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### INTESTINAL HELMINTHS IN SOME CASES OF ACUTE APPENDICITIS OPERATED IN BAMENDA, CAMEROON

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#### ABSTRACT

**Background:** Acute appendicitis is the most frequent infectious surgical abdominal emergency and previous studies have noted the presence of parasites in the appendicular lumen.

**Objective:** This study was done to determine the involvement of intestinal worms in the etiology of acute appendicitis.

**Materials and Methods:** This was a prospective and descriptive study concerning cases of confirmed and operated acute appendicitis between 15<sup>th</sup> April, 2013 and 14<sup>th</sup> April, 2015 at the People's Clinic, Ngomgham, Bamenda, Cameroon. The appendicular content was macroscopically examined for parasites and formol-ether concentration technique was carried out for ova detection.

**Results:** A total of 112 patients were operated for acute abdominal pain within the study period. There were 74 (60.8%) cases confirmed with acute appendicitis of which 45 (60.1%) were males and 29 (39.2%) were females. The most affected age group was the 21 to 40 years (50%). The removed appendices appeared congestive in 30 (40.5%) cases, suppurated in 27 (40.5%) cases and gangrenous in 17 (23.0%) cases. There was no relationship between the appearance of the removed appendix and the gender of participants ( $P > 0.05$ ). Three different helminth ova were identified in the 74 samples. In decreasing prevalence, the parasite trend was 8 (10.8%) *Ascaris lumbricoides*, 5 (6.8%) *Enterobius vermicularis*, 3 (6.0%), *Ankylostoma duodenale*, Adult *Ascaris lumbricoides* and *Enterobius vermicularis* were seen in 1 and 3 cases respectively.

**Conclusion:** A small percentage of parasitic worm eggs were found in the appendicular content, though a good portion of patients took medications against parasites before surgery. Intestinal worms could not be incriminated in the causation of the appendicitis; nevertheless, one adult ascaris was found as an evident cause of appendicular lumen obstruction.

**Key words:** Intestinal Helminthes, Acute appendicitis, Bamenda

### LES HELMINTHES INTESTINAUX DANS CERTAINS CAS D'APPENDICITES AIGUES OPERES A BAMENDA, CAMEROUN

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#### RÉSUMÉ

**Contexte:** L'appendicite aigue est la plus fréquente des urgences chirurgicales abdominales d'origine infectieuse et des études ont démontré la présence des parasites dans la lumière appendiculaire.

**Objectif:** Le travail a été réalisé pour investiguer l'implication des helminthes intestinaux dans l'étiologie de l'appendicite aigue.

**Méthodologie:** Il s'agissait d'une étude prospective et descriptive concernant les cas confirmés et opérés d'appendicite aigue du 15 Avril 2013 au 14 Avril 2015 à Peoples Clinic, Ngomgham à Bamenda. Le contenu appendiculaire a été examiné macroscopiquement pour la détection des parasites adultes pendant que la technique de concentration par le formol-éther était utilisée pour la détection des œufs.

**Résultats:** Un total de 112 patients présentant des douleurs abdominales ont été opérés. Il y avait 74 (60.8%) cas d'appendicites aigues confirmés desquels 45 (60.1%) étaient de sexe masculin et 29 (39.2%) de sexe féminin. Le groupe d'âge le plus affecté était celui compris entre 21 et 40 ans (50%). Les appendices enlevés étaient congestifs dans 30 (40.5%) cas, suppurant dans 27 (40.5%) cas et gangreneux dans 17 (23.0%) cas. Il n'y avait pas de relation entre l'apparence de l'appendice enlevé et le sexe des participants ( $P > 0.05$ ). Les œufs de 3 types d'helminthes ont été identifiés des 74 spécimens. Il s'agissait par ordre décroissant de prévalence de 8 (10.8%) *Ascaris lumbricoides*, 5 (6.8%) *Enterobius vermicularis* et 3 (6.0%) *Ankylostoma duodenale*. Les adultes d'*Ascaris lumbricoides* et d'*Enterobius vermicularis* ont été observés dans 1 et 3 cas respectivement.

**Conclusion:** Un petit pourcentage de cas avait des œufs de vers intestinaux dans le contenu appendiculaire. Mais une grande proportion des patients avait pris un vermifuge avant la chirurgie. La parasitose intestinale ne pouvait pas être incriminée comme cause d'appendicite aigue; néanmoins un adulte d'ascaris a été identifié comme cause évidente d'obstruction de la lumière appendiculaire.

