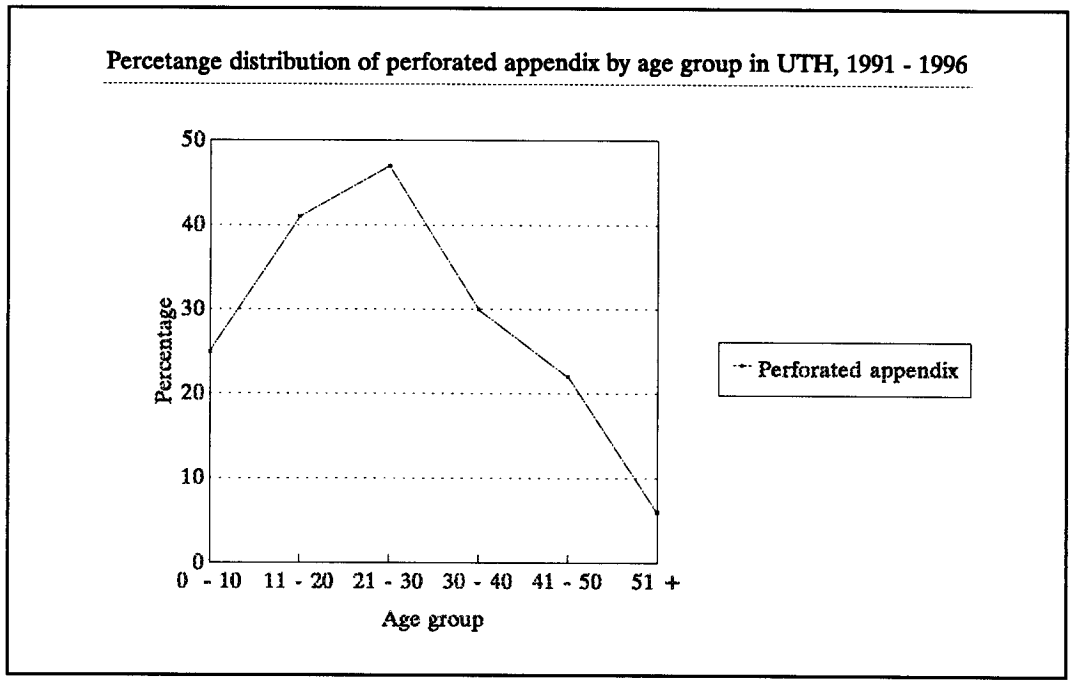
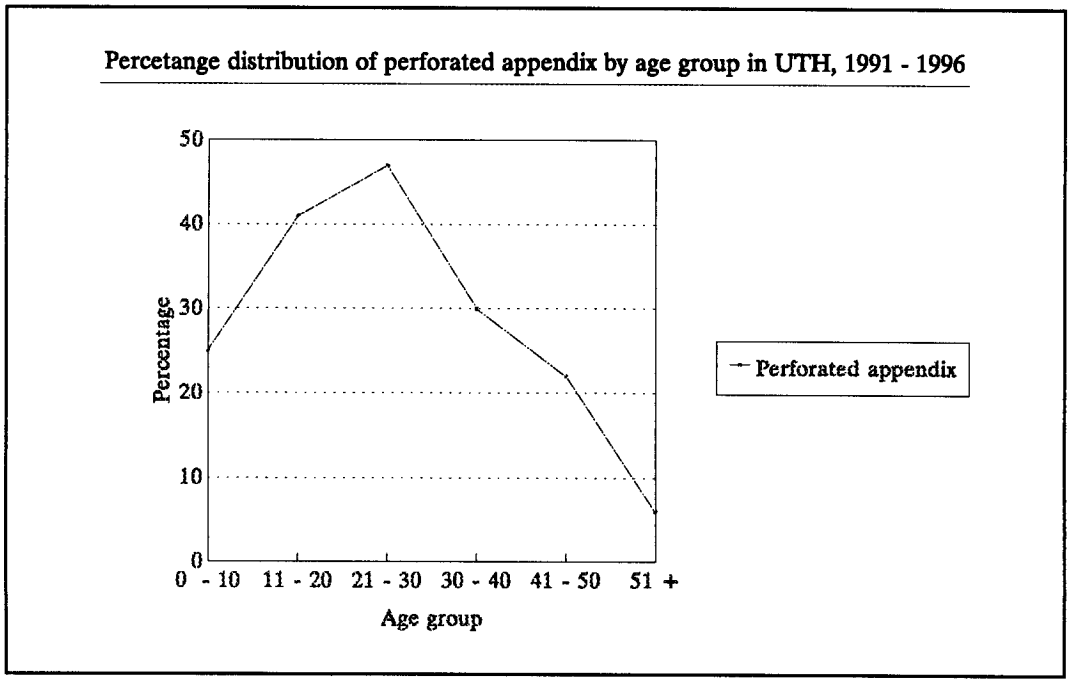


