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Risk Factors, Management and Other Correlates of Peptic Ulcer Disease in a University Community in South-South Nigeria

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Abstract

The most common causes of peptic ulcer disease (PUD) are Helicobacter pylori infection and use of non-steroidal anti-inflammatory drugs (NSAIDs).Treatment choices include standard triple therapy. This study evaluated the patterns of prevalence, life-style risk factors and correlates of management of PUD among Staff and Students of Delta State University, Abraka Campus, Nigeria. A descriptive cross sectional study was initiated among 450 willing staff and student respondents. A total of 126 respondents that had been diagnosed for PUD were further evaluated for prevalence and patterns, confounding life-style factors, drug therapy and other correlates of PUD management by using self-designed, pre-tested questionnaires that addressed the objectives of the study. Data was analyzed using Statistical Package for Social Sciences, version16.0 (SPSS Inc. Chicago Illinois). Duodenal Ulcer (DU) had a higher prevalence than Gastric Ulcer (GU) in a ratio of 1.5:1. The prevalence of GU was higher among Staff, Males and those older than 35 years; DU had a higher prevalence among the Students, Females and 16-35 yrs age group. The greatest life-style risk factors identified were consumption of NSAIDs, Tobacco and Alcohol. Regarding drug treatment, over 90% of drugs prescribed were antibiotics; nearly all respondents claimed to experience side-effects which included Diarrhea, Abdominal Pain and Headache; nearly all respondents often adhered to instructions to avoid Alcohol. In this population, PUD prevalence and pattern was structured along gender and age. There were issues with life-styles which could have contributed to the pathophysiology of PUD. Patients experienced some side-effects that affected adherence to instructions. Management seemed appropriate with the use of triple therapies. However, there is still a dire need for strategic health education on PUD risk factors and self-care practices.

1 Introduction

Excessive acid production was presumed to be responsible for inducing ulcer disease, and this premise informed the focus of management on the use of drugs that neutralize and/or inhibit the secretion of stomach acid. Even though the acid theory is still considered valid, the preponderant cause of ulcer disease is now believed to be infection of the stomach by a bacterium called *"Helicobacter pyloridus"* (*H. pylori*); it is claimed to be responsible for about 70-90% of ulcer cases[1, 2].In Nigeria, almost 100% of duodenal ulcer and 82% of gastric ulcer patients are *H. pylori* positive[3].Based on the *H. pylori* theory, the institution of treatment protocols such as "triple therapy," has been instituted. Triple therapy is the use of a proton-pump inhibitor (PPI) or H2 blocker which reduces gastric acid secretion, with either two different antibiotics or an antibiotic combined with bismuth salicylate. Other treatment choices include sequential therapy, quadruple therapy, and levofloxacin-based triple therapy[4]

Many other risk factors for PUD have been identified in literature. These include, among many others, the use of

anticoagulants, corticosteroids, smoking, coffee and stress[5,6]. The long-term use of NSAIDs especially in the presence of *H. pylori* infection has been linked with greater risk of PUD. The prophylactic use of misoprostol and proton pump inhibitors has been recommended for such patients[4].

This study was carried out to identify patterns of PUD, the confounding factors and correlates of its management among Staff and Students of Delta State University, Abraka Campus, South of Nigeria.

2. Methods

2.1 Study population

The study was carried out among staff and students of the three campuses that make up the Abraka Campus of Delta State University with an estimated population of less than 10,000.

2.2 Study design and sample

A descriptive cross sectional study was initiated among 450 willing staff and students in the various Faculties and Departments that constituted the Delta State University, Abraka Campus.

A total of 126 respondents that had been diagnosed for PUD were further evaluated for patterns of PUD, drug therapy and other correlates of PUD management, which included risk factors, types of therapy, side-effects experienced, self-reported effectiveness of therapies and self-care practices.

The sample size was calculated using the Cochran formula[7]. A purposive and convenient sampling technique was adopted for the study; 150 questionnaires were allocated to each of the three campuses; respondents were visited in their offices (staff) and class rooms (students).

2.3 Data collection

A self-designed, pre-tested questionnaire that addressed the objectives of the study was used. The questionnaires were designed to retrieve demographic information, patterns of prevalence of PUD, prevalent risk factors, PUD management, drug procurement practices, counseling practices, Side effects and compliance to instructions. A panel of 3 experts (2 professors of pharmacy and a consultant statistician) determined the questionnaire content validity.

