

DETECTION, DIAGNOSIS AND ANTIBIOTIC SENSITIVITY OF BACTERIA IMPLICATED IN GASTROINTESTINAL DISORDERS

Mansour, F. A.*; Y. A. EL-Zawahry**; M. Raoaf*** and Reham M. Fiayad***

* Department of Botany, Faculty of Science, Mansoura University

** Department of Botany, Faculty of Science, Zagazig University

*** Gastroenterology center, Faculty of Medicine, Mansoura University

ABSTRACT

From November 2006 to November 2007, a number of 69 stool specimens were collected from patients suffering from gastrointestinal disorders, after being subjected to endoscopic investigation 9 cases (13%) were free, while endoscopic findings were found in 60 cases (87%). It includes: gastric ulcer in 8 cases (11.6%), duodenal ulcer in 8 cases (11.6%), duodenitis in 12 cases (17.4%), gastritis in 10 cases (14.5%), duodenitis with gastritis in 11 cases (15.9%), colitis in 7 cases (10.1%), and bacillary dysentery in 4 cases (5.8%). The stool samples were inoculated immediately in selenite broth for 24 h at 37°C and recultured on chocolate agar media in microaerophilic conditions (5% O₂, 10% CO₂, 85% N₂ and 99% relative humidity). Five bacterial species viz. *Helicobacter pylori*, *Escherichia coli*, *Salmonella typhi*, *Shigella dysenteriae* and *Yersinia enterocolitica* were isolated with frequencies of 43.5%, 27.5%, 18.8%, 7.2% and 2.9%, respectively. *H. pylori* bacteria was isolated from 62.5 % of duodenal ulcer cases, 58.3% of duodenitis cases, 50% of gastritis cases, 45.4 % of duodenitis plus gastritis cases and 71.4% of colitis cases, *Salmonella* was isolated from 75% of bacillary desentery cases, whereas *E. coli* was isolated from 100% of normal cases. The present results clearly established the fact that *H. pylori* is the main etiologic agent of gastrointestinal disorders in man (duodenal ulcer & duodenitis & gastritis and colitis), while *Shigella* and *Salmonella* seemed to be responsible for bacillary dysentery. These observation demonstrated that there was a relation between bacteria isolated and endoscopic diagnosis of patients. Antibiogram test was performed to all bacteria isolated using 14 different antibacterial agents, namely Sulfonamides, Ofloxacin, Cefuroxime sodium, Nalidixic acid, Meropenem, Fortum, Imipenem, Gentamicin, Nitrofurantoin, Augmentin, Cefotaxime sodium, Ciprfloxacin, Levofloxacin and Flumox, this studies show that *H. pylori* was sensitive to Ofloxacin and Nitrofurantoin, *Salmonella* was sensitive to Nitrofurantoin and Ciprfloxacin, *Shigella* was sensitive to Gentamicin and Ciprfloxacin, *Yersinia* was sensitive to Nitrofurantoin and Imipenem and *E. coli* was sensitive to Ciprfloxacin and Ofloxacin. β-lactamase test was performed to isolates of *H. pylori*. The present results further indicated that isolates of *H. pylori* display positive β-lactamase test; a phenomenon that present a plausible explanation for their resistance to penicillin. Plasmid miniprep was performed to isolates of *H. pylori*, the results indicated that this bacterium contain or host a plasmid with molecular wt=2.5 kb, this lend a support of its resistant to the antibiotics.

INTRODUCTION

The gastrointestinal system in human is subjected to various infections by foodborne and waterborne bacteria or other pathogenic bacteria. Many diseases can, therefore, be incited by these organisms, notably: gastritis (an

inflammation or irritation of the lining of the stomach, gastric ulcer (raw, eroded area in the lining of the stomach), duodenitis (an inflammation and irritation of the wall of the small intestine, duodenal ulcer, colitis (a disease that causes inflammations and sores in the lining of the rectum and colon (Blaser. 2004 and 2006). This inflammation has killed the cells that line the colon, then bleed and produce pus and bacillary dysentery (Gerard *et al.* 2007).

Several bacterial pathogens have been reported to be implicated in these gastrointestinal disorders. However *Helicobacter pylori* has been repeatedly shown to be the most prevalent etiologic agent in humans worldwide; causing infection of >50% of adults in developed countries (Taylor *et al.* 1994, Robert *et al.* 2004). Almost all species of *Salmonella* are considered pathogenic to some degree, causing salmonellosis, or *Salmonella gastroenteritis* (Gerard *et al.* 2007a and Tribe *et al.* 2007). Other members of *Enterobacteriaceae. viz.: Shigella*, that causes a common but often incapacitating dysentery called shigellosis specific to human, *Yersinia* that is known to cause gastroenteritis in all age groups (Black *et al.* 1988), and certain strains of *E. coli* are also important opportunistic pathogens; causing a wide variety of gastrointestinal diseases (Joklik *et al.* 1988).

