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Original Research Paper

A STUDY ON PREVALANCE OF H. PYLORI INFECTION IN GASTRODUODENAL PERFORATION.

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ABSTRACT:

Background: Most patients with chronic peptic ulcer disease have Helicobacter pylori (H. pylori) infection. The incidence of perforated peptic ulcer (PPU) has only declined minimally despite the widespread use of Helicobacter pylori (H. pylori) eradicative agents. Hencethe current study was conducted to assess the prevalence of H. pylori infection and other factor like NSAIDS, alcohol, smoking, level of education and economic condition in the patients of gastroduodenal perforation admitted in GMERS Medical College Hospital, Valsad. **Methods:** It was a cross sectional hospital based analytical study conducted among 100 patients over the span of 2 years from October 2020 to December 2022, who were diagnosed to have gastroduodenal perforation and who underwent surgical treatment for it. All the details of history, investigation and H. pylori status recorded in the standard, semi-structured, pre-validated case record proforma which is prepared by surgical department. **Results:** It is observed that the proportion of H. Pylori positive was significantly more in those who were not on NSAID's compared to those who were on NSAID's medication. The p-value turns out to be significant at 5% which means that there is an association between NSAID's and H. Pylori infection. **Conclusion:** It is noted that 46(69%) patients were found to be H. Pylori positive. It is observed thatthe proportion of H. Pylori positive was significantly more in those who were not on NSAID's compared to those who were on NSAID's medication.

Keywords: GERD, H Pylori, Peptic ulcer disease, gastroduodenal perforation

INTRODUCTION:

Peptic ulcer disease is defined as an insult to the mucosa of the upper digestive tract resulting in ulceration that extends beyond the mucosa and into the sub mucosal layers. Peptic ulcers most commonly occur in the stomach and duodenum though they can occasionally be found elsewhere (esophagus or Meckel diverticulum) [(1)] While the majority of peptic ulcers are initially asymptomatic, clinical manifestations range from mild dyspepsia to complications including GI (gastrointestinal) bleeding, perforation, and gastric outlet obstruction. Peptic ulcers may be either duodenal or gastric in location. This article will provide a brief overview of peptic ulcer disease with a primary focus on the complexity of perforated peptic ulcers from an emergency medicine perspective. Peptic ulcer disease was traditionally thought to be the result of increased acid production, dietary factors, and even stress. However, Helicobacter pylori infection and the use of nonsteroidal anti-inflammatory drugs (NSAIDs) including low-dose aspirin are now the more popular etiologies leading to the development of peptic ulcer

disease. [1][2] Other factors such as smoking and alcohol may also contribute. The main risk factors for PUD are *H. pylori* and NSAID use, however not all individuals infected with *H. pylori* or taking NSAIDs develop PUD [3] Almost half of the world's population is colonized by *H. pylori* [4] The organism is usually acquired in childhood and persists until treated. Risk factors for acquiring the infection include a lower socioeconomic status and unsanitary conditions or crowding. The prevalence of *H. pylori* is higher in developing countries and more common in certain ethnicities. The prevalence of H. pylori in the Indian subcontinent can be as high as 80 per cent or more in rural areas. The most commonly recognized manifestation of H. Pylori infection in India is peptic ulcer disease [5] Most patients with chronic peptic ulcer disease have Helicobacter pylori (H. pylori) infection. In the past, immediate acid-reduction surgery has been strongly advocated for perforated peptic ulcers because of the high incidence of ulcer relapse after simple closure. Simple oversewing procedures either by an open or laparoscopic approach together with H. pylori eradication appear to supersede definitive ulcer surgery. More than 95% of patients suffering from duodenal ulcer and about 70-80% patient with gastric ulcer are H. pylori positive. The incidence of perforated peptic ulcer (PPU) has only declined minimally despite the widespread use of Helicobacter pylori (H. pylori) eradicative agents. About 95% of the patients suffering from duodenal ulcers and 70-80% of the gastric ulcer patients are found to be H. pylori-positive [6]. Although the role of H. pylori is well known in peptic ulcer disease (PUD) etiology, its role in PPU is not well established [7-8]. There are conflicting results in the literature regarding its association. While some studies show a high prevalence of H. pylori infection in PPU patients, and its eradication preventing the relapse of ulcer, others show a low or complete lack of association, suggesting different pathogenesis for PPU [9-10] Hence the current study was conducted to assess the prevalence of H. pylori infection and other factor like NSAIDS, alcohol, smoking, level of education and economic condition in the patients of gastroduodenal perforation admitted in GMERS Medical College Hospital, Valsad.