2.4 Data analysis

Data was analyzed using Statistical Package for Social Sciences, version16.0 (SPSS Inc. Chicago Illinois). Results were presented as means ± standard deviation for quantitative variables and number (percentages) for qualitative variables. Categorical variables were compared with

Pearson's Chi-square. Significant P-value was taken as <0.05.

2.5 Ethical considerations

Permissions were taken from Delta State University management. Privacy of all interviews was ensured and prior informed consents of respondents were taken after explaining the purpose and benefits of the study.

3 Results

3.1 Demographic profile of PUD patients

A total of 126 respondents participated in the study and response rate was 100%.

Over 70% of the respondents were aged between 16 and 25 years; 60% were females; 78% were Christians; 76% were students; 70% were not married. About 70% were undergraduates.

3.2 Patterns of prevalence of PUD among respondents

The prevalence of GU and DU was 40% and 60% respectively. The prevalence of GUand DU among the males was 40% and 30% respectively; and among the females, 13% and 17% respectively for GU and DU. The prevalence of GU and DU in Staff was 42% and 15% respectively; the prevalence of GU and DU in Students was 10% and 33% respectively.

GU and DU prevalence among the 16-35 year-olds was 6% and 21% respectively; GU and DU prevalence among respondents older than 35 years was 56% and 17% respectively (Table 1).

Table 1: Patterns of prevalence of PUD among respondents

Variables		Freq.	%
PUD Diagnosis	Gastric Ulcer	50	40
	Duodenal Ulcer	76	60
Staff	Gastric Ulcer	53	42
	Duodenal Ulcer	19	15
Student	Gastric Ulcer	12	10
	Duodenal Ulcer	42	33
Male	Gastric Ulcer	50	40
	Duodenal Ulcer	38	30
Female	Gastric Ulcer	16	13
	Duodenal Ulcer	22	17
Age: 16 – 35 years	Gastric Ulcer	8	6
	Duodenal Ulcer	26	21
Age: >36 years	Gastric Ulcer	70	56
	Duodenal Ulcer	22	17

3.3 Risk factor assessment

A total of 68%, 60%, 56%, 48%, 47%, 44% and 41% respectively consumed tea/coffee, anti-malaria drugs, fruit juices, carbonated, alcohol, paracetamol and tobacco. About a third of respondents took milk drinks, multivitamins, energy drinks and herbal medicines. About a fifth of respondents took beer, antibiotics and Tramadol; about a tenth of respondents took indomethacin, diclofenac, ibuprofen and the local gin (Table 2).

Table 2: Drugs and other substances commonly taken by respondents

Variables	Freq.	%
Tea/Coffee	85	68
Anti-malarial drugs	76	60
Fruit Juice	70	56
Carbonated Drinks	60	48
Alcohol	59	47
Paracetamol	56	44
Tobacco	51	41
Milk Drinks	40	32
Multivitamins	40	32
Herbal Medicines	35	28
Energy Drinks	35	28
Beer	24	20
Antibiotics	25	20
Tramadol	20	16
Misoprostol+ Diclofenac	18	14
Codeine	16	13
Indomethacin	15	12
Local Gin	12	10
Diclofenac	13	10
Ibuprofen	12	10
Aspirin	8	6
Naproxen	7	6
Kolanuts	8	6
Oxaproxin	8	6
Ketovolac	2	2

3.4 Management and drug procurement patterns

In terms of recommended therapies, 93%, 86% and 79% respectively were placed on Antibiotics, PPIs and Antacids. Combination therapies largely involved PPI +Antacid + Antibiotic (48%) and PPI + Sucralfate + Antibiotic (29%); 14% were using PPI + Antacid + Antibiotic + Herbal.

In terms of drug procurement sources, majority (87%) utilized Hospitals and Community Pharmacies; only 1% patronized Open Markets, Hawkers and Supermarkets.

Regarding Additional therapies, nearly all respondents (93%) took analgesics; 64% took Anti-emetics.

On self-reported effectiveness of therapy, 71% of respondents rated their therapy as High; 7% rated it as not effective. See Table 3.

3.5 Counseling practices

All respondents were placed on special diet; majority were counseled to avoid Milk (93%), Alcohol (86%), Spicy Foods (79%) and Chocolate/Coffee (71%)(Table 4).

3.6 Side effects and compliance correlations

Majority (95%) of claimed to experience some form of Side-effects; frequencies of such side-effects include Diarrhea (67%), Abdominal Pain (49%) and Headache (25%). Majority (43%) of claimed the side-effects sometimes affected how regularly they took their drugs.