Figure 10:



DISCUSSION

Our data have several important limitations. The diagnosis of appendicitis for the retrospective component of the study was on the basis of operative findings. Very few histological records were available. But in the prospective study, only histologically confirmed diagnosis of appendicitis was accepted. Patients in whom specimen was lost were not included in the prospective study. Some histology results showed periappendicitis which were included in the acute appendicitis group. It was difficult to decide whether periappendicitis was due to primary infection or secondary infection from adjacent pathology.

Table 1 shows the incidence of appendicectomy to be 73 per 1,000,000 in UTH and 21 in Katete. This is very low compared to developed countries. The incidence of appendicitis is 1,160/1,000,000 in Sweden (Anderson et al 1994), 3,700/1,000,000 in Italy (Basali et al). 798/1,000,000/year in spain (Osta et al 1991) and 1,100/1,000,000 population/year in USA (Addis 1990).

Table 7: In UTH, appendicectomy comprises 0.80 percent of total operations and 0.34 percent in Katete. The figures represent the incidence in urban UTH and rural Katete. This suggests urban areas have a higher incidence than rural areas. These results are similar to results of other African states. In Gelfand's (1976) series 22 out of 24 patients with appendicitis were urban dwellers.

Table 2 shows males preponderance. Male to female ratio is 1;51. Our results are similar to other African countries and developed countries. Male to female ratio is 1;6 in Ethiopia (Kottiso and Missele - 1996) and 1.4:1 in the USA (Addis 1990).

Table 3 shows a 29 percent incidence of appendicectomy in the age group 21-30 and a second of peak 23.79 percent in the age range 31-40 years in the UTH, whereas there is a higher incidence in Katete during the years between 11 to 40. Table 5 shows also the highest incidence for males and females to be in the age group 21-30. Our results correlates with other African studies but differ from those of the USA were the highest incidence is in the age 10-19 (Addis 1990).

Table 6 shows the highest incidence of appendicitis in the UTH to be from October to January which represents the rainy season in Zambia. In the USA, it is more frequent in the rainy season (Addis 1990). It is different in Katete however, this difference is difficult to explain because of low numbers in Katete.

Table 7 shows that appendicectomy comprises 11.1 percent of abdominal operations. Appendicectomy comprised 17.32 percent of abdominal operations in Ethiopia (Kittiso and Messele 1996). It forms a significant component of abdominal operations in the UTH. The Table for Katete shows the rate to be 1.28 percent for abdominal operations.

Table 8 shows the category of appendicitis. Acute appendicitis was the commonest category requiring appendicectomy (83.46 percent). It is almost the same to the Kenya figure of 94 percent (Loefler 1983). Recurrent appendicitis composed 11.15 percent which is similar to the 10 percent in the USA (Hawes and Whalen 1994). Incidental appendicectomy represents 5.39 percent in UTH which is lower than the USA figures of 23 percent (Addis 1996). The majority of incidental appendicectomies were done during tubo-ovarian surgery (44.82 percent) and repair of the terminal ileum (24.14 percent) by surgeons.