MICROBIOLOGY OF H. PYLORI:

Figure: Helicobacter pylori. Image courtesy S Bhimji MD

The genus *Helicobacter* belongs to the ε subdivision of the *Proteobacteria*, order *Campylobacterales*, family *Helicobacteraceae*. This family also includes the genera *Wolinella*, *Flexispira*, *Sulfurimonas*, *Thiomicrospira*, and *Thiovulum*. To date, the genus *Helicobacter* consists of over 20 recognized species, with many species awaiting formal recognition. Members of the genus *Helicobacter* are all microaerophilic organisms and in most cases are catalase and oxidase positive, and many but not all species are also urease positive. [11]

EPIDEMIOLOGY:

The prevalence of *H. pylori* shows large geographical variations. In various developing countries, more than 80% of the population is *H. pylori* positive, even at young ages. The prevalence of *H. pylori* in industrialized countries generally remains under 40% and is considerably lower in children and adolescents than in adults and elderly people. Within geographical areas, the prevalence of *H. pylori* inversely correlates with socioeconomic status, in particular in relation to living conditions during childhood. In Western countries, the prevalence of this bacterium is often considerably higher among first- and second-generation immigrants from the developing world. While the prevalence of *H. pylori* infection in developing countries remains relatively constant, it is rapidly declining in the industrialized world. [12]