Regarding adherence to specific instructions, 48%, 63% and 91% respectively often adhered to instructions to avoid Aspirin, Spicy foods and Alcohol; 76% of respondents always adhered to instructions to avoid smoking. (Table 5).

4 Discussions

4.1 Demographic data of respondents

Among the initial total respondents,a total of 126 respondents out of 450 were identified as PUD patients making a PUD prevalence of 28%.Majority were females, undergraduates, Christians and single.

4.2 Patterns of prevalence of PUD among respondents

In this study, DU had a higher prevalence than GU in a ratio of 1.5:1. This closely tallies with two studies that reported the ratios of 1.55:1[8] and 1.2:1[9] but slightly lower than 3.8:1 as reported by other researchers[10]. Thus, globally, it would appear that the trend of prevalence is higher for DU. It is reported that both DU and GU differ in their pathogenesis, clinical presentation and management strategies[11].

The prevalence of GU was higher than DU among Staff respondents; the ratio of GU to DU in this population was 2.8: 1. This is not coming as a surprise as we expect to have more elderly respondents among this population. Conversely, this

study revealed a higher prevalence of DU among the Students (DU to GU ratio of 3.3: 1) of lower age-group. This further supports the claim of higher prevalence of GU among the elderly[12]. Indeed, a study reported that DU is ten times more common than GU in young patients[13].

Table 3: PUD therapy and procurement practices

Variables		Frequency	%
Recommended Therapy	Antibiotics	117	93
	PPIs	108	86
	Antacids	99	79
	Sucralfate	36	29
	Herbal medications	18	14
Combination Therapy	PPI + Antacid + Antibiotic	61	48
	PPI + Sucralfate + Antibiotic	37	29
	PPI + Antacid + Antibiotic + Herbal	18	14
	Antacid + Antibiotic	11	9
Additional Therapy	Analgesics	117	93
	Anti-emetics	81	64
Self-reported Therapy	High	90	71
Effectiveness	Moderate	18	14
	Low	9	7
	Not Effective	9	7
Procurement Sources	Hospital	100	79
	Community Pharmacy	11	9
	Patent Medicine Store	8	6
	Open Market	1	0.8
	Itinerant Hawkers	1	0.8
	Supermarkets	1	0.8
Procurement Sources	Hospital + Community Pharmacy	110	87
	Community Pharmacy + Patent Medicine Store	15	12
	Open Markets + Hawkers + Supermarkets	13	1

Regarding gender differentials, this study showed that GU was more prevalent in males than DU (GU to DU ratio of 1.3: 1). Conversely, DU was more prevalent among the females (DU to GU ratio of 1.3:1). In essence, this study showed that GU had a higher prevalence among the Males whereas DU had a higher prevalence among the Females. Males are supposedly involved in greater and more vigorous physical activities and may be predisposed to consuming NSAIDs as pain relievers than their female counterparts. Hence, there is the tendency for males to develop more of GU than the females. Alternatively, the population may consist of older males.

Regarding Age, there was a higher prevalence of DU among respondents in the 16 -35 yrs age group (Ratio of DU to GU was 3.5: 1). Conversely, there was a higher prevalence of GU among respondents older than 35 years (GU to DU ratio was 3.3: 1). These data support the literature that GU is more prevalent among the elderly[12,13].

4.3 Risk factor assessment

In this population, the greatest risk factors identified were consumption of NSAIDs, Tobacco and Alcohol.

Tobacco, Alcohol and NSAIDS are known risk factors for the development and maintenance of PUD in general[4, 14,15].

Table 4: Types of counsel received by respondents

Physician Counsel	Frequency	%
Placed on special diet	126	100
Avoid milk	117	93
Avoid Alcohol	108	86
Avoid Spicy foods	99	79
Avoid Chocolate / coffee	90	71
Avoid ice-cream	81	64
Avoid cheese	63	50

The literature identified other risk factors to include anticoagulants, corticosteroids, diet (Spicy Food), H. Pylori, stress, past history of PUD, genetics and gender. Further, excess acid production from tumors of the acid producing cells of the stomach (gastrinomas) has been identified as a cause of PUD.

Smoking is considered a risk factor because it is said to elevate the risk of ulcers and impairs the healing process. Alcohol consumption is said to cause similar effects[16].

In this study, more than two-third of respondents took Tea/Coffee. These contain Caffeine and other products, which can make it difficult to differentiate effects of caffeine per se from other compounds[17,18].

