HELICOBACTER PYLORI INFECTION IN PATIENTS REFERRED FOR ENDOSCOPY AT THE UNIVERSITY TEACHING HOSPITAL, LUSAKA.

BY

CUSTER MUSHE MULIA BSc. (Hb), MBChB (UNZA)

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE MASTER OF MEDICINE (SURGERY) DEGREE OF THE UNIVERSITY OF ZAMBIA

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SUPERVISOR' PAGE

THIS DISSERTATION OF DR. CUSTER MUSHE MULIA IS READY FOR EXAMINATION.

SIGNED (SUPERVISOR):.....7/2/98.....
(Signature)

PROF. KRIKOR L. ERZINGATSIAN, FRCSI
ASSOCIATE PROFESSOR OF SURGERY
HEAD - DEPARTMENT OF SURGERY
SCHOOL OF MEDICINE
UNIVERSITY OF ZAMBIA

STATEMENT

I HEREBY STATE THAT THIS DISSERTATION IS ENTIRELY THE RESULT OF MY OWN PERSONAL EFFORT. THE VARIOUS SOURCES TO WHICH I AM INDEBTED HAVE BEEN CLEARLY INDICATED IN THE BIBLIOGRAPHY AND ACKNOWLEDGEMENTS.

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DECLARATION

I HEREBY DECLARE THAT THIS DISSERTATION HEREIN PRESENTED FOR THE DEGREE OF MASTER OF MEDICINE (SURGERY) HAS NOT BEEN PREVIOUSLY SUBMITTED EITHER WHOLLY OR IN PART FOR ANY OTHER DEGREE AT THIS OR ANY OTHER UNIVERSITY NOR IS IT BEING CURRENTLY SUBMITTED FOR ANY OTHER DEGREE.

SIGNED_____ 6/2/98

(Candidate)

APPROVED BY_____ 7/2/98

(Supervisor)

APPROVAL

This dissertation of **Dr. Custer Mushe Mulia** is approved as fulfilling part of the requirements for the award of the degree of Master of Medicine in Surgery by the University of Zambia.

Signature:	Date:
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DEDICATION

I dedicate this work to my family; my wife Yvonne and our children Walusimo and Nobutu, for their love which nurtures me, their faith which strengthens me, and their quiet expectations which challenge me to excel.

DEFINITION OF TERMS

Gastritis	-	Inflammation of gastric mucosa
Type A Gastritis	-	Gastritis histologically accompanied by profound atrophy with complete or partial loss of parietal and chief cells and a scanty chronic inflammatory cell infiltrate within the lamina propria. It is associated with pernicious anaemia.
Type B Gastritis	-	Histologically there is infiltration of the lamina propria of the upper part of the antral mucosa by lymphocytes and plasma cells. It is associated with ***Helicobacter pylori*** infection
Type C Gastritis	-	Associated with bile reflux
Duodenal ulcer	-	Ulcers occurring in the duodenum
Gastric ulcer	-	Ulcers occurring in the stomach
Peptic ulcer disease	-	Gastric and duodenal ulcers
Duodenitis	-	Inflammation of duodenal mucosa
Metaplasia	-	The change in the type of adult cells in a tissue to a form that is abnormal for that tissue.
Dysplasia	-	Alteration in size, shape and organisation of adult cells.
Helicobacter pylori infection	-	Presence of ***Helicobacter pylori*** infection in antral mucosa of the stomach as demonstrated by two positives of the following test: Giemsa stain, Gram stain, Urease test and Culture.
Endoscopy	-	The visual inspection of the oesophagus, stomach and duodenum by means of an endoscope

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ABSTRACT

A prospective study was conducted to determine the frequency of occurrence of ***Helicobacter pylori (H.pylori)*** infection in out-patients presenting to the gastroenterology unit of the University Teaching Hospital (UTH), Lusaka, over a ten months period. Dyspepsia and upper gastrointestinal bleeding were the commonest symptoms for requesting endoscopy. A total number of 87 patients were interviewed using a standardised symptom and demography questionnaire and then underwent upper endoscopy and antral biopsy. There were 49 males and 38 females (ratio 1.3:1) and the age range was 17-74 years with a mean of 37. All the 87 were tested for ***H. pylori*** infection. Abnormal endoscopy results were obtained in 30 of the 87 (35%) patients and the major endoscopic findings were peptic ulcer disease in 13 patients (14.9%) and gastritis in 12 patients (13.8%).

To identify ***H. pylori*** infection five antral biopsy specimens were taken from all patients and these were then examined using giemsa stain, gram stain, biopsy urease test and culture. Infection was considered positive when two or more tests were positive for ***H. pylori***, indeterminate if one of the tests was positive and negative if all four were negative. Infection by ***H. pylori*** was found in 54 patients (62%), 15 patients (17%) had indeterminate results and 18 patients (18%) were negative. Among the 57 patients with normal endoscopic findings 32 patients (56%) had infection and of the 30 patients with abnormal findings, 22 (73%) had ***H. pylori*** infection. The result of this study show that ***H. pylori*** infection is a common finding in patients referred for gastroscopy at UTH, Lusaka.

INTRODUCTION

1. Historical Perspective

We are now in the second decade since ***Campylobacter pylori (Helicobacter pylori)*** was first identified from the human stomach. Following the report of Warren and Marshall and the identification of the organism in endoscopic biopsies of the stomach, there has been a rapidly growing literature reporting the association of ***Helicobacter pylori (H. pylori)*** with upper gastrointestinal disease (Zegabriel Tedla, 1992).

H. pylori colonisation of the stomach does not appear to be a new phenomenon. Descriptions of curved and spiral organisms (spirocetes) was initially noticed in stomachs of dogs in 1893 by Bizozzero followed 3 years later by Solomon in rats and cats. Doenges in 1938 was however the first to discover it in humans when he found the bacterium in 103 (43%) of 242 stomachs examined at autopsy. He was however unable to detect the relationship between the presence of the organisms and involvement in gastrointestinal disease.

In 1975 Steer and Colin Jones using a fibreoptic biopsy technique observed gram-negative bacilli in 80% of patients with gastric ulcers although attempts to culture the organism yielded ***Pseudomonas aeruginosa.***

The pioneering work in 1979 by John Warren, a pathologist in Perth, Western Australia noticed the appearance of spiral bacteria overlying gastric mucosa especially over inflamed tissue. Warren and Barry Marshall in 1983 successfully cultured these organism from 11 patients with gastritis.

Warren and Marshall were less successfully in their classification of this spiral organism. It was first designated as ***Campylobacter pyloridis*** in 1984. Three years later, Hartmann and Von Graevenitz pointed out a grammatical error in the nomenclature (***pyloridis*** is not the genitive case of pylorus). As a consequence, the name was changed to ***Campylobacter pylori***. When authorities looked critically at the organism they found that its genomic and phenotypic characteristics differed not only from that of ***Campylobacter*** species but also from all other know genera. Therefore, while retaining its old species name, it was ascribed a new genus, ***Helicobacter***, denoting that in ***vivo*** it is helical and in ***vitro*** it is often rod shaped (***Bacter:*** a staff).

2. Epidemiology of *Helicobacter pylori* infection.

The seroprevalence of ***H. pylori*** has been found in Europe and in white communities of the USA to increase with age (Graham et al, 1991). Age specific seroprevalence also varies with different populations of the same country (Malfertheiner et al, 1996).

In Africa and India, over 80% of children were found to be infected by the age of 20, in contrast to 29% in Italy and only 4% in Belgium (Malfertheiner et al, 1996).

These geographic and social patterns of ***H. pylori*** infection indicate faecal-oral transmission. An increased prevalence of ***H. pylori*** infection in gastroenterologists has been reported and there is evidence that infection may be an occupational hazard for doctors (Tadataka et al 1991, NIH consensus, 1994).