Table 9 shows that 31.78 percent of appendicitis cases present with generalised peritonitis in the UTH which is comparable to other studies. In Ethiopia it is 45 percent (Kotisso and Messele 1996), in Malaysia 18 percent (Lee and Teoh 1990), in Uganda 13.5 percent (Nzarabara 1988) and in the USA 21.8 percent (Addis et al 1990).

Table 10 shows the highest number of perforations to be in the age group 21-30 for both male and female.

Table 11 represents the incidence of perforation which is in the age group 0-10 (46.30 percent) and 41-50 (48.89 percent) in UTH. Children with perforation comprised 47 percent in Los Angeles (Gomal et al 1990) and 36 percent in Tennessee, USA (Marrero et al 1992).

Table 12 shows the mortality due to appendicectomy to be 0.93 percent. It is similar to other studies. Another Lusaka study showed zero mortality (Watters 1988), in Ethiopia it was 4.5 percent (Kotisso and Messele 1996). In Bulawayo, Zimbabwe 11.9 (Oliver 1987) and in Spain 0.42 percent (Basali et al 1993). Our mortality is lower than that of other African countries but similar to Spain' series. Probable reason may be the highest incidence of appendicitis in adult than extreme age when they have higher immune capacity.

Table 13 shows that bilharzia ova was detected in 4 out of 122 specimens in the UTH ans 2 out of 6 in Katete. The rural incidence is similar to Mozambique's results. One in five of appendices contained schistosoma ova in Mozambique (Barrades 1982).

CONCLUSIONS

The St. Frances of Katete cases are far too small in number and contribute nothing, so, we left out the comments about it from the conclusion. This study has shown that the incidence of appendicectomy is 73 per 1,000,000 in Lusaka between 1991 and 1996. This is very low compared to developed countries.

This thesis shows that even though there is an apparent increase in appendicitis, which is often stated, that there is no significant actual increase when the increase in population is taken into account.

In addition to the aforementioned main conclusions, the following observations merit attention:

1. The Incidence of appendicectomy in Zambia is lower than in developed countries.

2. It is commoner in males.

3. Persons aged 21-30 years have the highest incidence of appendicitis.

4. It is more common during the rainy season.

5. Children aged 0-10 years and adult aged 41-50 years more are prone to perforations

6. Urban areas appear to have a higher incidence than in rural areas.

7. Appendicectomy is a common operation in UTH.

8. It represents a significant component of emergency surgery.

9. Incidental appendicectomy is more commonly performed in females.

10. Schistosomiasis could be one of the aetiologic factors in some areas.

11. Perforation increases surgical morbidity and mortality.

ABBREVIATIONS

BMJ:- British Medical Journal

E. Afr. Med. J:- East African Medical Journal

UTH:- Unversity Teaching Hospital

ACT. Chir. Scand:- Acta chirurgica sacandinavica

USA:- United States of America

BIBLIOGRAPHY

1. Addis DG shaffer N Fowler and Tauxe RV (1990). " The Epidemiology of appendicitis and appendicectomy in United States," American Journal of Epidemiology. 123 (5): 916-25.

2. Andersson R, Hugander A, Thulin A Nystrom PO, Olaison G (1994). "Indications for operation in Suspected appendicitis and incidence of perforation "British Medical Journal 308(694): 107-10

3. Archibong AE. Ekanem 1. Jibrin P (1995). "Appendicities in South Eastern Nigerian Children" Central African Journal of Medicine. 41(3)94-7

4. Barrades R (1982). "Bilharzia appendicitis in Mozambique." The Proceedings of the Association of Surgeons of East Africa. 5:243-246

5. Basoli A, Zarba M. E Salvi A Grovaro M (1993) "Trends in the incidemce of acute appendicitis in Italy during the past 30 years." Minerva Chirurgica. 48 (3-4): 127-32.

6. Bem C (1991), "Perforation of the Distal Ileum in Lusaka: 1989-1990" The proceedings of the Association of Surgeons of East Africa, 14:18-20.