Further, about a third of the respondents took energy drinks which are thought to contain 70-120 mg Caffeine per 330 ml[18].

Most studies have focused on Coffee and not Caffeine per se. The position is canvassed that there is no apparent link between gastro-intestinal disorders / complaints and consumption of coffee[19,20].

In this study also, about a third of the respondents took milk drinks.The role of milk in the pathogenesis and prognosis of PUD has long been controversial. Most studies indicate that milk may reduce the pains of DU, has no beneficial effects on ulcer healing process and may actually increase acid production and also reduce the healing rate[21,22].

Milk products like Yoghourt, fermented and unfermented milk are thought to be loaded with probiotics that encourage healthy digestion and soothe irritated ulcers by replacing harmful bacteria in the gastrointestinal tract with healthy bacteria[23].

About half of respondents consumed carbonated drinks and fruit juices. These substances often contain high amounts of citric acid, a known risk factor for hyperacidity and indigestion. These and similar products like lime, lemon, pineapple, jam and jellies are, therefore, better avoided especially by PUD patients[24]

About a third of respondents took herbal medicines. Most herbal formulations are very rich in anti-oxidants and have antimicrobial, anti-inflammatory, anti-rheumatic and anticancer activities in addition to their gastro-protective and anti-ulcer activities[25,26]. These effects may underlie the beneficial effects users experience.

4.4 Management and drug procurement patterns

Over past several years, the major cause of PUD was assumed to be excessive acid production, which informed the use of agents that neutralized and / or inhibited acid secretion in the stomach. This concept has since changed following the identification of *H. pylori* as a primary cause of PUD in the majority of patients (70 – 90%). Numerous gastro-intestinal disorders have been linked to HP infection worldwide[27,28]. Notable among these is its major pathophysiologic role in gastric cancer[29,30]. Thus, HP eradication has since become the main thrust in the management of peptic ulcer disease and other gastro-duodenal disorders[31,32].Studies have since shown that HP eradication leads to reduction in the severity of gastritis and PUD recurrence rate[33,34].In the last decades, the standard 3-drug regimen (amoxicillin, clarithromycin, and metronidazole)has been widely used in many countries as a first step regimen for the purpose of eradicating HP[32,35,36].The recommended first-line treatment for HP is the combination of a PPI with two antimicrobial agents – clarithromycin and amoxycillin or metronidazole; often referred to as the standard triple therapy[37].

In this study, over 90% of drugs prescribed were antibiotics. This is in recognition of the cardinal strategy to eradicate *H Pylori*. Further, over 80% and 79% of drugs prescribed were PPIs and Antacids, respectively. Only about a third of prescribed drugs were Sucralfate. The latter is an effective alternative to Antacids in PUD management.

In this study, the preponderant combination therapy utilized was PPI + Antacid + Antibiotic. This conforms to the focus and objectives of PUD management. About a third of combination therapies involved PPI + Sucralfate + Antibiotics.

In this study, about a tenth of combination therapies involved 2 drug combinations of Antacids + Antibiotics.

Further, in this study, a little over one-tenth of respondents used Herbal Medicines in addition to PPI, Antacid and Antibiotics.

Spices and herbal remedies have been used since ancient times to treat a variety of disorders. It has been experimentally demonstrated that spices, herbs, and their extracts possess antimicrobial, anti-inflammatory, antirheumatic, lipid-lowering, hepatoprotective, nephroprotective, antimutagenic and anticancer activities, besides their gastroprotective, anti-ulcer

activities. They have been demonstrated to have anti-*Helicobacter pylori* effects and mechanisms regulated by nitric oxide, prostaglandins, non-protein sulfhydryl molecules and epidermal growth factor expression. Accordingly, their consumption may, therefore attenuate and help prevent peptic ulcer disease[25,26].

Table 5: Side effects and compliance to instructions

Item		Frequency	Percentage
Do you experience side -effect?	Yes	120	95
	No	6	5
If Yes What type?	Diarrhea	84	67
	Headache	31	25
	Abdominal pain	62	49
Do the side effects affect how regularly you take your drugs?	Always	42	33
	Sometimes	54	43
	Never	30	24
Do you take your drugs as recommended?	Always	36	28
	Sometimes	50	40
	Never	40	32
How do you keep to instructions given to you concerning?			
Avoidance of spicy foods	Always	44	35
	Often	80	63
	Never	2	2
Avoidance of drugs like Aspirin	Always	56	44
	Often	60	48
	Never	10	8
Avoidance of alcohol?	Always	2	2
	Often	115	91
	Never	9	7
Avoidance of smoking	Always	96	76
	Often	20	16
	Never	10	8

Regarding additional therapies, Analgesics and Anti-emetics were more commonly used.