Antibiotics such as penicillins (ampicillin or its analogue amoxicillin) are the drug of choice for sensitive isolates. Trimethoprim-sulfamethoxazole is the drug of choice when the sensitivity is unknown or patients is allergic to penicillin-type antibiotic. Adult patients can be also treated with either norfloxacin or liprofloxacin. Nevertheless, bacteria can evolve resistance to antibiotics, resistance factors can be encoded on plasmids or on the chromosome, resistance may involve decreased entry of the drug, changes in the receptor (target) of the drug, or metabolic inactivation of the drug, (Reynolds *et al.* 1993).

The aim of this study was to investigate the bacteria implicated in infections of the gastrointestinal tract in patients hospitalized in the Gastroenterology Hospital, Mansoura University. Special emphasis was laid upon the investigation of the resistance and susceptibility of the isolated organisms to the various available antibiotics.

MATERIALS AND METHODS

Sample Collection

Between November 2006 to November 2007, a number of 69 stool samples were collected from patients that suffering from some gastrointestinal disorders (11.6% gastric ulcer, 11.6% duodenal ulcer, 17.4% duodenitis, 14.5% gastritis, 15.9% duodenitis plus gastritis, 10.1% colitis, 5.4% bacillary desentery & 13.0% normal) after performing endoscopic investigation to them in Mansoura University Hospitals, Egypt.

Stool samples were collected in sterile clean plastic containers under complete aseptic conditions, and transported to the laboratory as quickly as possible, where they were cultured into selenite broth medium and incubated microaerophilically (5% O₂, 10% CO₂, 85% N₂ and 99% relative humidity) for 24 h at 37°C.

Isolation and Identification of Bacterial Isolates

The selenite broth cultures after being incubated for 24 h, were recultured on chocolate agar and incubated microaerophilically (in an inverted position) for 24 to 48 h at 37°C according to (Cappuccino *et al.* 2001). Pure colonies were isolated from the surface of the media and then subjected to characterization and identification procedures as adopted and described by Holt *et al.* (1994).

Antibiotic Susceptibility Tests

Antibiotic resistance was assayed for virulent isolate using a modified Kirby-Bauer disc diffusion method (Robert *et al.* 2003).

Beta- lactamase test:

This test was performed to isolate of *Helicobacter pylori* (30 isolates) that displayed relatively high resistant to most of antibiotics employed. The methods described by (James H. *et al.* 1977) was used. It is performed by adding a few drops of buffered crystalline penicillin bromocresol purple solution to a filter paper placing in the bottom of petri dish until the paper is almost saturated, transfer a few colonies to the filter paper to cover an area approximately 5 mm in diameter, incubate at 35-37°C for 30 minutes, then examine the filter paper spots for a change in colour from purple to yellow. A yellow colour indicates the production of penicilloic acid from the breakdown of penicillin by a beta-lactamase producing organism.

RESULTS

A number of 69 bacterial isolates have been isolated from stool culture of patients which showed positive growth on chocolate agar, all of them are Gram–nonspore forming rod-shaped bacteria (Bacilli) and were tentatively identified on the bases of their morphological, cultural and biochemical characteristics, show (table 1) these results are 30 isolates of *Helicobacter pylori* (43.5%), 13 isolates of *Salmonella typhi* (18.8 %), 5 isolates of *Yersinia enterocolitica* (7.2%), 2 isolates of *Shigella dysenteriae* (2.9%) and 19 isolates of *E. coli* (27.5%).

Table (1): Characteristics of bacteria isolated from stool culture:

Bacteria isolated	Chracteristics
<i>Helicobacter pylori</i>	+ve catalase, +ve urease and +ve oxidase test.
<i>Salmonella typhi</i>	+ve catalase, -ve urease and +ve motility test.
<i>Shigella dysenteriae</i>	+ve catalase, -ve urease and -ve motility test.
<i>Yersinia enterocolitica</i>	+ve catalase,+ve urease,-ve oxidase and +ve coagulase test.
<i>Escherichia coli</i>	+ve catalase, _ve urease and + ve lactose fermentation.

There was a strong relation between bacteria isolated and endoscopic diagnosis of patients of our study as follows: show table (2).

Table (2): Relation between endoscopic diagnosis and bacteria identification.