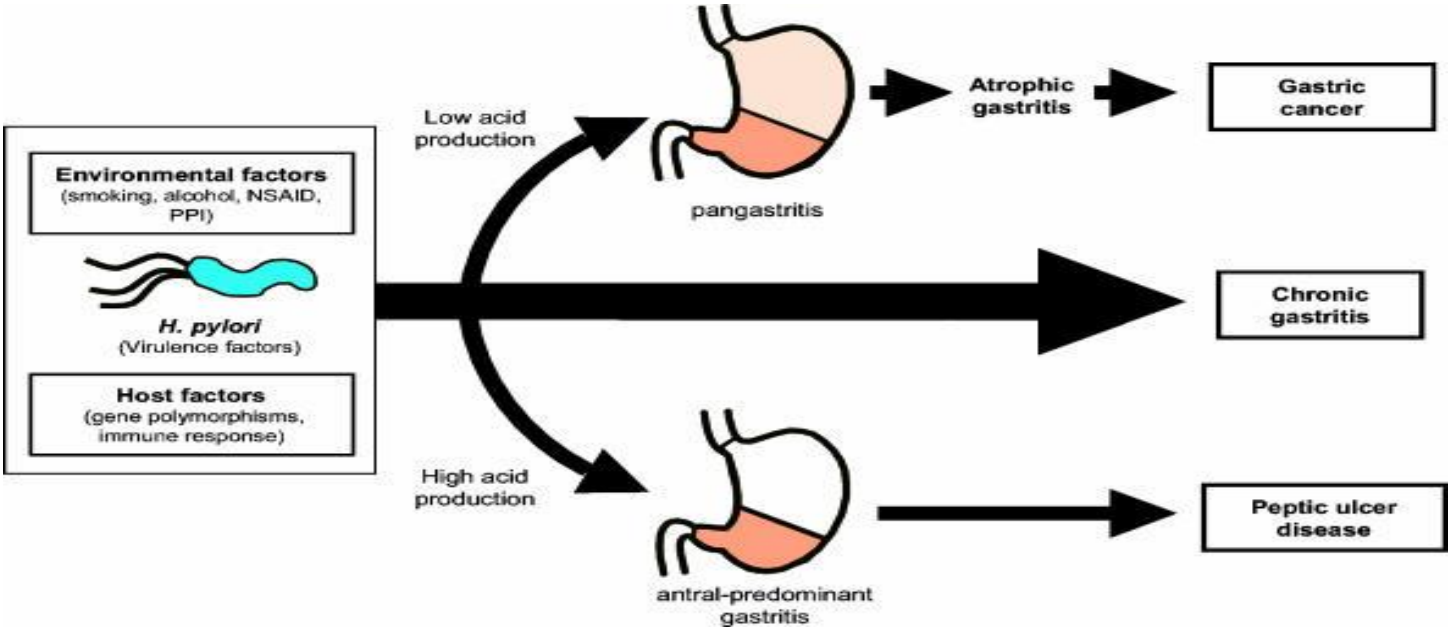


Figure: Schematic representation of the factors contributing to gastric pathology and disease outcome in *H. pylori* infection.

Pattern of gastritis	*Gastric histology*	*Duodenal histology*	*Acid secretion*	*Clinical condition*
 Pan-gastritis	• Chronic inflammation • Atrophy • Intestinal metaplasia	• Normal	• Reduced	• Gastric ulcer • Gastric cancer
 Antral-predominant	• Chronic inflammation • Polymorph activity	• Gastric metaplasia • Active chronic inflammation	• Increased	• Duodenal ulcer

Figure: Acid secretion and the associated pattern of gastritis play an important role in disease outcome in *H. pylori* infection. The figure displays the correlations between the pattern of *H. pylori* colonization, inflammation, acid secretion, gastric and duodenal histology, and clinical outcome.

Although colonization with *H. pylori* is almost invariably associated with the presence of gastritis, and gastritis is mostly due to *H. pylori* colonization, other causes of gastritis include infections such as cytomegalovirus, chronic idiopathic inflammatory and autoimmune disorders such as Crohn's disease and pernicious anemia, and chemical damage due to alcohol abuse or nonsteroidal anti-inflammatory drug (NSAID) use.

AIM & OBJECTIVES:

"To know the prevalence of H. pylori infection and it's association with other factors like NSAIDS, alcohol, smoking, level of education and economic condition in

the patients of gastroduodenal perforation admitted in GMERS Medical College Hospital, Valsad."

MATERIAL AND METHODS:

It was a cross sectional hospital based analytical study conducted in GMERS Medical College and Hospital, Valsad, Gujarat, India, a tertiary care government hospital for surgical patients, with all the necessary investigation facilities like 24-hour advanced pathology, microbiology and biochemical lab, X-ray, and CT scan. All Patients present coming to GMERS Medical College Hospital, Valsad, Gujrat fulfilling the set of inclusion criteria of gastroduodenal perforation are included in the study. The current study was conducted between October 2020 to December 2022.

SAMPLE SIZE ESTIMATION:

According to the literature, the prevalence of H Pylori infection among the Indian population was observed to be in between 50% to 80%. For the current study, 60% prevalence was taken as a reference value.

The sample size was calculated with the help of following formula:

$n= (1-\alpha)^2 * P * Q / d^2$

P =Your guess of Population P (any value<1) =0.6

Q=(1-P) = 0.4

1-α =Confidence level set by you =0.95

Z=Z value associated with confidence=1.95

d=Absolute precision (Value less than P) =0.125

n=Minimum sample size=60

Hence in the present study 60 study subjects fulfilling the inclusion criteria were included.

Universal sampling method was used in the current study to enroll the study sample size fulfilling the set inclusion criteria.

INCLUSION CRITERIA:

- All patients who were diagnosed to have gastroduodenal perforation and who underwent surgical treatment for it.
- Both males and females, of all ages were included in the present study.

EXCLUSION CRITERIA:

- Those patients of gastroduodenal perforation who did not survived in the resuscitation and who did not undergo surgical treatment.
- Those patients who had perforation other than gastroduodenal perforation.