Epigastric pain, Nausea and vomiting are common symptoms of PUD and may have been responsible for the use of these drugs.

Regarding self-reported effectiveness of therapies, over 70% of respondents rated their therapies as high; less than one-tenth rated their therapies as in-effective.

The high level of effectiveness reported in this study is in conformity with the appropriateness of the combination therapies used in the management of their PUD.

In terms of drug procurement practices, a large majority of respondents sourced their drug products from the most appropriate sources of quality products -Hospital and Community Pharmacies; only a mere 1% of them patronized

open markets, hawkers and supermarkets. This is highly commendable.

4.5 Counseling practices

There are self-care practices that PUD patients should be aware of and engage in order to adequately promote the ulcer healing process. These include adequate adherence to prescribed medications, appropriate self-medication and avoidance of aggravating risk factors like smoking, alcohol, and dietary restrictions where necessary[38,39].

In this study, over 70% of respondents were counseled to avoid milk, spicy foods, alcohol and Chocolate/Coffee. All respondents were placed under some form of special diet.

It is generally recommended that the consumption of healthy diet is of immense advantage to the intestinal tract and one's health in general. To this end, eating a diet rich in fruits, vegetables and fiber is recommended[40,41].

Generally, since the introduction of H_2-inhibitors, it has become unnecessary to introduce special diets for patients with peptic ulcer. The dietary focus should be the avoidance of unnecessary upsurges of gastric acid secretion and direct gastric mucosa irritation[42].

Generally, PUD patients should eat a healthy balanced diet. It really serves no purpose to eat more often or increase the amount of milk and dairy products taken; it may be counter-productive. PUD patients are commonly advised to:

- Avoid foods and drinks that cause discomfort like alcohol, coffee, caffeinated soda, fatty foods, chocolate, and spicy foods.
- Avoid spicy foods, such as chilies, hot peppers and hot sauce as they can increase stomach acid, trigger acid reflux and worsen symptoms associated with stomach ulcers.
- Avoid eating late night snacks.
- Quit Tobacco as it slows the healing process and increases recurrence
- Reduce stress level and learn ways to better manage stress.
- Avoid NSAID such as aspirin, ibuprofen, or naproxen. If, required, to take Paracetamol to relieve pain.
- Take all medicines with plenty of water[22,43,44].

4.6 Side effects and compliance correlations

In this study, nearly all respondents claimed to experience side-effects, which included diarrhea, abdominal pain and headache. These are well-known side-effects and did not come as a surprise. Individual tolerance levels may, however, differ.

Important to note that a significant number (43%) of respondents claimed that the side-effects they experienced sometimes affected how regularly they took their drugs. This situation is quite worrisome as it may result into delayed ulcer healing consequent upon inadequate adherence and, possibly, early emergence of resistance. Appropriate therapeutic counseling is needed for such patients. Alternative drugs may be required.

Regarding adherence to specific instructions, this study revealed variable responses. Whereas, nearly all respondents *often* adhered to instructions to avoid alcohol, only about half *often* adhered to instructions to avoid aspirin; majority (63%) often abided by instructions to avoid spicy foods. Significantly, majority (76%) of respondents *always* adhered to instructions to avoid Smoking.

Total adherence to avoidance of aggravating factors is needed to promote ulcer healing and / or prevention of worsening of the condition.

5 Conclusion

In this study, DU had a higher prevalence than GU in a ratio of 1.5:1. The ratio of DU to GU differs with status, gender and age. In this population, the greatest risk factors identified were consumption of NSAIDs, tobacco and alcohol. The preponderant combination therapy utilized was PPI + Antacid + Antibiotic. Majority of respondents rated their therapies as high effective.

Majority were counseled to avoid milk, spicy foods, alcohol and chocolate/coffee. All respondents were placed on some form of special diet; nearly all respondents claimed to experience side-effects which sometimes affected how regularly they took their drugs; nearly all respondents *often* adhered to instructions to avoid alcohol, and majority always adhered to instructions to avoid smoking.

There is need for strategic health education on PUD risk factors and self-care practices.

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7 Conflict of interest

None

8 Authors' contribution

EJF: Concept, Data analysis, Manuscript review, Final draft manuscript

AUD: Concept, Data Analysis, Manuscript review

OOC: Data collection, Data analysis, Draft manuscript

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