3. Clinical Presentation and Pathogenesis

H. Pylori causes gastritis in humans, which in many cases is asymptomatic (Malfertheiner et al, 1996, Tadataka et al 1991, NIH consensus, 1994). A proportion of colonised individuals will develop peptic ulceration and this may be due to difference in infecting strains of ***H. pylori.***

H. Pylori expresses a number of putative factors of pathogenicity. An important factor of pathogenicity is the vacuolating toxin A protein ***(VacA)***. Most cytotoxic ***H. Pylori*** strains also express a protein called cytotoxin-associated gene protein A (***CagA***). ***H. pylori*** possesses a urease located on its cell surface, which rapidly hydrolyses urea to ammonia and carbon dioxide. This reaction is the basis for several tests for the presence of the organism but additionally the ammonia produced is a cytotoxin. ***H. pylori*** also decreases the quality and quantity of the mucus covering the gastric epithelial cell (Calam, 1990, Holton, 1995).

Other potential pathogenicity factors of ***H. pylori*** include neuraminidase, haemolysins, flagella and heart-shock proteins.

The strongest association of ***H. pylori*** infection and gastroduodenal disease has been with type ***B*** gastritis. The hypothesis that this common type of gastritis is associated with the

presence of ***H. pylori*** dates back to the work of Warren and Marshall, and many other workers have confirmed the presence of ***H. pylori*** in Type ***B*** gastritis (Lule et al, 1991, Spence et al, 1993, Tadataka et al 1991, NIH consensus, 1994).

Prolonged gastric inflammation, induced by ***H. pylori***, may lead to atrophic gastritis, interstitial metaplasia, dysplasia and finally to adenocarcinoma. ***H. pylori*** plays an important role in the development of Mucosa-Associated Lymphoid Tissue (MALT) gastric lymphomas.

4. Diagnosis of *Helicobacter Pylori*

Gastric ***H. pylori*** may be detected by invasive and non-invasive methods (Calam, 1990, Holton, 1995, Tadataka et al, 1991, NIH consensus, 1994). The invasive diagnostic method utilises endoscopy to obtain biopsy which could be used for the direct urease test, gram stain, culture and histology.

The biopsy urease test is based on the pH change that occurs when the urease splits urea to release ammonia. A biopsy specimen is crushed into a solution containing urea, a pH indicator, a buffer and bacteriostatic agent, the last of these being added to make certain that only preformed enzyme is detected and to suppress extraneous urease-producing organism that might spoil the medium before use. The urease test is an excellent test for the provision of presumptive diagnosis of ***H. pylori*** infection.

Several histological staining tests for ***H. pylori*** are available. Silver staining tests using the Warthin-Starry method is excellent but difficult and expensive. Giemsa stain has an excellent sensitivity (100%) and specificity (97%) and has been found to be the best staining tests technique for histological diagnosis of ***H. pylori*** infection (Calam, 1990, Holton, 1995). Other stains include haematoxylin and eosin (H&E) staining test, and Gram stain.

H. pylori may be cultured from one or two gastric biopsies. It will grow well on routine blood or chocolate agars but they must not have a dry surface. Growth supplements may be added but not necessary. The ideal atmosphere for ***H. pylori*** is 5% O_2 with 5-10% CO_2. Commercial gas producing sachets are available for use within a normal anaerobic gas jar.

The non-invasive tests for the detection of ***H. pylori*** infection include the urease breath test and serology. Urease breath test utilises the presence of urease as its principle. The subject ingests C-labelled Urea and any Carbon dioxide produced by Urease is detected in the breath. It is rapid and versatile and can be used diagnostically, to screen patients prior to endoscopy, monitor treatment and in epidemiological investigations.

Serology is used mainly for epidemiological studies but can also be used to monitor the efficacy of treatment. The principal format is the ELISA test for the detection of IgG, although latex agglutination tests are also available. IgA and IgM can also be detected but are less useful diagnostically.

New techniques adopted for the diagnosis of ***H. pylori*** infection include in situ hybridisation and Polymerase Chain Reaction (PCR). These are molecular biology-based techniques and can also be used to detect the organism in other specimens, such as faeces, or other sources such as animal. They also form the basis for the main typing system for ***H. pylori*** and are therefore useful in epidemiological investigations and in deciding whether treatment failure represents re-infection or complete eradication (Holton, 1995).

Recently Moayyedi et al (1997) at Leeds University reported on the accuracy of a rapid whole blood test introduced by Cortecs diagnostics. The Helisal rapid whole blood test is claimed to diagnose ***H. pylori*** status within ten minutes as compared to serological testing that is commonly used to screen for ***H. pylori*** but requires analysis in a central laboratory thereby delaying results.

Although culturing the organism is traditionally considered the criterion ("gold" standard) for diagnosis of ***H. pylori***, it is the least sensitive diagnostic test with approximately 70% to 80% positivity (Holton, 1995). Both Histological demonstration of the organism by Giemsa or Warthin-Starry stains and Urease testing have sensitivities and specificities greater than 90%.

5. Eradication

Available studies have demonstration clearly the principal benefit of eradication in patients with peptic ulcers, a substantial reduction in the risk of ulcer recurrence to less than 10% in one year (Malfertheiner, 1996, Tadataka et al, 1991, NIH consensus, 1994). Therapy contribute to a modest reduction in time of ulcer healing and enhances healing of ulcers refractory to conventional therapy.

Multiple agents that have been studied in various combinations include metronidazole, tetracycline, amoxycillin, clarithromycin, bismuth compounds, H_2-receptor antagonists, and proton-pump inhibitors (PPI). Consideration of the therapeutic options should take into account efficacy, compliance, side effects, and cost.

6. Vaccines

Until recently, vaccination against chronic ***H. pylori*** was considered to be problematic because natural immunity was known to be inadequate in clearing the infection (Malfertheiner, 1996). Vaccination against ***H. pylori*** has been accomplished in animal models. It has been shown that resistance of ***H. pylori*** to the immune response can be circumvented by orogastric immunization with ***H. pylori*** antigens, together with mucosal adjuvants such as cholera toxin of ***vibrio cholerae.*** or the heat labile toxin of ***Escherichia coli.***

OBJECTIVES

The aims of this study are to:

1. Determine the frequency of ***H. pylori*** infection in patients referred for gastroscopy at the University Teaching Hospital, Lusaka.

2. Determine factors which may be related to ***H. pylori*** infection in our environment.

3. To compare the results obtained from (1), and (2) above with published work from other centres.

RATIONALE

Gastroduodenal diseases are considered to be common in Zambia but there is very little information regarding prevalence. The few studies available were undertaken before the recognition of ***H. pylori*** as an important factor in the aetiology of gastroduodenal diseases. There is no data on the prevalence of ***H. pylori*** infection in Zambia.

This study is therefore justified because for the first time in Zambia, the relationship between ***H. pylori*** and common gastroduodenal problems as well as the role ***H. pylori*** might play in the morbidity and mortality encountered in these diseases shall be established.

It is further hoped that this study will help in offering better management to patients with gastroduodenal diseases as eradication of ***H. pylori*** may benefit patients with gastroduodenal diseases.

Finally the study will also serve as a basis for future research.

LITERATURE REVIEW

Warren and Marshall, in 1983, were the first to characterise ***H. pylori*** and to describe its close association with gastritis when they cultured the organism form 11 patients with gastritis (Calam , 1990, Lule et al, 1991, NIH consensus, 1994). It has now been recognised that ***H. pylori*** causes type B antral gastritis and that it is an important aetiological factor in the pathogenesis of peptic ulceration, gastric adenocarcinoma and Mucosa-Associated Lymphoid Tissue (MALT) gastritis (Malfertheiner et al, 1996).

Gastritis has long been recognised to be a common finding in the normal population and its histological presence is closely paralleled by the presence of ***H. pylori*** (NIH consensus, 1994, Malfertheiner et al, 1996). The presence of ***H. pylori*** and gastritis is related to age, geographical location, and ethnic background without evidence of a sexual predilection (Graham et al, 1991, Malfertheiner et al, 1996). Studies from USA and Europe on asymptomatic subjects suggest that prevalence of ***H. pylori*** and gastritis increases with age. Dooley and colleagues studied 113 asymptomatic volunteers in Los Angles with endoscopy and biopsy and reported that the overall prevalence of ***H. pylori*** increases from 10% in the 20s to 47% in the 60s (Malfertheiner et al, 1996).

Other studies from western countries have also reaffirmed the low infection rate in children and that infection increases with age at approximately the same rate as it does in gastritis, i.e. 1% - 2% per year (Graham et al, 1991).