Diagnosis \ Bacteria	<i>H. pylori</i>	<i>Salmonella</i>	<i>Shigella</i>	<i>Yersinia</i>	<i>E. coli</i>	Total
1- G ulcer						
Count	3	2	0	1	2	8
%	37.5%	25.0%	0%	12.5%	25.0%	100.0%
2- D ulcer						
Count	5	0	1	1	1	8
%	62.5%	0%	12.5%	12.5%	12.5%	100.0%
3- Duodenitis						
Count	7	2	0	1	2	12
%	58.3%	16.7%	0%	8.3%	16.7%	100.0%
4- Gastritis						
Count	5	3	0	0	2	10
%	50.0%	30.0%	0%	0%	20.0%	100.0%
5- D + G						
Count	5	3	0	1	2	11
%	45.5%	27.3%	0%	9.1%	18.2%	100.0%
6- Colitis						
Count	5	0	0	1	1	7
%	71.4%	0%	0%	14.3%	14.3%	100.0%
7- B. desentery						
Count	0	3	1	0	0	4
%	0%	75.0%	25.0%	0%	0%	100.0%
8- Normal						
Count	0	0	0	0	9	9
%	0%	0%	0%	0%	100%	100.0%
Total						
Count	30	13	2	5	19	69
%	43.5%	18.8%	2.9%	7.2%	27.5%	100.0%

P = 0.002 highly significant relation

In case of gastric ulcer (11.5%), four bacterial species, namely: *H. pylori*, *Salmonella typhi*, *Yersinia enterocolitica* and *E. coli* were recovered with frequencies of (37.5, 25, 12.5& 25%), respectively. However, *H. pylori* seems to be the most frequent pathogen responsible for this disease. In case of duodenal ulcer (11.5%) and duodenitis (17.4%) cases, the forementioned 4 species were also recovered and *H. pylori* appears to surpass the other species in causing duodenal ulcer and duodenitis ($P < 0.009$ and 0.007), respectively.

Concerning the cases of gastritis (14.5%), the present results revealed also that all of *H. pylori*, *Salmonella* and *E. coli* took part in infection, their frequencies being 50, 30 and 20%, respectively. Meanwhile the 3 species were also implicated in gastritis plus duodenitis cases (15.9%) together with *Y. enterocolitica*, their frequencies being 45.5, 27.3, 9.0 and 18.2%, respectively. However *H. pylori* was the most predominant in all these infections.

Also *H. pylori*, *Yersinia* and *E. coli* were recovered from colitis cases (10.1%) with frequencies of 71.4, 14.3 and 14.3%, respectively. However in case of bacillary dysentery (5.7%), only *Salmonella typhi* (75%) and *Shigella*

dysenteriae (25%) were isolated, it is apparent that *Salmonella* implicated, to a great extent in bacillary dysentery.

Effect of sex and age on the various gastrointestinal disorders:

The results presented in table (3) revealed that, males are more susceptible to *H. pylori* and *Salmonella* infections than females, where there is highly significant positive correlation between *H. pylori* and *Salmonella* infections and sex ($P < 0.023$ and < 0.026), respectively. On the other hand, there is no significant relation between *H. pylori* or *Salmonella* infections and age ($P < 0.062$ and < 0.07). However, the situation was different in case of *Yersinia* as well as *E. coli* cases where female are more susceptible to infection than males ($P < 0.028$ and < 0.03), respectively. Meanwhile in case of *Yersinia* infection, old individuals were more susceptible to infection than young ones and the reverse was true in *E. coli* cases.

Table (3): Relation between Bacteria and Sex and Age.

Bacteria	Sex				Age					
	Male		Female		(30-39)		(40-49)		(50-60)	
	No	%	No	%	No	%	No	%	No	%
<i>H. pylori</i>	23	76.7 $P < 0.023$	7	23.3	3	10	13	43.3	14	46.7 $P < 0.062$
<i>Salmonella</i>	9	69.2 $P < 0.026$	4	23.3	5	38.5	3	23.1	5	38.5 $P < 0.07$
<i>Yersinia</i>	1	20	4	80 $P < 0.028$	1	20	1	20	3	60 $P < 0.026$
<i>E. coli</i>	8	42.1	11	57.9 $P < 0.03$	11	57.9 $P < 0.04$	1	5.3	7	36.8

Susceptibility and resistance of the various bacterial species recovered to antibiotics:

The results of antibiogram test revealed that *H. pylori* displayed a quite sensitivity to Ofloxacin and Nitrofurantoin, but resistant to Sulfonamides, Cefuroxime sodium, Nalidixic acid, Meropenem, Fortum, Imipenem, Gentamicin, Augmentin, Cefotaxime sodium, Ciprfloxacin, Levofloxacin and Flumox. *Salmonella* was sensitive to Nitrofurantoin, Ofloxacin and Ciprfloxacin, but resistant to Sulfonamides, Cefuroxime sodium, Nalidixic acid, Meropenem, Fortum, Imipenem, Gentamicin, Augmentin, Cefotaxime sodium, Levofloxacin and Flumox. *Shigella* was sensitive to Gentamicin, Ciprfloxacin, Nitrofurantoin and Levofloxacin, but resistant to Sulfonamides, Cefuroxime sodium, Nalidixic acid, Meropenem, Fortum, Imipenem, Ofloxacin, Augmentin, Cefotaxime sodium and Flumox. *Yersinia* was resistant to Sulfonamides, Nalidixic acid, Fortum, Ofloxacin. *E. coli* was resistant to Sulfonamides, Fortum, Nalidixic acid, Levofloxacin and Cefotaxime sodium, show figures (1,2,3,4,5). B-lactamase test was performed to *H. pylori* strains and show positive results, that the presence of these beta-lactamase enzymes in *H. pylori* bacteria make it resistant to pincillines antibiotics. Plasmid miniprep was performed to isolates of *H. pylori*, the results indicated that this bacterium contain or host a plasmid with molecular wt= 2.5 kb, this lend a support of its resistant to the antibiotics, show figure (6).

