



Spectrum of Adult Digestive Diseases Presenting at a Suburban Tertiary Health Facility in Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author ACJ designed the study, wrote the protocol, performed the statistical analysis and wrote the first draft of the manuscript. Author OOA participated in the design of the study and reviewed the protocol and the manuscript. Authors SOO, AAA and OAA participated in the design of the study. All authors read and approved the final manuscript.

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ABSTRACT

Background: Diseases of the digestive system vary in type and distribution worldwide. There is presently no comprehensive audit of the types of digestive diseases presenting at any particular tertiary health facility in Nigeria. We present an audit of the digestive diseases presenting over a period of four years (2012 to 2015) at the LAUTECH Teaching Hospital, Ogbomoso, Nigeria, a suburban healthcare facility.

Methodology: Outpatient and inpatient digestive disease cases and relevant information were

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extracted from the medical and surgical gastroenterology clinics' and wards' registers. Patients' case files were retrieved from the medical records department and consulted for clarification when necessary. Diagnoses were categorized according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision, 2016 version (ICD-10) codes for digestive diseases. Data were stratified into outpatient cases, inpatient (admissions) cases, in-hospital mortalities and digestive cancers.

Results: There was a total of 799 gastrointestinal clinic cases. Chronic hepatitis B was the commonest cause of clinic visit (28.8%). Appendicitis was the most frequent cause of admission (16.0%) of the 682 gastrointestinal admissions. There was a total of 86 in-hospital digestive disease mortalities of which hepatocellular carcinoma was the leading cause at 22.1%. Of the 188 cases of digestive cancers identified; hepatocellular carcinoma had the highest frequency (43.4%) and the highest mortality (59.4%).

Conclusion: A very important finding from this study is fact that chronic hepatitis B and its attendant sequelae (liver cirrhosis and hepatocellular carcinoma) constituted a substantial proportion of the digestive diseases among our study population.

Keywords: Audit; digestive diseases; digestive cancers; chronic Hepatitis B; Nigeria.

1. INTRODUCTION

Diseases of the digestive system vary in type and distribution worldwide. These include a wide range of disorders affecting the oropharynx and alimentary canal, liver and biliary system, and pancreas [1,2]. The etiologies of these diseases are diverse in nature. They include genetic and congenital anomalies, autoimmune disorders, acute and chronic infections, cancer, adverse effects of drugs and toxins, and unknown causes in many cases [1]. The impact of these diseases on the quality of life of patients ranges from the discomfort of a fleeting diarrheal disease leading to a brief withdrawal from daily activities, to prolonged and incapacitating illnesses needing continuous medical care, or, to dreaded cancerous conditions on several occasions [1,2].

Whereas, many developed countries of the world have well-established audit systems for gathering comprehensive data relating to the prevalence, risk factors and the socio-economic burden of diseases afflicting their people [1], this cannot be said of many developing countries.

There are a few publications relating to the pattern of presentation of a few specific digestive diseases or groups of diseases affecting particular part(s) of the digestive system by authors from different parts of Nigeria [3–5], but there is no comprehensive audit of the types of digestive diseases presenting at a particular tertiary health institution in any part of the country at present.

Audit of disease presentation in healthcare facilities is a valuable exercise that helps to highlight the prevailing disease pattern in the

particular community and the catchment area of the health facility in general. If done regularly, it could help to detect changes in the temporal profile of disease incidence in the locality. The information provided by this type of evaluation is vital in formulating strategic action plans for future effective healthcare delivery by helping to recognize areas of need that have hitherto been neglected and specific areas that need to be prioritized. Such information would indeed be of immense help to the institution, the government and relevant non-governmental organizations in attending to the healthcare needs of the community.

In the present study, an appraisal of the spectrum of digestive diseases presenting over a period of four years (January 2012 to December 2015) at the Ladoke Akintola University of Technology (LAUTECH) Teaching Hospital, Ogbomoso, Oyo State, Nigeria, was made using the International Statistical Classification of Diseases and Related Health Problems 10th Revision, 2016 version (ICD-10) codes for digestive diseases [6]. The data and information generated are to serve as an objective reference for future research activities in this regard.