In contrast histologic gastritis and ***H. pylori*** infection develop at an earlier age and with much greater frequency in parts of South and Central America, Asia, and Africa (Graham et al, 1991, Katelaris et al, 1992, Lule et al, 1991, Malfertheiner et al, 1996). David Y. Graham et al (1991) in investigating the epidemiology of ***H. pylori*** in an asymptomatic population of metropolitan Houston in the USA, found the prevalence of ***H. pylori*** to be 70% in blacks and 34% in whites, with that in the latter increasing at the rate of 1% per year.

Lachlan et al (1988) in Kenya associated ***H. pylori*** with gastritis in over 85% of their patients studied. Palmer et al (1992) in Cameroon demonstrated evidence of histologic gastritis in all biopsies in which ***H. pylori*** was identified. They found histologic gastritis in 88% and ***H. pylori*** in 72% of their patients. This was almost similar to the finding of Kassa et al in Ethiopia in which histologic chronic antral gastritis (CAG) was found in 84% of their patients and overall ***H. pylori*** infection in 70% of patients (Kassa et al 1996).

The early age of acquisition of ***H. pylori*** infection was reported by Chris Holcombe et al (1992) in a random serological study conducted in north-eastern Nigeria and demonstrated no significant increase in the prevalence of ***H. pylori*** infection with increasing age in the population he studied and suggested that most subjects were infected before the age of five years. In a small group of children, aged six months to two years, 57% (12 of 21) had antibodies to ***H. pylori*** and the infection was 80% in those aged between five and nine years. This was similar to the study by Megraud et al (1989) who also confirmed the young age of initial infection: 64 of 116 (55%) subjects under the age of nine had antibodies to ***H. pylori*** in the Ivory Coast and 19 of 42 (45%) in Algiers.

In his original description of ***H. pylori,*** Warren noted that the bacilli were "often found in chronic gastritis " (an increase in mucosal round cell infiltration), while the "curved bacilli were almost always present in active chronic gastritis"(an increase in neutrophil as well as round cells)-(Tadataka et al, 1991). Most other investigators have confirmed that ***H. pylori*** is more common in active gastritis than in inactive chronic gastritis. The prevalence of ***H. pylori*** in subjects with active chronic gastritis ranges between 70%-95% while ***H. pylori*** prevalence in individuals with inactive gastritis varies greatly from 15% - 90% (Tadataka et al, 1991). Siurala and colleagues (1988) noted the decreasing prevalence of ***H. pylori*** in the body of the stomach with increasing severity of gastritis (superficial gastritis 91%, light, moderate and severe atrophic gastritis: 60%, 22% and 0% prevalence respectively). Lachlan et al (1988) in Kenya, in a study to find out ***H. pylori***-associated chronic gastritis, found that, of the 89 (89 of 179) patients with histologic chronic gastritis, 50% showed superficial chronic gastritis and 27% had atrophic chronic gastritis.

Endoscopic diagnosis of gastritis has been shown to be an underestimation of gastritis as opposed to the good correlation between histological findings in ***Helicobacter*** -associated gastritis (Malfertheiner et al, 1996). It has been found by some authors that 40% of patients with endoscopically normal mucosae had histological gastritis (Tadataka et al, 1991). In Adana, Turkey Sandikcu et al (1993) found the prevalence of ***H. pylori*** in patients with gastric and duodenal ulcers to be 91%. Zegabriel Tedla in Northwestern Ethiopia between 1989 and 1990 found endoscopic gastritis in 23%. This is even higher than the 15% (149 of 1002) endoscopic gastritis found by Frank C. Jones at Kilimanjaro Christian Medical Centre in Northern Tanzania in 1986.

Self-inoculation studies, epidermic hypochlorhydria outbreaks and longitudinal treatment trials are evidence leading to suggestions that ***H. pylori*** is a cause, and not a result of histologic gastritis (Malfertheiner et al, 1996).

H. pylori and histologic gastritis have a strong association with peptic ulcer disease (Tadataka et al, 1991, NIH consensus, 1994). Approximately 85% to 100% of patients with duodenal ulcers and 70% to 90% of patients with gastric ulcers have gastric ***H. pylori*** (Malfertheiner et al, 1996, Tadataka et al, 1991, NIH consensus, 1994). Zegabriel Tedla (1990) in Ethiopia reported ***H. pylori*** positivity in 83% of patients with peptic ulcer disease and duodenal ulcer patients alone had a positivity of 91% with an overall prevalence of ***H. pylori*** of 73%. Tsega et al (1985) in Ethiopia found ***H. pylori*** in 94% of patients with duodenal ulcers, whilst Palmar et al (1994) in Cameroon histologically identified ***H. pylori*** in 85% of patients with duodenal ulcers, 80% in those with gastric ulcers and those with both gastric ulcers and duodenal ulcers had a 100% prevalence of ***H. pylori***. Lule et al (1989) in Kenya, however reported only 57% ***H. pylori*** prevalence in patients with duodenal ulcers compared to the 87.5% and 85.7% ***H. pylori*** isolation in patients with antral gastritis and duodenitis respectively.

The low prevalence of ***H. pylori*** infection in patients with gastric ulcers may be due to some lesions being caused by the ingestion of Non-Steroidal Anti-inflammatory agents (NSAIDS) and these drug-induced ulcers are reported to have a lower prevalence of associated histologic gastritis and ***H. pylori*** (Malfertheiner et al, 1996). ***H. pylori*** is also significantly less frequent in patients with ulcers due to a profound acid hypersecretion, as in Zollinger-Ellison Syndrome.

It is important to note that the majority of ***H. pylori*** infected individuals do not develop duodenal or gastric ulcers. These facts imply that host characteristics, strain variability, or other factors play a role in the pathogenesis of peptic ulcer disease. Chris Holcombe et al (1992) in Nigeria found no significant difference between the prevalence of infection in the group he studied and the general population.

Peptic ulcer was until recently regarded as an "un African" disease (Davey, 1979). However it has been reported that the problem then was one of recognition and not of incidence. Dolman et al between September 1978 and March 1980 endoscopied 466 patients at Muhibili Medical Centre (MMC) in Dar-es-Salaam, Tanzania and found 32% (102 of 466) had peptic ulcers. Another study in Tanzania by Frank Jones (1986), at Kilimanjaro Christian Medical Centre, also found a 32% incidence of peptic ulcers.

Palmer et al (1994) in Cameroon found 35% (33 of 93) had peptic ulcers with a ratio of duodenal to gastric of 5:1. In Ethiopia, Zegabriel Tedla (1990), reported a 20% incidence of peptic ulcers in the patients he studied.

Zambia is no exception, as Juliette Tukli in 1977 demonstrated in her paper that upper gastroduodenal bleeding in 60 cases was associated with chronic duodenal ulcer in 33 or 55%, with gastric ulcer contributing only one case. Umerah et al (1977), in a Radiological study showed a 26.8% (152 of 568) incidence of peptic ulcers in patients with dyspepsia referred for barium meal study at the University Teaching hospital (UTH), Lusaka, Zambia. In 1978 Mundia using endoscopy reported a 42% (21 of 50) incidence of peptic ulcer disease and in 1979 Din found peptic ulcers to the commonest cause of upper gastrointestinal

hemorrhage as it was responsible for 30% (74 of 145) of all cases that presented during the period the study was carried out. This was followed by oesophageal varies in 23% and gastritis in 20% of the patients.

On a more surgical note, Sebastian et al (1995), in the United Arab Emirates, examined ***H. pylori*** in perforated peptic ulcer disease and its relationship to persisting ulcer. Twenty nine patients with perforated peptic ulcer underwent simple closure of the perforation at laparotomy.

A ^{13}C Urease Breath Test carried out on the eighth day after operation was positive in 24 (82%) patients and 14 of 17 patients who underwent upper gastro-intestinal endoscopy had a positive ^{13}C Urease Breath Test six weeks after discharge from hospital and all had persisting duodenal ulcers. He concluded that all patients with perforated peptic ulcer disease should be treated by simple closure of the perforation and with therapy aimed at healing the ulcer and eradicating ***H. pylori*** infection and that treatment should be started during the immediate postoperative period.