7. Central Statistical Office, Lusaka, Zambia (1990-2015). "Demographic projections", 2,70.

8. Daniel E Marchal D (1991) "Childhood appendicitis: Factors associated with its incidence and perforation in Ethiopian Children." Ethiopian Medical Journal. 29(1): 15-9

9. Davey; W.W. (1968). "Appendicitis the Second commonest general abdominal emergency in Kitwe 1964-65" In Companion to Surgery in Africa. Livingstone, London; 262.

10. Dewulffe (1986). "Abdominal emergencies; a four year experience in Central Africa." Tropical Doctor, 16: 129-131.

11. Gamal R. and Moore T.C. (1990) "Appendicitis in children aged 13 years and younger." The America Journal of Surgery, 159:589-92

12. Gelfand M (1976). "The pattern of disease in Africa and the Western way of life." Tropical Doctor 6 173-179.

13. Hawes, Whalen GF (1994). Recurrent and chronic appendicitis: the other inflammatory conditions of the appendix." American Surgeon, 60(3):217-9.

14. Kotisso B. And Messele G (1996); "Acute Appendicitis in Ethiopia." E. Afr. Med. J., 73 (4): 251-252.

15. Lee CM. Teoh MK(1990). "Perforated appendicitis- the Malaysian experience." Journal of the Royal College of Surgeons of Edinburgh, 35(2):83-7.

16. Lepreau FJ (1975). "Surgery in Haiti" Tropical Doctor. 5:106.

17. Loefler IJP (1983). "Appendicitis and appendicectomy." The Proceedings of the Association of Surgeons of East Africa, 6: 135-138.

18. Luckmann R. Davis P. (1991) "The epidemiology of acute appendicitis in California: Racial, Gender, and Seasonal variation" American Journal of Epidemiology, 2 (15): 323-30.

19. Makwami RB (1988). "Emergency Appendicectomy: The Bugando Tanzania experience." The Proceedings of the Association of Surgeons of East Africa, 11: 21-22.

20. Malazgirt Z (1992). "Effect of appendicectomy on development of right inguinal hernia." European Journal of Surgery, 158 (1): 43-4.

21. Marrero RR Jr. Barnwell S. Hoover EL (1992) "Appendicitis in children: A continuing clinical challenge." Journal of the National Medical Association, 84 (10); 850-2.

22. Noer T (1975). "Decreasing incidence of acute appendicitis." Act. Chir. Scand: 14 (5) 431-2.

23. Nzarubara RG (1988). "Complications of appendicectomy at Mulago Hospital, Uganda." The Proceeding of the Association of Surgeons of East Africa. 11: 92-93.

24. Oliver MJ (1987). "Generalized peritonitis due to Appendicitis." The Proceeding of the Association of Surgeons of East Africa, 10: 26-27.

25. Osta PA Redondo MJ London E and Monzon A (1991). "A Retrospective study of 469 cases of acute appendicitis. Importance of Primary care. "Attencio Primaria, 8(2): 123-7.

26. Royes CA. Duquesnay DR. Coard K. Fletcher PR. (1991). "Appendicectomy at the University Hospital of the West Indies (1984-1988). "A Retrospective Review" West Indian Medical Journal, 40 (4): 159-62.

27. Schroder DM Lapoth JE Lloyd LR Boccaccio LE (1993). "Laparoscopic appendicectomy for acute appendicitis: Is there really benefits?" American Surgeon, 59 (8) 541-8.

28. Stine EDJ (1991). "surgery in rural Tanzania." Tropical Doctor 11: 56.

29. Umerah BC and Obadike G (1990). "Acute abdomen in Zambia" E Afr Med J.; 55:77-81.

30. Waker AFP. Richardson BD, Walker B Alfred A (1973). "Appendicitis; fibre intake and Bowel behavior in Ethnic groups in South Africa." Postgraduate Medical Journal, 49: 243-9.

31. Walker AR Seal I (1990). "What causes appendicitis?" Journal of Clinical Gastroenterology. Apr. 12 (2): 127-9.

32. Watter D.A.K. (1988); "Severe peritoneal sepsis" Bailliere's Clinical Tropical Medicine and Communicable Diseases, 3(2):275-95.