METHOD OF COLLECTION OF DATA:

- All patients who fulfilled inclusion criteria were included in this study after taking informed consent and detailed history and clinical examination.
- Each patient underwent thorough clinical examination and we took a detailed history & history of sociodemographic factors.
- Cases were admitted as emergency and emergency investigations will bewere after taking history, clinical features and X ray abdomen erect position and if require USG AND CT scan of abdomen and pelvis.
- All the details of history, investigation and H. pylori status recorded in the standard, semi-structured, pre-validated case record proforma which is prepared by surgical department.

METHOD OF CLINICAL SURVEY:

- A patient selected for study were evaluate on basis of a specialized format.
- Patients of any age who were diagnosed with perforated gastroduodenal ulcer were evaluated by clinical examinations and were treated in surgical department.
- After explaining the diagnosis to the patient and relatives and obtaining informed written consent for surgery from them, the Pre anesthetic assessment and relevant investigations were done.
- Pre-operative investigations included complete blood counts, blood grouping and random blood sugar, renal function test, liver function test, bleeding time, clotting time, viral screening, x-ray chest, x -ray abdomen erect posture, USG abdomen and pelvis and CT abdomen and pelvis if whenever required.
- All the patient were managed by surgical exploration through midline supra-umbilical incision and sucking out peritoneal fluid. Stomach and duodenum scanned in all the cases to locate perforation in the anterior or posterior wall.
- A note was made about the exact site and size of perforation. The biopsy sample was taken from edge of perforation include mucosa.
- Rapid urease test was conducted among the study subjects and result of rapid urease test (RUT DRY TEST) were obtained within 15 min and confirmation was obtained on 24 hours for conformation.
- Closure of perforation was done by standard graham patch omentopexy. Peritoneal toilet was carried out with saline and two drain were put one in Morison pouch and second in the pelvic cavity in all cases. Patient found to be positive for H. pylori will be put on medical therapy that comprised of

cap. Omeprazole 20mg, Tab. Tinidazole 500mg and Tab. Amoxicillin 750mg twice daily for 14days.

STATISTICAL ANALYSIS:

- The data was entered using MS excel software.
- The data was represented in the form of tables and charts for frequency analysis
- The data was analyzed with the help of SPSS version 22 software.
- Qualitative parameters were analyzed using chi-square tests, while quantitative variables were analyzed using t-test.
- Central tendency of quantitative variables was measured using mean, SD and median.
- P-value less than 0.05 was considered to be statistically significant.

RESULTS:

Table 1: Sex distribution of patients

Sex	Count	%
Male	58	87%
Female	9	13%
Total	67	100%

Table 2: Age distribution of patients

Age group	Count	%
Up to 20	9	13%
21 - 40	23	34%
41 - 60	21	31%
61 - 80	14	21%
Total	67	100%