Similarly Ng et al (1996) of the Chinese University of Hong Kong recruited 73 patients with perforated duodenal ulcers over a 16 months period (September 1994 - December 1995) and found 70% (51 of 73) had evidence of ***H. pylori*** infection by intra-operative gastroscopy and antral biopsies; and the infection rate rose to 80% if NSAID users were excluded. The authors also recommended anti-microbial therapy to eradicate ***H. pylori*** infection in patients suffering from perforated duodenal ulcers not caused by NSAID usage especially in young men with a long history of dyspepsia or proven ulcers.

Perforated peptic ulcers are fairly common in Lusaka. Bem (1991) reported perforated peptic ulcers to be the third commonest cause of generalised peritonitis for which surgery was carried out between November 1988 and April 1990, by the surgical department of the University Teaching Hospital, Lusaka. He found it in 16% (18 of 109) of patients, third after perforated terminal ileum and perforated appendicitis.

It has been suggested that patients undergoing partial gastrectomies and gastroenterostomies for peptic ulcer disease would be expected to have a high prevalence of ***H. pylori*** at the time of operation. However it has been found that reflux of duodenal contents, including bile acids, decreases ***H. pylori*** infection (Tadataka et al, 1991). O'Connor et al (1986) reports of thirty-five patients with active duodenal ulcers and those treated with a highly selective vagotomy had ***H. pylori*** prevalences of 97% and 94% respectively, while 54 patients with previous Billroth-I or Billroth-II partial gastrectomies or truncal vagotomies with gastroenterostomy had significantly lower prevalences (22%, 47% 50%, respectively). Of eight patients who had a partial gastrectomy for peptic ulcers with Roux-en-Y- anastomosis (preventing bile reflux into the stomach), all had continued ***H. pylori*** infection.

Active duodenitis is found in a majority of patients with duodenal ulcers. Wyatt and co-workers (1987) as well as Johnson and co-workers (1988), found duodenal ***H. pylori*** in most cases of active duodenitis and stated that ***H. pylori*** never occurred in the absence of neutrophils. ***H. pylori*** is found only on gastric epithelia of the duodenum. Gastric metaplasia in the duodenum forms a link between antral gastritis associated with ***H. pylori*** and active chronic duodenitis which parallels peptic ulcers. Lule et al (1989) in Kenya found six out of seven patients with duodenitis had ***H. pylori*** representing 85.7% isolation rate, while

Zegabriel Tedla (1992) in Ethiopia found ***H. pylori*** in 81% (25 of 31) of the patients with duodenitis.

The incidence of gastric metaplasia has been investigated in several studies. In China, Yang et al (1995) found gastric metaplasia in 62.7% of 142 patients. The prevalence of moderate and severe metaplasia was greater in duodenal ulcer than that in dyspepsia without duodenitis. Out of 40 patients with active duodenitis, 75% had moderate to severe metaplasia and ***H. pylori*** in the duodenum, and 92% of them had duodenal ulcers. In contrast, antral metaplasia and duodenitis coexisted in only 14% of those with inactive duodenitis. Yang's study (1995) supports the view that gastric metaplasia and active duodenitis are essential co-factors in duodenal ulcer pathogenesis.

The extent of gastric metaplasia is related to both duodenal and antral inflammation and to the density of ***H. pylori*** in the gastric antrum. Eradication of ***H. pylori*** resulted in reduction in inflammation at both sites and in the extent of gastric metaplasia, suggesting that ***H. pylori*** is at least partly responsible for the maintenance and the extension of gastric metaplasia. Gastric metaplasia is the direct consequence of acid and ***H. pylori*** in that acid suppression plus eradication of ***H. pylori*** results in a more profound reduction of gastric metaplasia (69%) than that of acid suppression (43%) or that of ***H. pylori*** eradication (42%) alone (Malfertheiner et al, 1996). In addition it has been found that, both the severity and activity of antral gastritis were greater in duodenal ulcer patients than those in non-ulcers patients.

The association of ***H. pylori*** infection, gastric adenocarcinoma, Non-Hodgkins lymphoma and Mucosa-Associated Lymphoid Tissue (MALT) gastric lymphomas is well established (Buruku et al, 1993, Malfertheiner et al, 1996 NIH consensus, 1994).

Houben and Stockbrugger (1995) associated ***H. pylori*** with normosecretory atrophic antral gastritis and that in the presence of ***H. pylori***, progression of epithelial cell through atrophy, intestinal metaplasia to gastric cancer occurs. This view was supported by Correa (1995) whose conclusions were that ***H. pylori*** has an important role to play in the development of gastritis and intestinal metaplasia with the progression to colonic type intestinal metaplasia which is a known high risk factor for gastric cancer.

Buruk et al in Ankara, Turkey in 1993 associated ***H. pylori*** in 88% (23 of 26) of patients with intestinal-type gastric adenocarcinoma and in 55% (11 of 20) of patients with diffuse-type gastric adenocarcinoma compared to the 50% prevalence of ***H. pylori*** in the normal population. They concluded that ***H. pylori*** may be a co-factor in the development of gastric cancer especially the intestinal type and they further postulated that treatment of ***H. pylori*** infection might play a role in the prevention of gastric adenocarcinoma.

One study by Eidt et al (1994) on the prevalence of ***H. pylori*** infection in MALT lymphomas showed that in 162 surgical specimens, lymphoid follicles were present in 78.7% of low grade cases (versus 24% of high grade cases). Chronic gastritis and ***H. pylori*** were found in 98% of cases supporting the hypothesis that this bacterial infection has an important role in the development of MALT lymphomas. The significant increase of intraepithelial lymphocytes (which are of T origin and are driven by an ***H. pylori*** - specific antigenic stimulus) suggest that lymphocytic gastritis can be a lymphoma precursor.

The recognition that low grade B cell lymphomas are neoplastic conditions that can be treated in the early stage with anti-***H. pylori*** therapy and emphasis on selection of cases for anti-microbial treatment was addressed by Miller et al (1995). They reported 80% ***H. pylori*** positivity out of their 45 cases of primary gastric lymphoma. The overall five year survival, irrespective of stage or grade, was 40%, but only 1 out of 18 low grade cases had mucosal disease alone.

Their conclusion was that the majority of patients with gastric lymphomas are diagnosed in an advanced stage and earlier diagnosis is needed in order to propose a treatment protocol based on anti-***H. pylori*** therapy. In fact, Cammarota et al (1995) found that ***H. pylori*** eradication induced the loss of acquired MALT in 21 out of 25 infected patients as well as the complete regression of the neoplasm in one case of MALT lymphoma. Another evidence came from Roggero (1995) who found a 60% rate of complete regression in 25 MALT lymphomas. Even better results (70%) have been reported by Bayerdorffer (1995) in another series of 33 cases of primary gastric lymphoma this study also demonstrated a complete disappearance of monoclonal B cells in 13 out of 16 patients together with no relapse at one year follow-up.

PATIENTS AND METHODS

Patients: The study was carried out form April 1996 to January, 1997. One hundred and six (106) patients referred for endoscopic examination of the upper gastrointestinal tract in the gastroenterology unit of the University Teaching Hospital (UTH), a teaching and referral hospital of the University of Zambia (UNZA), were studied for ***H. pylori*** consented to be study subject. There were no definite inclusion criteria. Any patient who was referred for endoscopy and agreed to biopsies being taken from him/her was included irrespective of the initial indication for endoscopy. Patients were then requested to answer a standard questionnaire, the interviewer being the investigator himself and in his absence a female Senior Resident House Officer interviewed the patients. Information on age, sex, province where they grew up before the age of seven, tribe, the specific presenting symptom, drug history and social history were taken. This study was approved by the Research and Ethics committee of the University of Zambia.

Endoscopy: Upper gastrointestinal endoscopy using a forward viewing endoscope (Olympus GIF 10, 20 or 30) was done after oropharyngeal anaesthesia with one percent xylocaine spray. In addition some patients also received intravenous 20mg Hyoscine butylbromide (Buscopan). Patients were requested to fast overnight before the procedure. The endoscopes and the biopsy forceps were cleansed with a detergent (30% savlon) and disinfected with 70% alcohol and 2% glutaraldehyde (Cidex) by soaking for five to ten minutes and finally rinsed with water after each examination. The scope was introduced with the patient lying in the left lateral position. The oesophagus, stomach and duodenum to the second portion were viewed as the scope advanced forward or withdrawn. The biopsies were performed by three endoscopists; a consultant gastroenterologist based at the Digestive Diseases Research Centre of the Medical College of St Barthromew's Hospital, London; a consultant surgeon based at the University Teaching Hospital, and a Medical Registrar who had prior experience and training obtained at the Medical College of St. Barthromew's Hospital in London.