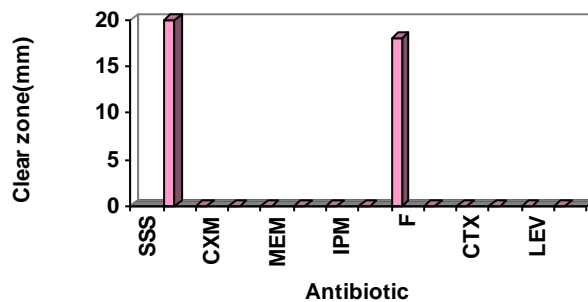


Figure (1): Sensitivity test of *H.pylori*

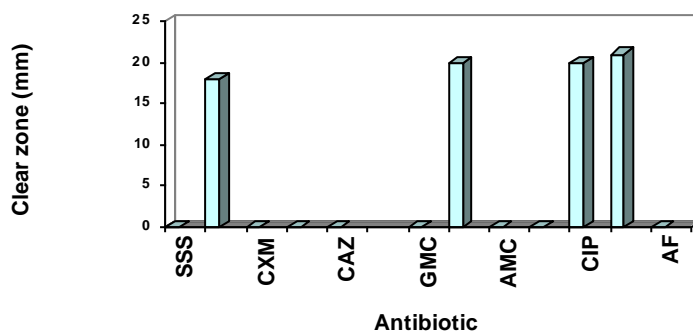


Figure (2): Sensitivity test of *Salmonella*

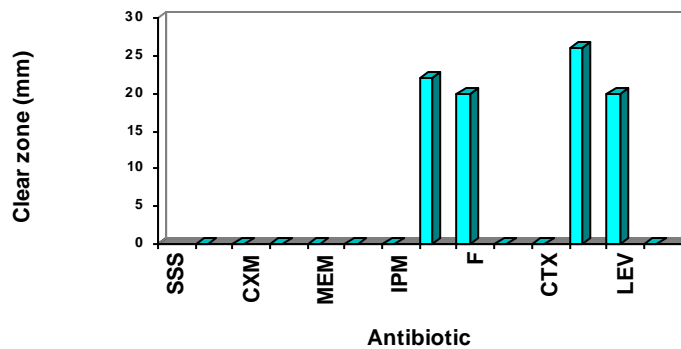


Figure (3): Sensitivity test of *Shigella*

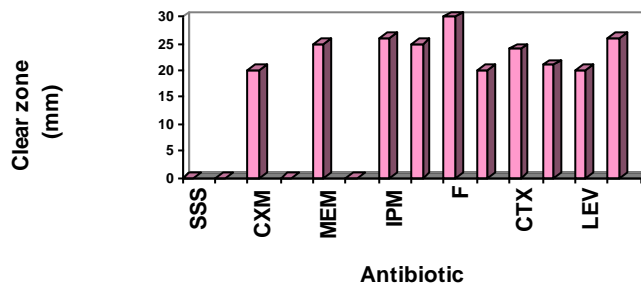


Figure (4): Sensitivity test of *Yersinia*

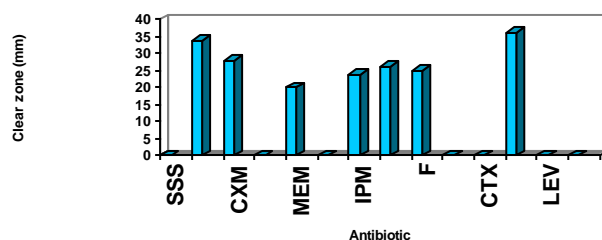


Figure (5): Sensitivity test of *E. coli*

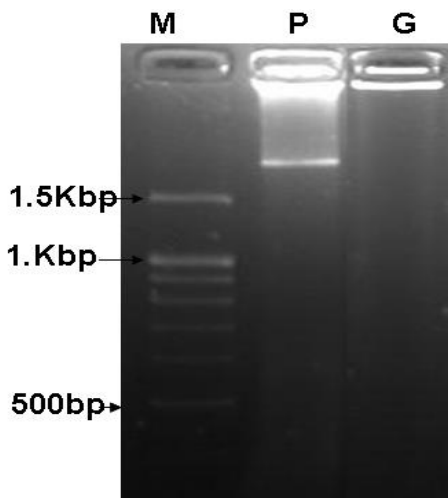


Fig (6): Plasmid miniprep. from *H. pylori* compared with the genomic DNA of the bacterial cell after plasmid inquiry. Lanes, M: DNA marker 2.5k, P-the extracted plasmid from the bacterial cell, G: the genomic DNA