**Mots clés:** Appendicite aigue, contenu appendiculaire, vers intestinaux, obstruction appendiculaire.

## INTRODUCTION

Acute appendicitis is the most frequent infectious surgical abdominal emergency and usually suspected in all cases of acute abdominal pain which makes it a serious public health problem [1]. It is admitted that appendicular mucosal lesions are responsible for the pathology and pressure in the appendix caused by obstruction at its base is known to be the main mechanism [2]. Obstruction favours bacterial multiplication and development of the pressure within the appendix [2]. The diagnosis is essentially clinical though laboratory and ultrasonography investigations are often requested and done [3-6]. Presence of a foecolite, tumour, or foreign body on ultrasonography and macroscopically on surgical specimens would confirm the assertion [6,7]. But there are cases of appendicitis without the presence of any obstruction. Therefore other mechanisms could be at the base.

More than one dozen different species of intestinal helminths infect humans, particularly in the tropical and subtropical parts of the developing world. However, four nematodes stand out due to their widespread prevalence and distribution that result in hundreds of millions of human infections. These include the large roundworm (*Ascaris lumbricoides*), the whipworm (*Trichuris trichiura*), and two species of hookworm (*Necator americanus* and *Ancylostoma duodenale*) [8]

In Cameroon intestinal helminthiasis are among the most important parasitic diseases. These infections are more prevalent in the Southern part of the country [9] and about 5.6 million people are infected with *A. lumbricoides*, 6.5 million with *T. trichiura*, and 2.6 million with *N. americanus* [10]. These parasites co-exist in most parts of the country with *Schistosoma* species [11] causing great parasitic burden in infected children.

Numerous studies have reported the presence of parasites in the appendicular lumen which is continuous with the lumen of the caecum [4, 12, 13]. Parasitism as a predisposing factor of acute appendicitis is preventable. Bamenda is a highly populated rural town where few campaigns for the elimination of intestinal worms have been known to be carried out. This study was done to determine the involvement of intestinal worms in the etiology of acute appendicitis. Such information would be of great contribution in elaborating an appendicitis prevention programme.

## MATERIALS AND METHODS

### Study design and ethical considerations

This was a prospective and descriptive study carried out from April, 2013 to April, 2015 at the People's Clinic Ngomgham in Bamenda- Cameroon. It included all

persons aged 5 years and above that presented with abdominal pain clinically diagnosed as acute appendicitis, and who consented to be included in the study. Patients or their guardians were made to understand that it was not a hospital obligation to take part in the study, neither was it a prerequisite for receiving medical attention. Written informed consent/parental assent forms were signed. An ethical clearance was obtained from the Institutional Review Board (IRB) of the Regional Delegation of Health prior to the study.

### Sample collection and processing

After the routine clinical examination and ultrasonography (if requested by the physician), patients were operated upon and acute appendicitis. Those operated for appendicular abscess were not retained. Appendectomy specimen were emptied of their contents and analysed in the parasitology laboratory. Detection of adult parasites was done macroscopically. For detection of parasite ova, formol-ether concentration technique was carried out. A gram of each faecal sample was emulsified in 3 mL of 10% formol water. Four mLs of formol water was further added to the preparation and mixed. The emulsified preparation was therefore sieved and the filtrate was collected and transferred to a centrifuge tube, then 4 mLs of ethyl acetate was added to the preparation. The tube was therefore stoppered and its content mixed for a minute. The stopper was gently removed and the preparation centrifuged at 3000 rpm for one minute. The layer of faecal debris from the side of the tube was gently loosened with a stick and the supernatant was discarded. The content of the sediment was transferred to a slide, covered with a coverslip and observed using the X10 and X40 objectives. A drop of iodine was run under the slide to increase visibility of parasite ova. Slides were read within 24 h of preparation. More details on this technique is described elsewhere [14].

Data from the examinations were retained for analysis; they included patients' biodata, whether or not antiparasitic drugs were taken prior to operation, ultrasonography results, parasites found in the appendicular content, and the pathology results. The Chi-Square test was used to determine the significance of results obtained at significant level of 0.05.

## RESULTS

A total of 112 patients were operated for acute abdominal pain within the study period. There were 74 (60.8%) cases of confirmed with acute appendicitis of which 45 (60.1%) were males and 29 (39.2%) were females. The mean age was 21.4 years and the age range was 5 years to 53 years. The most affected age group was the 21 to 40 years (50%) followed by the 11 to 20 years (36.5%). Table 1 shows the Distribution of study participants according to age and sex.

TABLE 1: DISTRIBUTION OF STUDY PARTICIPANTS ACCORDING TO AGE AND SEX.

Age group, (years)	Number (%)* of participants		Total n (%)
	Males	Females	
5 - 20	17 (37.8)	10 (34.5)	27 (36.5)
21 - 40	23 (51.1)	14 (48.3)	37 (50.0)
>40	5 (11.1)	5 (17.3)	10 (13.5)
Total	45 (100.0)	29 (100.0)	74 (100.0)

\*Percentages based on number of participants

Ultrasonography was carried out on 42 participants of which 19 (42%) showed a positive result. The removed appendices retained for examination appeared congestive in 30(40.5%) cases, suppurated in 27(40.5%) cases and

gangrenous in 17(23.0%) cases. These pathologies are shown in Table 2. There was no significant relationship between the appearance of the removed appendix and the gender of participants ( $P>0.05$ ).