Five biopsies (two for bacteriology, two for histology and one for biopsy urease test) were obtained from the antrum of each patient.

Bacteriology: The two biopsy specimens for bacteriological studies were transported in 0.5ml of sterile normal saline. In the Laboratory, one portion was directly smeared, gram stained and examined under oil immersion for 3-5 minutes or until gram negative curved rods were observed. The second portion was cultured on ***Campylobacter*** (oxoid) media to which ***Helicobacter*** selective media was added and the plate incubated at 37°C in a moist 10% candle jar (microaerophilic intubation). The plate was then inspected daily for seven days for flat and colourless colonies. If such colonies appeared, they were smeared, gram stained and tested for urease, catalase and oxidase positivity. A curved gram-negative rod shaped bacteria that was oxidase, catalase and urease positive were identified as ***H. pylori***. The bacteriological examination was done by a trained and experienced Senior laboratory microbiologist.

Biopsy Urease Test The urease test was done immediately after the endoscopic procedure in the endoscopy room by putting one of the crushed biopsy specimens into the urea solution. The urease test is based on the principle that the bacteria will hydrolyse urea to ammonia. The urease present hydrolyses urea in the solution with the production of ammonium ions which raise the pH. This pH change is detected by the phenol red indicator, which changes colour from yellow at pH 6.8, to pink at pH 8.4.

A colour from yellow to pink of the urea solution was considered positive. The reading was done within 30 minutes.

Histology: The two biopsy specimens for histology were kept in 10% formalin until embedded in paraffin. Sections were stained with Giemsa stain. ***H. pylori*** was identified as curved rod shaped bacteria lying beneath the mucous layer of the epithelium, especially in the region of the gastric pits.

The endoscopist remained blinded to the bacteriogical and histological results until the end of the study. Likewise, the bacteriologist had no access to the endoscopic and histologic findings and the pathologist did not have the knowledge about the endoscopic and bacteriologic results until the completion of the study.

STATISTICAL ANALYSIS

Data analysis was done with Epi. Info software by looking at tests of significance namely chi-square tests and confidence intervals. Significance was assumed when p-value $\leq$ 0.005.

RESULTS

One hundred and six (106) patients were recruited during the period of study. However only 87 patients were analysed because the first 19 patients had only one investigation for identification of ***H. pylori*** namely giemsa stain as the culturing and the urease test kits were initially not available . Of the 87 patients analysed, there were 49 males and 38 females with a ratio of 1.3:1. Their ages ranged from 17-74 years with a mean of 37 years. All were black Zambians, brought up within Zambia except for one who was brought up in South Africa. The Bemba tribe contributed the majority patients with a 24%. (21 of 87) and were followed by the Tonga, Ngoni, Lozi tribes with 17%, 10% and 6% respectively. The four tribes happen to be the largest ethnic groupings in Zambia.

The overall prevalence of ***H. pylori*** infection was 62% (54 of 87), positivity was recorded if the patient was positive in two or more tests, 17% (15 of 87) had indeterminate ***H. pylori*** status (positive only in one of the four tests) while 21% (18 of 87) were negative (negative in all four tests).

There was minimal differences in the prevalence of ***H. pylori*** infection between smokers and non-smokers, alcohol users and non-alcohol users, the use of flush toilets against pit latrine, the source of drinking water and whether this water was boiled or not boiled. This is summarised in Table 5.

Table 1

DISTRIBUTION OF CASES BY AGE GROUP

AGE GROUP	No. OF CASES	No. OF CASES WITH *H. PYLORI*	% OF *H. PYLORI* ISOLATED
10 - 19	4	1	25%
20 - 29	29	21	72%
30 - 39	25	13	52%
40 - 49	13	8	62%
50 - 59	9	7	78%
60 - 69	2	0	0%
70 - 79	5	4	80%
TOTAL	**87**	**54**	**62%**

Table 1 shows isolation of ***H. pylori*** per age group. ***H. pylori*** was isolated in all age groups except the 60 - 69 years age group. The maximum age of isolation was between 70 - 79 (80%), followed by ages 50 - 59, 20 - 29, 40 - 49, with a 78%, 72% and 62% isolation rates respectively.

Table 2

DISTRIBUTION OF CASES BY ETHNIC GROUPS

TRIBE	NO. OF CASES	NO. OF CASES WITH *H. PYLORI*	% OF *H. PYLORI* ISOLATED
Bemba	21	14	67%
Tonga	15	11	73%
Ngoni	9	4	44%
Lozi	5	4	80%
Chewa	5	4	80%
Nsenga	4	3	75%
Kunda	4	1	25%
Kaonde	3	2	67%
Mambwe	3	2	67%
Luvale	3	1	33%
Lala	2	2	100%
Lenje	2	1	50%
Namwanga	2	0	0
Swaka	2	0	0
Lamba	2	2	100%
Lunda	1	1	100%
Ila	1	1	100%
Soli	1	0	0
Ushi	1	1	100%
Ndebele	1	0	0
TOTAL	**87**	**54**	**62%**

The Bemba, Tonga, Ngoni and Lozi tribes contributes the majority of patients. The Ushi, Ila Lunda, Lamba and Lala though they contributed very small numbers had a 100% isolation rate for ***H. pylori*** infection.

Table 3.

THE DISTRIBUTION OF CASES ACCORDING TO THE PROVINCE THE INDIVIDUAL WAS BOUGHT UP BEFORE THE AGE OF SEVEN YEARS

PROVINCE	NO. OF CASE	NO. OF CASES WITH *H. PYLORI*	% OF *H. PYLORI* ISOLATED
Lusaka	20	14	70%
Copperbelt	16	10	63%
Southern	14	10	71%
Northern	10	4	40%
Luapula	7	6	86%
North-Western	5	3	60%
Eastern	4	2	50%
Western	4	3	75%
Central	3	1	33%
Not Indicated	4	1	25%
TOTAL	**87**	**54**	**62%**

The majority of patients grew up in Lusaka - 23% (20 of 87). It was followed up by Copperbelt, Southern and Northern provinces with 18%, 16%, and 11% respectively. Luapula province had the highest isolation rate of ***H. pylori*** infection with 86%, followed by Western, Southern and Lusaka provinces with 75%, 71% and 70 isolation rate respectively.

Table 4

DISTRIBUTION OF CASES BY ENDOSCOPIC DIAGNOSIS

ENDOSCOPIC DIAGNOSIS	NO. OF CASES	NO. OF CASES WITH *H. PYLORI*	% *H. PYLORI* ISOLATED
Normal Mucosa	57	32	56%
Gastritis	12	8	67%
Oesophagitis	9	6	67%
Duodenal Ulcers	9	8	89%
Gastric Ulcers	4	3	75%
Duodenitis	2	1	50%
Oesophageal Candidiasis	1	1	100%
Oesophageal Varices	1	0	(0)
Carcinoma Stomach	1	1	100%
K.S. Stomach	1	1	100%
Others	4	2	50%
TOTAL	101	63	62%

The endoscopic findings in the 87 patients is as shown. 14 patients had multiple pathology. Normal endoscopic findings were found in 66.5% (57 of 87). Peptic ulcer disease was the commonest endoscopic diagnosis with 14.9% (13 of 87). Gastritis was found in 12 patients (13.8%) while those with Oesophagitis were 9 (10.4%).