DISCUSSION

In this study, it is revealed that *H. pylori* infection as indicated by stool culture method is implicated in gastric ulcer disease by 37.5% ($P < 0.082$) (Wyatt and Dixon. 1988) reported that the prevalence of *H. pylori* indicated by stomach biopsy method in gastric ulcer disease varies more widely, but has most consistency been found to be around 70%, this variation in results may be due to the variation in the method that is used in isolation of *H. pylori* from patients. Our study revealed that there is extremely significant correlation between duodenal ulcer disease and *H. pylori* infection as indicated by culture method that ($P < 0.009$) (Blaser. 1990) reported that infection with *H. pylori* was almost 95% in those patients with duodenal ulcers (Raouf M. A. 2001) revealed that, extremely significant positive correlation between *H. pylori* infection and the severity of gastrointestinal disease (positive endoscopic findings, duodenal ulcer, gastric ulcer, gastritis, duodenitis, gastric cancer) ($P < 0.0001$). Also this study said that there is extremely significant correlation between colitis disease and *H. pylori* infection ($P < 0.005$). On the other hand (Zhang C. et al. 2005) reported that no theories about the causes of ulcerative colitis have been proven, may be infectious causes, psychological factors or due to radiation.

This study revealed that *Shigella* isolated by stool culture method is not the cause of bacillary dysentery disease ($P < 0.128$) but *Salmonella* is the main cause of this disease ($P < 0.014$), on the other hand (Fan Yang et al. 2005) reported that, the *Shigella* bacteria isolated by blood culture method cause bacillary dysentery.

It is apparent from this study that there is no relation between *Yersinia* and all endoscopic investigations in this study. On the other hand (Mingrone and Fantasia. 1988 and Cornelis. 2002) reported that *Yersinia* can cross the gastrointestinal mucosa to infect underlying tissue, but infections usually remain localized in the submucosal area, symptoms of *Yersinia* infections vary from a mild form of the disease, characterized by diarrhea and abdominal pain, to a more severe form, characterized by fever and abdominal pain so severe that it can be mistaken for appendicitis. We found that *E. coli* is not a pathogenic bacteria, the recent studies have demonstrated that certain strains of *E. coli* are important intestinal pathogens causing a wide variety of gastrointestinal diseases (Joklik et al. 1988).

We found that there is no significant relation between *H. pylori* infection and patients age, but highly significant relation between *H. pylori* infection and patients sex. (Barry and Marshall. 1995) found that the prevalence of *H. pylori* infection was higher among old people than young one and, (Raouf M. A. 2001) reported that there is non-significant relation between patients sex and *H. pylori* infection ($P < 0.1$), but the odds of *H. pylori* infection in males is two times greater than females (relative risk=1.2) that is mean, this phenomena is not rare. There was extremely significant positive relation between *H. pylori* and severity of pathological lesions (positive endoscopic findings) in males and females ($P < 0.0001$) but non-significant relation between patients sex and *H. pylori* infection in different positive endoscopic diagnosis ($P < 0.5$) (Mossi et al. 1993) reported that the prevalence of *H. pylori*

infection was higher in males. In contrast (Ruslan. 1992) found that the frequency of *H. pylori* infection in men and women was similar.

There is no significant effect between *Salmonella* infection and age of patients ($P < 0.07$), but there is a significant relation between *Salmonella* and sex of patients ($P < 0.026$) that males are more susceptible to *Salmonella* infection than females, also (Duc J. *et al.* 2004) found that the incidence of *Salmonella* was higher among men than women ($P < 0.001$) and the mean annual incidence of invasive salmonellosis was highest among infants. It was found that there is a significant correlation between *Yersinia* infection and age that patients with age more than 50 years are more susceptible to *Yersinia* infection ($P < 0.026$), also there is a significant relation between *Yersinia* infection and sex of patients that women are more susceptible to *Yersinia* infection than men ($P < 0.028$). On the other hand (Swetha G. *et al.* 2008) reported that the male-to-female ratio is 1.7:1. and most infections occur in children younger than 7 years, with most younger than 1 year. Also in the current study, it was found that there is a significant correlation between *E. coli* infection and age of patients and sex of patients ($P < 0.04$ & $P < 0.03$) respectively that young female people (30-39 years) are more susceptible to *E. coli* infection than old men or old women people, (Eleftherios Mylonakis. 2007) reported that *E coli* is more common in females than in males. Other studies as (Thierry Wirth *et al.* 2006) reported that women in their late teens and older are most susceptible to cystitis.