Fig.-1 Sex distribution

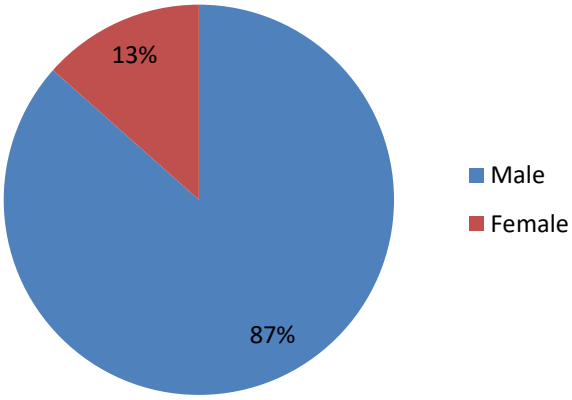


Fig.-2 Age distribution

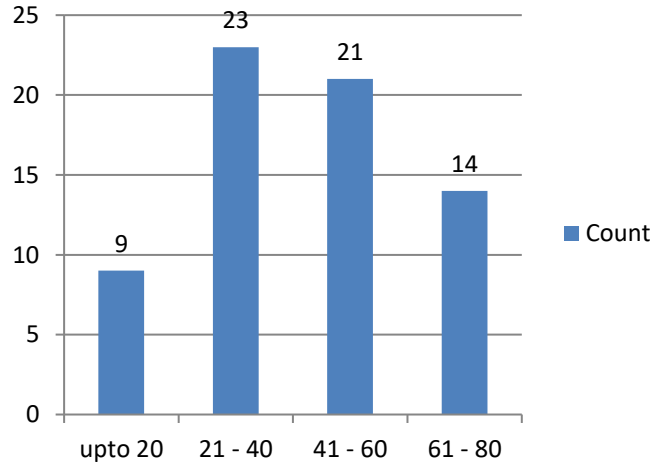


Table 3: On medication of NSAID

NSAID	Count	%
Yes	41	61%
No	26	39%
Total	67	100%

Table 4: Data of H. Pylori infection

H. Pylori	Count	%
Positive	46	69%
Negative	21	31%
Total	67	100%

Fig.-3 Consumption of NSAID's

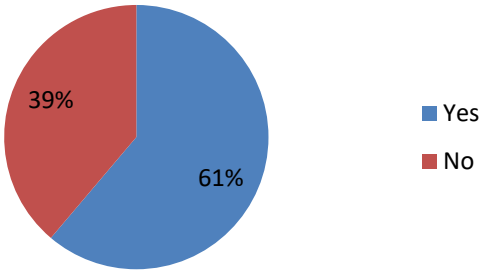


Fig.-4 H. Pylori

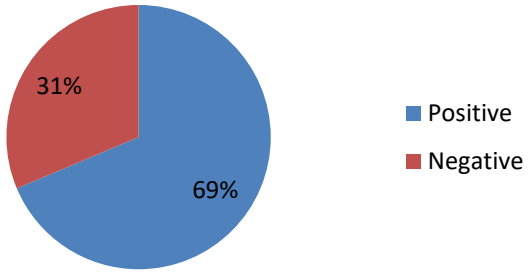


Table 5: Stay post operation at Hospital

Stay (in days)	Count	%
Up to 7 days	57	85%
more than 7 days	10	15%
Total	67	100%

Table 6: Infection data

Infection	Count	%
Surgical Site Infection	3	4%
Operative site infection	1	1%
No infection	63	94%
Total	67	100%

Fig.- 5 Stay in hospital post operation

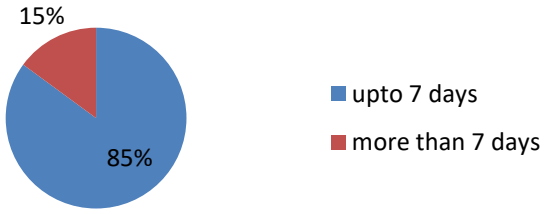
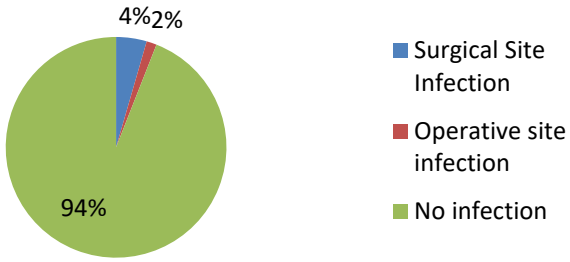


Fig.-6 Infection data of patients



Drug	H. Pylori		Total	chi-square value	p - value
	Positive	Negative			
NSAID	24	17	41	5.02	0.025
No NSAID	22	4	26		
Total	46	21	**67**		

It is observed that the proportion of H. Pylori positive was significantly more in those who were not on NSAID's compared to those who were on NSAID's medication. The p-value turns out to be significant at 5% which means that there is an association between NSAID's and H. Pylori infection.