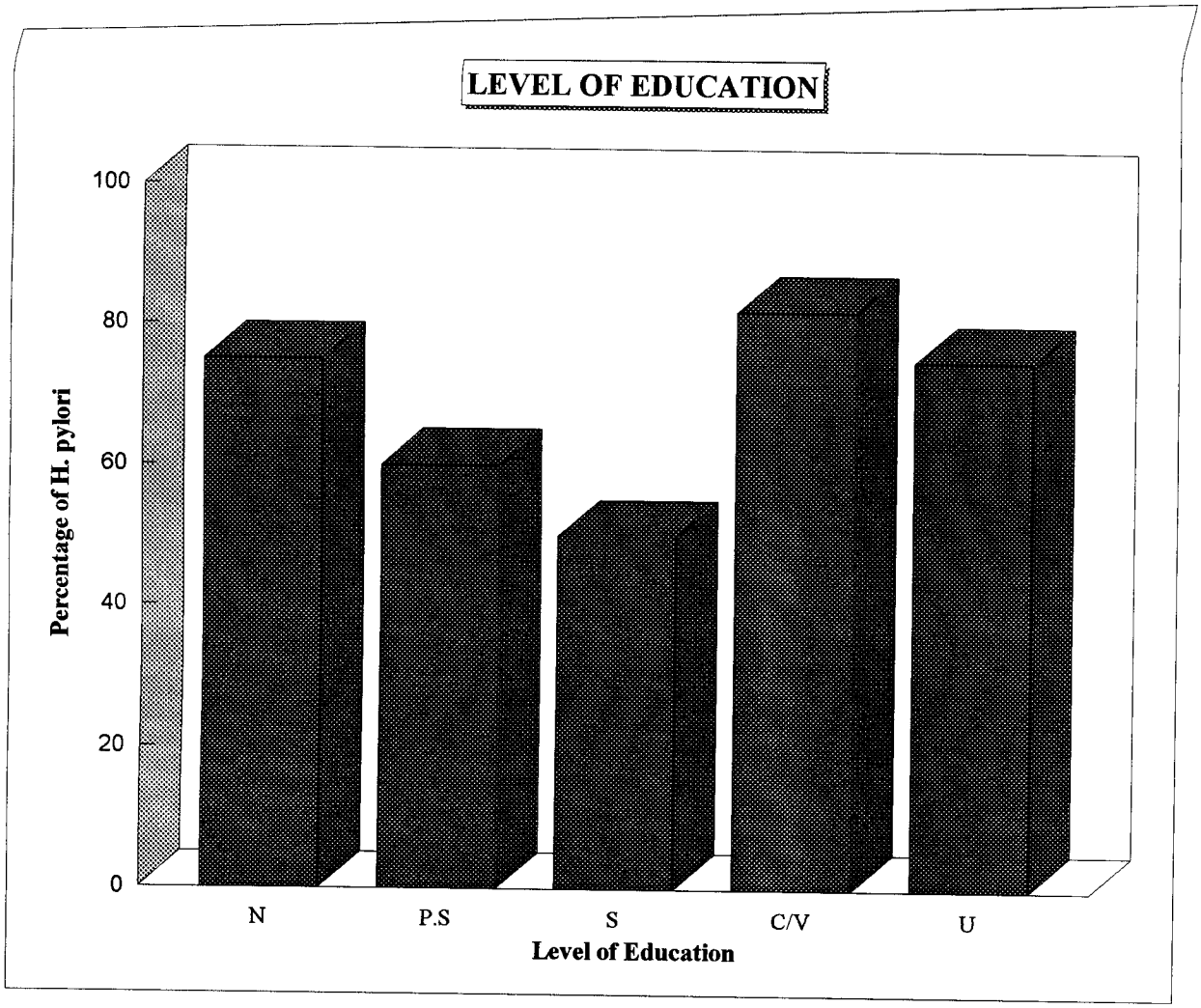
The prevalence of ***H. pylori*** according to endoscopic diagnosis is also shown in Table 4. ***H. pylori*** was found in 32 patients with endoscopically normal results, with a 56% isolation rate. ***H. pylori*** was detected in 11 (85%) of the patients with peptic ulcers disease and duodenal ulcer alone had a positivity of 89% and gastric ulcer with 75%.

Table 5

RELATIONSHIP OF *H. PYLORI* INFECTION WITH DIFFERENT PARAMETERS

PARAMETER	NO. OF CASES	NO. OF CASES POSITIVE FOR *H. PYLORI*
ALCOHOL USE		
Never	45	28 (62%)
Occasionally	14	9 (64%)
Every week	15	8 (53%)
Most days	4	3 (75%)
Every day	9	6 (67%)
SMOKING		
Never smoked	66	42 (64%)
Smoked	21	12 (57%)
TOILET FACILITY		
Pit latrine	37	22 (60%)
Flush Toilet	48	32 (67%)
Others	02	01 (50%)
SOURCE OF DRINKING WATER		
Tap in the House	44	31 (70%)
Public Tap	21	10 (48%)
Tap outside house but within yard	8	4 (50%)
Protected Well	8	6 (75%)
Borehole	3	2 (67%)
River	1	0 (0)
BOILING OF DRINKING WATER		
Never	43	26 (61%)
Always	21	16 (76%)
During Epidemics	3	1 (33%)
Sometimes	20	11 (55%)
LEVEL OF EDUCATION		
None	8	6 (75%)
Primary School	20	12 (60%)
Secondary School	38	19 (50%)
College/Vocational	17	14 (82%)
University	4	3 (75%)

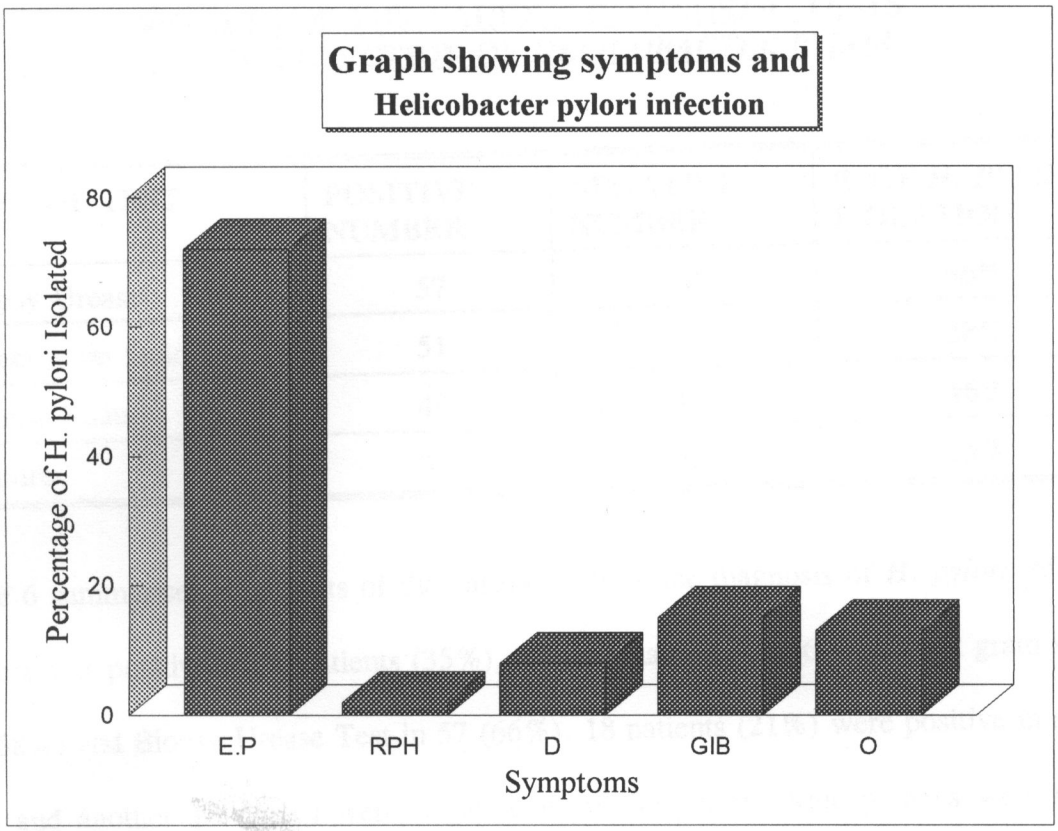
Figure 1



KEY

N	*None*
P.S	*Primary School*
S	*Secondary*
C/V	*College/Vocation*
U	*University*

Figure 2



Key

E.P	(N =72)	Epigastric Pain
RPH	(n = 2)	Restrosternal Pain/Heartburn
D	(n = 8)	Dysphagia
GIB	(n = 15)	Gastro-Interstinal Bleeding
O	(n = 13)	Others

Most patients presented with Epigastric pain (72 of 87) followed by Gastro-intestinal bleeding (15 of 87), 23 patient had more than one symptom. Epigastric pain and Gastro-intestinal bleeding had the highest isolation rate of Helicobacter pylori with 60%.