It was revealed that, *H. pylori* is sensitive to two antibiotics from 14, Ofloxacin and Nitrofurantoin but resistant to Augmentin (Paul Auwaerter. 2007) reported that *H. pylori* is treated by three drug regimens, two drug regimens and four drug regimens (Dilruba Ahmed. 2004) reported that Metronidazole resistance was detected in 10 (20%) isolates of *H. pylori*, these isolates were highly resistant to metronidazole and were not inhibited by 250mg/L, Resistance to clarithromycin, amoxicillin, and doxycycline was not detected, *Salmonella* was found that it is sensitive to some antibiotics as Tavanic and Nitrofurantoin but resistant to other antibiotics (Jennifer E. *et al.* 2003) reported that Fluoroquinolones commonly are used to Augmentin treat adult *Salmonella* infections (Kwai-Lin. 2004) reported that *S. typhi* strains were resistant to Augmentin, chloromphenicol, and trimethoprim-sulfamethoxazole, *Shigella* in the current study was sensitive to Ciprofloxacin, Nitrofurantoin, Gentamycin & Tavanic but resistant to ampicillin (Thomas L. *et al.* 2005) reported that resistance to Ampicillin and Trimethoprim / sulphamethoxazole was observed in 88.5% and 98% isolates of *Shigella* respectively, *Yersinia* was sensitive to Nitrofurantoin, Imipenem but resistant to Ofloxacin, (Singh I. *et al.* 2006) reported that most isolates of *Yersinia* were resistant to penicillins, first-generation cephalosporins, macrolides and lincosamides, while sensitive to aminoglycosides and quinolones.

In the current study, we found that the main reason of the resistancy of *H. pylori* to pincillines is *H. pylori* product – lactamase that make the medium acidic by converting Benzylpincillin to penzoic acid, (Hasibi Mehrdad *et al.* 2006) reported that antibiotic resistance is the main source of failure for *H. pylori* eradication, and beta-lactamases produced by resistant *H. pylori* strains.

REFERENCES

- Barry J. Marshall B. J. (1995): *Helicobacter pylori*: The etiologic agent for peptic ulcer. JAMA. Vol, 274, No.13.
- Black R. E. Slome S. (1988): *Yersinia enterocolitica*. Infect Dis Clin North Am; 2 (3): 625-41. [Medline].
- Blazer M. (1990): *Helicobacter pylori* and the pathogenesis of gastroduodenal inflammation. Journal of Infectious Diseases; 161: 626-33.
- Blazer M. J. (2004): Duodenitis, an article last updated, December, NH publication No. 05-4764.
- Blazer M. J. (2006): Gastritis and peptic ulcer disease, an article last update in October. NH publication No. 05-8756.
- Cornelis S. G. R. (2002): *Yersinia* type secretion: send in the effectors. J. Cell Biol. 158(3): 401-8.
- Dilruba Ahmed; Heather Brooks; Michelle McConnell; Gil Barbezat. (2004): Antibiotic resistance in *Helicobacter pylori*: is it a problem in New Zealand?, Journal of new Zealand Medical Association, 20 Aug. vol. 117 No. 1200.
- Duc J. Vugia; Michael Samuel; Monica M. Farley; Ruthanne Marcus; Beletshashew Shiferaw; Sue Shallow; Kirk Smith; Frederick J. Angula; for the Emerging Infections Program FoodNet Working Group. (2004): Invasive *Salmonella* Infections in the United States, FoodNet, 1996-1999: Incidence, Serotype Distribution, outcome. Clinical Infectious Diseases; 38: S149-S156.
- Eleftherios Mylonakis. (2007): *Escherichia Coli* Infections, Article Last Updated: Oct 18, eMedicine Specialties > Infectious Diseases > MEDICAL TOPICS.
- Fan Yang; Jian Yang; Xiaobing Zhang; Lihong Chen; Yan Jiang; Yongliang Yan; Xudong Tang; Jing Wang; Zhaohui Xiong; Jie Dong; Ying Xue; Yafang Zhu; Xingye Xu; Lilian Sun; Shuxia Chen; Huan Nie; Junping Peng; Jianguo Xu; Yu Wang; Zhenghong Yuan; Yumei Wen; Zhijian Yao; Yan Shen; Boqin Qiang; Yunde Hou; Jun Yuand Qi. 2005: Genome dynamics and diversity of *Shigella* species, the etiologic agents of bacillary dysentery, Research vol. 33, No. 19 6445-6458.
- Gerard J. Tortora, Berdell R. Funke and Christine L. Case. (2007): Microorganisms and human disease. Microbiology; 4: 752-755.
- Gerard J. Tortora; Berdell R. Funke; Christine L. Case. (2007a): *Salmonella* Gastroenteritis, Salmonellosis, Microbial Diseases of the Digestive System, MO an Hum disease. Microbiology; 25: 753-754.
- Hasibi Mehrdad; Mirbagheri Amir Seyed; Abouzari Mehdi; Rashidi Armin. (2006): Ampicillin-sulbactam versus amoxicillin in quadruple therapy for *Helicobacter pylori* eradication: A preliminary study, Departments of Infectious Diseases and Gastroenterology, Amir-Alam Hospital, Tehran; and Tehran University of Medical Sciences, Tehran, Iran, Vol 25; 3 P: 169-170.
- Holt. J. G.; Krieh N. R.; Sneath P. H. A.; Staley J.; and Williams S. T. (ed). (1994): *Bergey's manual of determinative bacteriology*. 9th ed. Williams and Wilkins, Co., Baltimore, Md.
- James H. Jorgensen; Jean C. Lee; and Gary A. Alexander. (1977): Rapid Penicillinase Paper Strip Test for Detection of Beta-Lactamase-Producing *Haemophilus influenzae* and *Neisseria gonorrhoeae*. Antimicrob Agents Chemother. June; 11(6): 1087-1088.