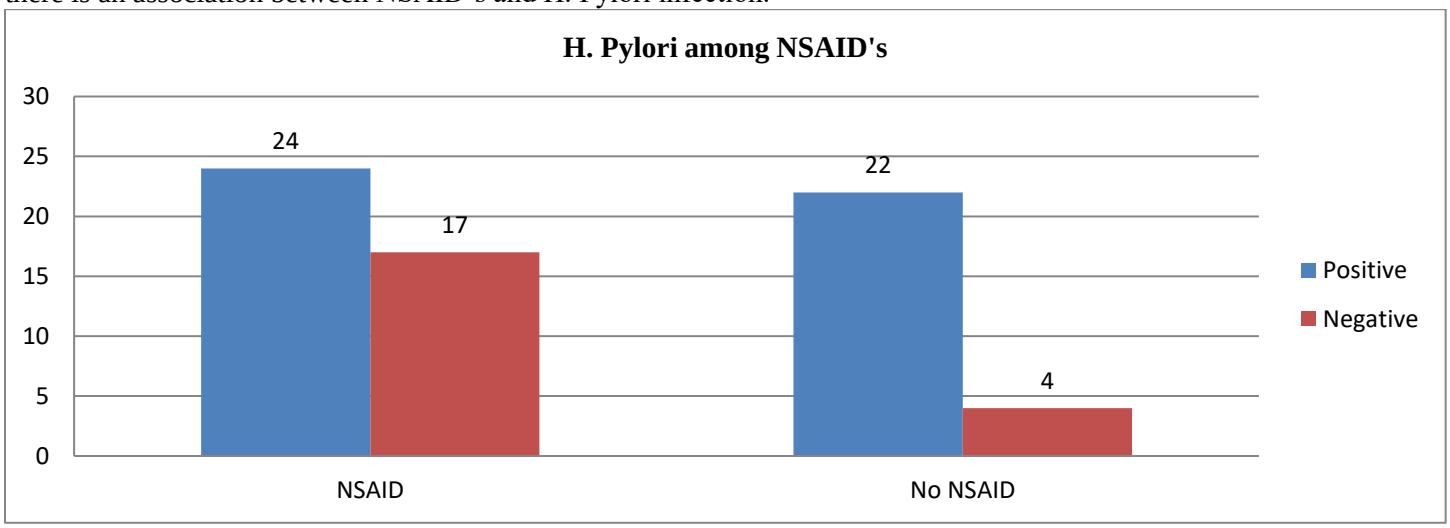


Fig-7: H. Pylori patients among NSAID's and Non-NSAID's patients.

DISCUSSION:

Despite the causal link between *H. pylori* infections and gastrointestinal pathology, only a minority of infected subjects actually develops disease. For those with acute symptoms, eradication in a test-and treat approach is usually recommended as the standard procedure. Yet on the population level, this may neither be necessary nor achievable, especially in regions with high prevalence and poorly developed health systems. Given the interaction between infections with *H. pylori* and mental stress in gastrointestinal diseases, short-term reduction may be another viable option during stressful life events, such as, e.g., exams, excessive work load, or other emotional distress. Treatment of H. pylori infection is becoming a very relevant problem, especially in the developing countries. Although different therapeutic regimens are currently available, treatment failure remains a growing problem in daily medical practice. Several factors could play a role in the eradication failure, but the most relevant are antibiotic resistance and patient's compliance.

Demographic information:

Total 67 patients were included in this study among which 57(87%) were males and 9(13%) were females. The male: female ratio in the current study was 6.3:1. Majority of patients belonged to age group 21-40 in which there were 23(34%) subjects. In age group 41-60 there were 21 (31%) cases while 14 (21%) cases belonged to age group 61. 80. 9 (13%) cases were less than equal to 20 years of age. The mean age of the study subjects was 43.61 ± 17.45 years

Study	Male: Female ratio	Mean age
Current study	6.3:1	43.61 ± 17.45 years
Mohamed H Emara et al [15]	1.5:1	35.00 ± 12.65 years
Katavath Thirupathaiah et al [16]	3.8:1	46.5 ±16 years
Dogra BB et al [17]	3:1	49.2 years

On use of NSAIDS:

About 41 (61%) of patients were on NSAID's whereas rest 26 (39%) patients were not consuming NSAIDS. Katavath Thirupathaiah et al in their study observed that 54.2% study subjects had history of NSAID use. [16]

Incidence of H. Pylori infection:

It is noted that 46 (69%) patients were found to be H. Pylori positive whereas 21 (31%) were negative of disease. John B et al [18] in their study observed that 46.9% patients with gastroduodenal perforation were positive for H Pylori. Katavath Thirupathaiah et al [16] in their study observed that the prevalence of H. pylori infection among patients with PUD was 31.3%. This was

based on the rapid urease test and histopathological examination.