TABLE 2: APPEARANCE OF REMOVED APPENDIX IN STUDY PARTICIPANTS ACCORDING TO AGE AND SEX.

Appearance of removed appendix	Number (%)* of participants		Total n (%)
	Males	Females	
Congestive	17 (37.8)	10 (34.5)	30 (40.5)
Suppurated	23 (51.1)	14 (48.3)	27 (36.5)
Gangrenous	5 (11.1)	5 (17.2)	17 (23.0)
Total	45 (100.0)	29 (100.0)	74 (100.0)

\*Percentages based on number of participants

Appendicular lumen obstruction was found in 46 (62.2%) of the retained cases, there were 29 (39.2%) foecalith cases and 16 (21.6%) cases showed a swollen appendix. One case

showed a 22cm long appendix as presented in Figure 1 with an adult *Ascarislumbricoides* within the lumen as shown in Figure 2



Figure 1: Appendix with a small portion of *Ascarislumbricoides*.



Figure 2: Adult *Ascarislumbricoides* extracted from appendicular lumen

The pathology report confirmed all the cases that were retained. Three different helminth ova were identified in the 74 samples examined. In decreasing prevalence, the

parasite trend was 8 (10.8%) *Ascarislumbricoides*, 5 (6.8%) *Enterobiusvermicularis*, 3 (6.0%) *Ankylostomaduodenale* shown in Table 3

TABLE 3. PREVALENCE OF INTESTINAL HELMINTH FROM APPENDICECTOMY SPECIMEN CONTENTS

Parasites	Number (%)* of specimen with parasites
<i>Ascarislumbricoides</i>	8 (10.8)
<i>Enterobiusvermicularis</i>	5 (6.8)
<i>Ankylostomaduodenale</i>	3 (6.0)

\* Percentages based on total examined samples

Adult *Enterobiusvermicularis* was seen in 2 (2.7%) samples while 1 (1.3%) showed an adult *Ascarislumbricoides*. The worm had been cut in two after ligation of the appendicular stump. A purse string suture was applied

below the stump, the first suture released, the worm extracted and the purse string tied to avoid spillage from the coecum. It should be noted that 27 (36.5%) patients said they had taken antihelminthic medications prior to

consultation while 11(14.9%) other had taken metronidazole.

## DISCUSSION

Two units were chosen for the study to maximize the number of cases. To limit bias as much as possible, the study was prospective, the sampling was consecutive, and the clinical investigations were carried out by the same people.

Majority (73.4%) of our participants were aged 21 to 40 years. This age range has been observed in other studies [14]. In this study, acute appendicitis was predominant in males, as reported in previous works [14]. Ultrasonography was positive in 42% of patients examined. As found in previous reports [19], the positivity of ultrasonography should not be considered as the only conclusive revelation of appendicitis. It is sometimes doubted and depends on the manipulator [15].

In the present study, the surgically removed appendices were most congestive or suppurated. This observation is consistent with a previous report [16]. The appendicular lumen obstruction was found in a high number of cases (62.2%). This observation was also reported in a study carried out in Niger by Marouma et al. [17].

Some parasites were found in the appendicular content but only one could be incriminated as being responsible for acute appendicitis. This is consistent with observations by Halkic et al. [12] and Flamant et al. [16] respectively. Nineteen patients showed evidence of parasitic helminth infection. The parasite most frequently involved in was *Enterobius vermicularis* in the form of the eggs or adult as it has been observed in other studies [12,18]. This is probably due to the localization of the adult worm in the caecum. Our study has not confirmed the reports from other works which had found *Entamoeba histolytica* and *Schistosoma mansoni* directly implicated as causes of acute appendicitis [15,18,19].

This study found a case of luminal obstruction by adult *Ascaris lumbricoides*. The worm could be considered

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responsible for acute appendicitis in consistence with a previous observation [1]. In some other reports the percentages of such obstruction ranged from 5 to 20 % [13]. The obstruction effect of this large worm is obvious, the worm being often larger than the orifice at the base of the appendix. The mechanisms by which smaller parasites cause appendicitis still remain to be clearly elucidated.

## CONCLUSION

A small percentage of parasites were found in the appendicular content in this study. Nothing in this study could lead to a formal conclusion that the parasite eggs seen in the appendicular content could have contributed to the acute appendicitis. However, adult *Ascaris lumbricoides* by its size is an evident cause of the obstruction of the lumen and obviously can be incriminated in the causation of acute appendicitis.

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## Authors' Contributions:

PTC -Study conception, appendicectomy, sample collection and analysis and compilation of results  
KFHL -Laboratory investigation and substantial review of the manuscript for final publication  
KFA and GML - Verification of results and data management  
LNS-Ultrasonography  
TS-Verification of data

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