- Jennifer E. Stevenson; Kathryn Gay; Timothy J. Barrett; Felicita Medalla; Tom M. Chiller; and Frederick J. Angulo. (2003): Increase in Nalidixic Acid Resistance among Non-Typhi Salmonella enterica Isolates in the United States from 1996 to 2003, Article updated in PEDIATRICS Vol. 65 No. 6 May.
- Joklik Willet H.; and Amos B. (1988): Zinsser Microbiology Nineteenth ed. Prentice-Hall International Ins. P. 464.
- Kwai-Lin Thong; Zulfiqar A. Bhutta; and Tikki Pang. (2004): Multidrug-resistant strains of Salmonella enterica serotype typhi are genetically homogenous and coexist with antibiotic-sensitive strains as distinct, independent clones, Institute of Biological Sciences, University of Malaya, Kuala Lumpur, Malaysia, Available online 11 February.
- Mingrone M. G.; Fantasia M. (1988): Characteristics of Yersinia spp. Isolated from wild and zoo animals. J.Wild. Dis.24(1): 25-9.
- Mossi Z. Brassens; Werth B.; Dilt S. (1993): Role of Helicobacter pylori in gastroduodenal disease. Gastroenterol.,101: 385-388.
- Paul Auwaerter. (2007): H. pylori-related Peptic Ulcer Disease, Article last updated in 09-13, Diagnosis> GI>.
- Reynolds J. E. F. (1993): Martindale The Extra pharmacopoeia, 31 st ed. London: The pharmaceutical press.
- Robert S.; Anders R. L. F.; and Frank E. (2003): Evaluation of different disc diffusion /media for detection of methicillin resistance in Staphylococcus aureus and coagulase-negative staphylococci. APMIS: 905-914.
- Robert W. Bauman; Elizabeth Machunis-Masuoka; Lan Tizard. (2004): Campylobacter and lactovegetarians, Microbiology; 21: 617-618.
- Rouf M. A. (2001): Bacteriological Studies On Vaccination Using Antigens From Helicobacter pylori., ph.D.
- Ruslan M. Z. Y. (1992): Effect of peptic ulcer surgery on Campylobacter pylori. General surgery Department, Faculty of Medicine, Zagazig University.
- Singh I.; and Virdi J. S. (2006): In vitro antibiotic susceptibilities of Yersinia enterocolitica biotype 1A, Department of Microbiology, University of Delhi South Campus, Benito Juarez Road, New Delhi, 110 021, India,10.1023/B: WIBL. 0000023909. 16771.7b.
- Swetha G. Pinninti. (2008): Yersinia Enterocolitica Infection, Article Last Updated: Jan 17, eMedicine Specialties > Pediatrics: General Medicine > Infectious Disease.
- Taylor D. N.; Parsonnel J. (1994): Epidemiology and natural history of Helicobacter pylori infection. In: Blazer MI, Smith PD, Ravdin J, eds. Infections of the gastrointestinal tract. New York: Raven press.
- Thierry Wirth; Daniel Falush; Ruiting Lan; Frances Colles; Patience Mensa; Lothar H. Wieler; Helge Karch; Peter R. Reeves; Martin C. J. Maiden; Howard Ochman; and Mark Achtman. (2006): Sex and virulence in Escherichia coli: an evolutionary perspective, Molecular Microbiology, Volume 60 Issue 5 Page 1136-1151.
- Thomas L. Hale; Gerald T. Keusch. (2005): Treatment of Shigella, medmicro book; 22: 58-61.
- Tribe; Ingrid G. (2007): An outbreak of Salmonella Typhimurium phage type 135 infection linked to the consumption of raw shell eggs in an aged care facility. Retrieved on 12 August.
- Wyatt J. I.; Dixon M. F. (1988): Chronic gastritis- a pathologic classification. Am J Pthol; 154:113.

Zhang C.; Yamada N. Wu. Y. L.; Wen M.; Matsuhisa T.; Matsukura N. (2005):
Colitis Causes, Department of Gastroenterology, Baogang Hospital,
Shanghai Second Medical University, Shanghai 201900, China, an
article updated in eMedicineHealth.