This is similar to the study done by Gisbert et al. [19] in which the prevalence of H. pylori infection in PPU was significantly less with an infection rate of 47%. They found that chronic recurrent PUD and PPU have different pathogenesis based on the fact that there is a low prevalence of H. pylori infection in patients presenting with PPU. It also suggests that other pathogenic factors might also play a role in PPU. Also, another study done by Gisbert et al [19]. found that all their 15 patients with PPU were negative for H. pylori. Ng et al., [20] in their series found 70% prevalence of H. pylori infection with duodenal perforation Kumar et al. [21] conducted a study on 49 patients with duodenal perforation by the means of three diagnostic methods (rapid urease test, histology, and culture method), and reported infection rate of 57%. He found rapid urease test as the most sensitive diagnostic method with reported prevalence of 70%.

Post operative stay at hospital:

Among all the patients who underwent surgery, 57(85%) patients were discharged within a week while 10(15%) patients were discharged after one week.

Infection data:

It is observed that surgical site infection was found in 3(4%) cases whereas operative site infection was found in 1(1%) case. 63(94%) cases had no infection at all.

H. Pylori among those on NSAID's:

H. pylori and NSAIDs are the major causes of gastroduodenal ulcer disease. Their potential interaction in the induction of ulcer disease remains a controversial area. A thorough analysis of interaction data revealed that the ulcer-inducing effects of both risk factors are cumulative. Eradication of H. pylori in chronic NSAID users decreases the incidence of ulcer disease. In a study from Hong Kong, patients starting with NSAID maintenance therapy were randomized to eradication therapy or placebo. After 6 months of follow-up, the incidence of ulcers was 12.1% (95% confidence interval [CI], 3.1 to 21.1) in the eradication group and 34.4% (95% CI, 21.1 to 47.7) in the placebo group (P = 0.0085). The corresponding 6-month probabilities of complicated ulcers were 4.2% (95% CI, 1.3 to 9.7) and 27.1% (95% CI, 14.7 to 39.5) (P = 0.0026), respectively. It is observed that the proportion of H. Pylori positive was significantly more in those who were not on NSAID's compared to those who were on NSAID's medication. The p-value turns out to be significant at 5% which means that there is an association between NSAID's and H. Pylori infection. (p-value: 0.025) John B et al [18] in their study observed that patients having history of NSAIDS intake showed a less prevalence rate of infection in 43.4% cases compared to non-users (p-value 0.4873). This is similar with the observations of Ullah et al. [22]

CONCLUSIONS:

- The male: female ratio in the current study was 6.3:1.
- The mean age of the study subjects was 43.61 ± 17.45 years
- It is noted that 46(69%) patients were found to be H/Pylori positive
- It is observed that surgical site infection was found in 3(4%) cases whereas operative site iinfection was found in 1(1%) case.
- It is observed that the proportion of H. Pylori positive was significantly more in those who were not on NSAID's compared to those who were on NSAID's medication.

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ABBREAVIATIONS:

- **NSAIDS: nonsteroidal anti-inflammatory drugs**
- **GI: gastrointestinal**
- **H Pylori: Helicobacter pylori**
- **PPU: perforated peptic ulcer**
- **MALT: mucosa-associated lymphoid tissue**
- **PPI: proton pump inhibitors**
- **GERD: gastroesophageal reflux disease**
- **UBT: urea breath test**
- **RUT: rapid urease tests**
- **FISH: fluorescent in situ hybridization**