Table 6

RESULTS OF THE VARIOUS DIAGNOSTIC TESTS IN THE DETECTION OF *HELICOBACTER PYLORI*

TYPE OF TEST	POSITIVE NUMBER	NEGATIVE NUMBER	% OF *H. PYLORI* ISOLATION
Biopsy Urease	57	30	66%
Direct gram Stain	51	36	58%
Giemsa Stain	40	47	46%
Culture	30	57	35%

Table 6 summarises the results of the various tests in the diagnosis of ***H. pylori*** infection. Culture was positive in 30 patients (35%), Giemsa stain in 40 (46%), Direct gram stain in 51 (58%) and Biopsy Urease Test in 57 (66%). 18 patients (21%) were positive in all four tests and another 18 (21%) were negative in all four tests. Nine patients were Giemsa negative but positive in the other three tests. All positive cultures except one were positive in all three other tests.

A positive test was recorded when the specimens were positive in two or more tests and indeterminate if only one gave a positive result (15 patients - 17%) and negative if all four test gave negative results 21% (18 of 87).

DISCUSSION

In this study, 35% (30 of 87) of patients had abnormal endoscopic findings. The two main diagnoses being peptic ulcer disease and gastritis with 14.9% and 13.8% respectively.

The prevalence of peptic ulcer disease among those undergoing endoscopy in this study is comparable to the 15.6% reported from Tananarive (Capdeville, 1979). Zegabriel Tedla (1992) in south-western Ethiopia reported a 20% prevalence and a 20.4% has been reported from Sudan (Arabi et al, 1984). However our prevalence rate is much lower than the 32% reported by Frank Jones (1988) in Tanzania, the 35% reported by Palmer et al (1994) in Cameroon. Umerah et al (1977) in the Zambian Radiological study reported a 26.8% prevalence and Mundia in 1978 in his endoscopic study recorded a 42% prevalence of peptic ulcer disease in those referred for routine endoscopic diagnosis at the University Teaching Hospital (UTH), Lusaka. The reason for this difference in prevalence rates of peptic ulcer disease may be that 56% (49 of 87) of our patients had cimetidine, 33% (29 of 87) had antibiotics, three of the patients were on omeprazole in addition to antibiotics prior to the endoscopy procedure. In fact only three of the patients who took cimetidine before endoscopy had peptic ulcer disease.

The 14.9% prevalence rate of peptic ulcer disease is however much higher than the 5.35% *reported by Lachlan et al at Chigoria Hospital in Kenya in 1988. All these reports however* indicate that peptic ulcer disease is fairly common among African patients.

Endoscopic gastritis of 13.8% (12 of 87) is closer to the 15% reported by Frank Jones at Kilimanjaro Christian Medical centre in 1986. It is however lower when compared to the 23% reported by Zegabriel Tedla (1992) in Ethiopia, the 39% by Wabinga (1996) in Uganda, the 33.5% from Madagascar (Cadeville,1979). The reason for this is unclear but the lack of histological diagnosis of gastritis may partly account for these variations. The poor correlation between the endoscopic diagnosis and histological findings of ***H. pylori*** associated gastritis has been shown by some authors, a result that confirms the limitations of endoscopy in the diagnosis of gastritis. It has been reported that about 40% of patients with endoscopically normal mucosae have histological gastritis (Malfertheiner et al, 1996).

The overall prevalence of ***H. pylori*** among those tested was 62%. This is comparable to the 62% reported in 1988 by Miller et al in South Africa in patients undergoing routine gastroscopy. Our figure is however lower than the 73% reported by Zegabriel Tedla in Ethiopia in 1990, the 72% by Palmer et al (1994) in Cameroon, the 70% by Kassa et al (1990) in Ethiopia, and the 85% by Chris Halcombe (1992) in Nigeria. The 62% recorded in this study is however much higher than the 25% reported by Wabinga in Uganda in 1995.

One probable major factor which could attribute to this variation would be antibiotic treatment prior to gastroscopic biopsy. Of the 87 patients, 29 (33%) had taken antibiotics prior to endoscopy, of these 12 (41%) were negative for ***H. pylori*** ($p = 0.001$). Three other patients received omeprazole (a proton pump inhibitor) in addition to antibiotics (anti-***H. pylori*** treatment) prior to gastroscopy. All three patients were negative for ***H. pylori*** in all four tests we conducted for the diagnosis of ***H. pylori***. Wabinga (1996), found no ***H. pylori*** in biopsy materials of patients who were on broad spectrum antibiotic at the time of

endoscopy. This further confirm our suspicion that antibiotic treatment prior to endoscopy maybe responsible for some negative results recorded in this study.

The series in this study would support what has been said by other authors that ***H. pylori*** effects both adult males and females equally (Wabinga, 1996; Graham, 1991). In this study 63% males and 61% females were infected with ***H. pylori*** (p-value 0.9).

In many patients, epigastric pain (72 of 87) was the indication for endoscopy. Epigastric pain and gastro-intestinal bleeding (Haematemesis and Malaena - 15 of 87) had the highest isolation rate of ***H. pylori*** infection with 60%. (43 of 72, 9 of 15 respectively).

The overall prevalence rate for ***H. pylori*** infection in peptic ulcer disease was 84%, and the prevalence rate was found to be higher (89%) in patients with duodenal ulcers than the 75% for patients with gastric ulcer. The prevalence rate of 89% in duodenal ulcer is similar to the 90% reported by Marshall (1983) in Australia, the 91% by Zegabriel Tedla (1992) in Ethiopia, the 85% by Palmer et al (1994) in Ethiopia and the 94% by Tsega et al (1985), in Ethiopia. It is however much higher than the 57% recorded by Lule (1991) in Kenya.

The prevalence rate of 75% for gastric ulcers is similar to the 80% reported by Palmer et al (1994) in Ethiopia. Our findings confirm those in the Literature where it has been reported that approximately 85% to 100% of patients with duodenal ulcers and 70% to 90% of patients with gastric ulcers have gastric ***H. pylori*** (Malfertheiner et al, 1996).

Two patients were referred for endoscopy six weeks after they presented to surgical units with perforated duodenal ulcers were positive in Biopsy Urease Test indicating a presumptive ***H. pylori*** infection.

A positivity of 67% of ***H. pylori*** infection for gastritis was recorded. This is higher than the 57% reported by Wabinga (1996) in Uganda, but lower than the 87.5% ***H. pylori*** isolation rate by Lule et al (1991) in Kenya. Our findings however are similar to the reported prevalence of ***H. pylori*** in subjects of gastritis of between 70% to 95% (Tadataka et al 1991).

One patient with gastric cancer was positive for ***H. pylori*** infection. Histologically, this was confirmed as an adenocarcinoma. Though a single case, it goes to show that ***H. pylori*** infection may be found in those with gastric malignancy.

The relatively high occurrence rate of 56% in endoscopically normal findings is comparable to the 63% reported by Zegabriel Tedla (1992) in south-western Ethiopia and this could be partly due to the fact that the apparently a normal mucosa may still show histological gastritis as demonstrated by Tsega et al in Ethiopia. Histological diagnosis is important therefore for correlating ***H. pylori*** with gastritis. On the other hand it is possible that the bacteria could just be present without evidence of any pathology as in the initial stage of a disease.

There is no significant increase in the prevalence of ***H.pylori*** infection with increasing age in the population studied. The maximum isolation rate was recorded in the 70-79 years age groups (80%), but this was close to the 78% and 72% in the 50-59 years and 20-29 years age groups respectively. This confirms the findings by Chris Halcombe (1992) in Nigeria;

Megrand (1989) in Ivory Cost and Algeria, Glupzyenski et al (1989) in Zaire, and David Y. Graham et al (1991) in Houston, U.S.A, that in black populations, infection is acquired early in life unlike in the white communities where the overall prevalence of ***H. pylori*** increases from about 10% in the 20s to 47% in the 60s increasing at the rate of 1% - 2% per year (Malfertheiner et al, 1996). This difference has been attributed to racial differences and socioeconomic factors.