اكتشاف البكتيريا المتورطة فى اضطرابات الجهاز الهضمى وتشخيصها ودراسة حساسيتها للمضادات الحيوية المختلفة

فتحى عواد منصور*, يحيى احمد الظواهرى**, محمد عبد الرؤوف فودة*** و
ريهام مجدى فياض***

* قسم النبات- كلية العلوم-جامعة المنصورة

** قسم النبات-كلية العلوم- جامعة الزقازيق

***مركز جراحة الجهاز الهضمى- كلية الطب- جامعة المنصورة

أجريت هذه الدراسة على 69 متطوع 43 ذكر و 26 انثى تتراوح اعمارهم بين 30 الى 60 عام من النزلاء أو المترددين على مركز جراحة الجهاز الهضمى جامعة المنصورة. وقد أجريت لهم فحوص طبية اكلينيكية بالمنظير كما أخذت عينات من البراز للفحص الميكروسكوبى والبكتيريولوجى و يمكن تلخيص نتائج هذه الدراسة على النحو التالى:

اثبت الفحص بالمنظار وجود (11.6%) من الحالات مصابون بقرحة بالمعدة (11.6%) مصابون بقرحة بالاثنى عشر (17.4%) مصابون بالتهابات بالاثنى عشر و (14.5%) مصابون بالتهابات فى المعدة و (15.9%) مصابون بالتهابات فى الاثنى عشر والمعدة (10.1%) مصابون بالتهابات فى القولون و (5.8%) مصابون بالدوسونطاريا الباسيلية و 13% وجدت خالية من أية علامات مرضية واضحة.

أظهر الفحص البكتيريولوجى لعينات البراز وجود انواع بكتيرية متعددة تابعة للبكتيريا العصوية السالبة لصبغة جرام وتم عزل تلك الأنواع البكتيرية وتوصيفها بالطرق المورفولوجية والبيوكيميائية تبعاً لأحدث مفاتيح التصنيف العالمية الى خمسة أنواع تابعة لخمسة أجناس هي: الهليكوباكتر بيلورى (43.5%) و سالمونيلا تايفى (18.8%) و شيجيلا ديزونتارى (2.9%) و بيرزيبيا انثيروكوليتيكا (7.2%) و ايشيريشيا كولاي (27.5%)

وقد تم اختبار حساسية ومقاومة الأنواع البكتيرية سالفة الذكر لعدد 14 نوع من المضادات الحيوية شائعة الاستعمال ممثلة فى سالفوناميدز و اوفلوكساسين و سفروكزيم صوديوم و ناليدكرك اسيد و ميروبيينم و فورتام و امبيينم و جينتاميسين و نيتروفيفورانتيون و اوجومنتين و سيفوتاكسيم صوديوم و سيبروفلوكساسين و ليفوفلوكساسين وفلوموكس. وقد اظهرت النتائج ان :

الهليكوباكتر بيلورى حساسة للمضاد الحيوى اوفلوكساسين و نيتروفيفورانتيون فقط. وكانت السالمونيلا تايفى حساسة لمجموعة من المضادات مثل ليفوفلوكساسين و نيتروفيفورانتيون و اوفلوكساسين فى حين كانت مقاومة لبقية المضادات الحيوية الاخرى المستخدمة. وكذا اظهرت النتائج ان الشيجيلا ديزونتارى حساسة للمضادات الحيوية سيبروفلوكساسين و نيتروفيفورانتيون و جينتاميسين و ليفوفلوكساسين بينما كانت مقاومة للمضادات الحيوية الاخرى المستخدمة بينما اليبيرزيبيا انثيروكوليتيكا حساسة للمضادات الحيوية نيتروفيفورانتيون و جينتاميسين و ليفوفلوكساسين و سيبروفلوكساسين و اوجومنتين و فلوموكس و ميروبيينم و سيفوتاكسيم و سفروكزيم و امبيينم. فى حين كانت مقاومة للمجموعة الاخرى وكانت ايشيريشيا كولاي حساسة للمضادات الحيوية فلوموكس و جينتاميسين و سيبروفلوكساسين و ميروبيينم و سيفوتاكسيم و امبيينم و اوفلوكساسين وقد اثبتت مقاومة واضحة تجاه سالفوناميدز و ناليدكرك اسيد و فورتام و ليفوفلوكساسين و سيفوتاكسيم.

تم اجراء اختبار قدرة الهليكوباكتر بيلورى على انتاج انزيم بيتا لاكتاميز وقد اظهرت النتائج أن هذه البكتيريا لها القدرة على انتاج هذا الانزيم. كما تم عزل البلازميد من خلال الهليكوباكتر بيلورى وتقنية دراسة خصائصه البيولوجية و الجزئية وتعيين الوزن الجزيئى له (2.5 kb) وقد عزيت قدرة هذه البكتيريا على مقاومة المضادات الحيوية لمجموعة البنسيلين ومشتقاته الى القدرة العالية لهذه البكتيريا لانتاج البيتا لاكتاميز وقد عزيت ايضا مقاومة هذه البكتيريا للمضادات الحيوية الاخرى على وجود البلازميد حيث ان الية المقاومة موجودة على هذا البلازميد وليست موجودة على الكروموسوم.