It has been reported that in most instances the differences in prevalence between ethnic group or race represents a surrogate marker for differences in exposure(s), such as differences in standards of living or sanitation practices.

We found however, no significant difference between various socioeconomic factors and ***H. pylori*** infection in the patients we studied. Alcohol users and those who never drunk alcohol had almost the same prevalence rate (67% vs 62% ; $p = 0.98$), use of pit latrine and flush toilets (60% vs 67% ; $p = 0.75$), and the sources of their drinking water ($p = 0.44$) and whether this water was boiled and not ($p = 0.97$).

Graham et al (1991) found no association between ***H. pylori*** and consumption of alcohol and smoking. The lack of association between source of drinking water and ***H. pylori*** infection is different from what was demonstrated from Lima, Peru, where the direct association between the prevalence of ***H. pylori*** infection and source of drinking water was demonstrated (Graham et al, 1991). It has been found that ***H. pylori*** is more prevalent in large families, of low socioeconomic status and live in overcrowded condition. However our findings are similar to that of Fiedorek et al(1991) who found lack of association between ***H. pylori***

infection and socioeconomic factors in their study in children in Little Rock. The probable explanation for this lack of association in this study may be that in our environment ***H. pylori*** infection is acquired early in life and this does not reflect the current socioeconomic status of the patient. Current data suggests that, once acquired, ***H. pylori*** is life long (Graham et al 1991).

The findings of different prevalence rates of ***H. pylori*** infection in difference Zambian provinces and tribes may suggest that the infection varies in different ethnic groups of Zambia. Environmental factors also may play a role. Similar variations have been reported in Uganda and South Africa. In Uganda Wabinga (1996) found a high frequency of ***H. pylori*** infection among the Nyankole ethnic group, while in South Africa the highest frequency was found in Cape Town and Natal provinces (Marshall et al, 1985; Graham et al, 1988). Graham et al (1991), also found ***H. pylori*** infection more common in the Chinese group than in the North American group of the same age. Those areas with high frequency of ***H. pylori*** were found to be the same areas with the high risk of peptic ulcer disease and gastric adenocarcinoma.

Only 34% of the patients had abnormal endoscopic findings and most of the patients had normal endoscopic findings. It should be possible to screen these patients either symptomatically or by use of non-invasive ***H. pylori*** tests like ELIZA or the ^{13}C-urease breath test which have sensitivities above 90%, before these patients are subjected to endoscopy and biopsy. Culture was the least sensitive test in this study and is not used for routine purposes. McCullen et al (1987) compared Giemsa stain, gram stain and culture for detection of ***H. pylori*** infection and reported the highest for Giemsa stain and the lowest for

culture. Their findings were similar to those of Megraud (1994) who compared urease test, histopathology, gram stain and culture and found out that culture and gram stain had a lower sensitivity. Urease test had the highest sensitivity in this study and it has been found by others (Kassa et al 1996) to be an excellent test for presumptive diagnosis of ***H. pylori*** infection.

It has been reported that eradicating ***H. pylori*** results in a marked reduction in ulcer recurrences. It should have important implications for the treatment of peptic ulcers in our environment. Treatment of acute disease with H_2-antagonists is difficult for many patients and long term maintenance therapy is rarely possible. The possibility of treating this medical problem with inexpensive drugs (tetracycline, amoxycillin, metronidazole) with the prospect of long term improvement needs exploration. We can not prove however from this study that ***H. pylori*** is a cause of gastro-duodenal diseases we encountered during the study, we can only postulate a possible association. It would be important to study the prevalence of ***H. pylori*** in the general population.

CONCLUSIONS

1. Of the patients referred for gastroscopy at the University Teaching Hospital, 62% were found to have ***H. pylori*** infection.

2. i. There is an association between ***H. pylori*** and peptic ulcer disease.

   ii. The infection varies between different ethnic groups of Zambia.

   iii. There was no association between ***H. pylori*** and smoking, alcohol consumption, socio-economic status of the individual, source of drinking water, boiling of drinking water as well as level of education.

   iv. There is no increase in prevalence of ***H. pylori*** infection with increasing age in the population studied.

   v. ***H. pylori*** affects adult males and females equally.

3. Our findings are comparative with other studies conducted elsewhere, though there are some areas in which our findings are at variance.

RECOMMENDATIONS

1. Prevalence of ***H. pylori*** in the normal population should be determined to confirm the observations in this study.

2. This study is to be taken as a preliminary one and future studies should be conducted on the diagnosis and outcome of treatment for the eradication of ***H. pylori*** infection with antimicrobial agents in the treatment of peptic ulcer diseases.

3. Cost effectiveness of diagnosis and treatment of ***H. pylori*** must be analysed to see if it is worthwhile to establish such a programme in Lusaka.

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APPENDIX 1

UNIVERSITY TEACHING HOSPITAL

Endoscopy Unit

HELICOBACTER PYLORI STUDY

A. EPIDEMIOLOGY

1. ID Number: ..... 2. Age: .. 3. Sex: M/F

4. Address: Low density/High density

5. Tribe: .....

6. Which province were you brought up before 7 years of age ?:

7. Presenting Symptom:

   1. Epigastric pain:
   2. Retrosternal pain / heartburn:
   3. Dysphagia:
   4. Gl Bleeding:
   5. Others

8. How long has the symptom been present ?: ..... months.

9. Does it wake you at night ?: Yes/No

10. Have you lost weight ?: Yes/No

11. a. Have you ever smoked ?: Yes/No

    b. For how many years?:.....

    c. How many cigarettes per day ?: .....

12. Do you drink alcohol ?: Yes/No

13. Have you ever taken any of these drugs since this problem started ?

    1. Cimetidine/Tagament/Zantac 2. Omeprazole

    3. Antacid/MMT 4. Bismuth

    5. Aspirin/Brufen/Indocid 6. Antibiotics

14. What is the household's main latrine facility ?:

    a. Pit latrine b. Flush toilet c. Others (specify)....

15. If (a.) above, is it shared with other households ?: Yes/No

16. What is your household's main source of drinking water these days ?:

    a. Tap in house b. Tap outside house within yard

    c. Public tap d. Shallow well

    e. River f. Protected well

    g. Borehole h. Buy in jerrycans

17. Do you ever boil this drinking water ?

    a. never

    b. always

    c. during epidemics

    d. sometimes

18. What is your main source of income ? Formal/informal

19. Do you own ....

a. a house ? b. a TV ? c. a car ?

20. What level of education did you reach ?:

1. none
2. primary
3. secondary
4. college/vocation
5. university

APPENDIX - 2

B. ENDOSCOPIC FINDINGS

21. Oesophagus:

    0. normal
    1. oesophagitis
    2. cancer
    3. candida
    4. varices
    5 others

22. Stomach

    0. normal
    1. gastritis
    2. cancer
    3. ulcer
    4. K/S
    5 others

23. Duodenum

    0. normal
    1. ulcer
    2. duodenitis
    3. multiple erosions
    4. others

APPENDIX - 3

HELICOBACTER STUDY

HISTOLOGICAL INVESTIGATION

Name of patient: .....

I.D. Number: ..... Age..... Sex.....

Nature of Specimen: ..... Date Collected..... Time.....

Date Received: ..... Time: .....

A: Stains Used:

[ ] Haematoxylin - Eosin

Helicobacter Seen/Not Seen

[ ] Giemsa

Helicobacter Seen/Not Seen

3. Others, Specify.....

APPENDIX - 4

HELICOBACTER STUDY
WORK SHEET (MICROBIOLOGY)

Name of patient: .....

I.D. Number: ..... Age:..... Sex:.....

Nature of Specimen: ..... Date collected:..... Time:.....

Date received: ..... Time:.....

MEDIA EMPLOYED

HELICO | |

CAMPY | |

DAY 1

BIOPSY UREASE TEST +ve/-ve

GRAM STAIN +ve/-ve

			CAT	NIT	HIP	Urease	Gram stain
GROWTH AT 25°C	+/-	ORG1					
		ORG2					
GROWTH AT 37°C	+/-	ORG1					
		ORG2					
GROWTH AT 42°C	+/-	ORG1					
		ORG2					

RESULTS: ***HELICOBACTER PYLORI*** - POSITIVE/NEGATIVE