2. MATERIALS AND METHODS

2.1 Study Setting

The study was conducted at the LAUTECH Teaching Hospital, Ogbomoso, Oyo State, Nigeria, a suburban healthcare facility. The LAUTECH Teaching Hospital, Ogbomoso, is a relatively new tertiary healthcare facility that provides outpatient, inpatient and 24-hour emergency services. It serves as a referral

center to primary and secondary healthcare facilities in Ogbomoso and neighboring communities in Oyo state and the bordering states of Osun and Kwara, Nigeria.

2.2 General Rules

1. This was a retrospective study involving male and female patients that attended the adult medical and surgical gastroenterology clinics and adult digestive diseases admissions to the medical and surgical wards from January 2012 to December 2015. Pediatric cases were not included.
2. Diagnoses were made clinically in all cases. Investigative procedures such as gastrointestinal endoscopy, radiological investigations, liver biopsy, viral serological tests, liver biochemistry tests, histopathologic tests etc. were ordered as appropriate to confirm diagnosis.
3. Diagnoses were categorized according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision, 2016 version (ICD-10) codes for digestive diseases. Associated diagnoses were combined when necessary to create single clinically meaningful entities.

2.3 Outpatient Digestive Disease Cases

Outpatient digestive disease cases were extracted from the medical and surgical gastroenterology clinics' registers. Patient's identifier, date at first presentation, age, gender and diagnosis were documented by means of data extraction forms. Patients' case files were retrieved from the medical records department and consulted for clarification when necessary. The primary diagnosis or the principal reason for hospital visit was used in our analysis. All cases were recorded once. A rank order list was created for the diagnoses. Temporal analyses of the three most common gastrointestinal disease diagnoses were performed to determine the trend of their presentation between 2012 and 2015.

2.4 Digestive Disease Admissions

Inpatient digestive disease admissions from January 2012 to December 2015 were extracted from the medical and surgical wards' registers. Identifier, age, diagnosis, date of admission and date of discharge were recorded for each admission. For patients who had more than one

admission, each of the admissions was recorded separately. A rank order list of all admissions was created. Temporal analyses of the 3 most common gastrointestinal disease admissions were performed to determine their trend between 2012 and 2015.

2.5 In-hospital Digestive Disease Mortality

Causes of in-hospital digestive disease deaths were derived from the inpatient registers. Case files were retrieved for clarification when required. Mortality was tabulated and stratified by age and gender.

2.6 Digestive Cancers

Digestive cancer cases were extracted from the clinic and inpatient registers. Data was checked for duplicity of entry and duplicate cases were deleted. Cancer frequency was stratified by age and gender. The male/female ratio, mean age and age range for each category of cancers were calculated. A rank order list was created for cancer frequency.

2.7 Data Analysis

Data analysis was done with the IBM- Statistical Package for Social Sciences (SPSS), version 20. Continuous variables were presented as means \pm SD, range and proportion as appropriate. Categorical variables were expressed as frequencies, percentages and ratios.

3. RESULTS

3.1 Outpatient Cases

The demographic characteristics of the patients that attended the medical and surgical gastroenterology clinics of the hospital from January 2012 to December 2015 are depicted in Table 1. A total of 799 patients attended the clinics in all. The mean age of the patients was 38.95 ± 18.39 years. The age range was 15 to 100 years. Majority of the patients (66.0%) belonged to the young age group (≤ 44 years), 21.0% belonged to the middle age (45 -64 years) while the remaining (13.0%) belonged to the old age group (≥ 65 years). More than half of the patients were males (59.7%) with the female making up the remaining (40.3%).

The gastrointestinal diagnoses at the outpatient clinics in the years under review are listed in Tables 2a and 2b. Chronic hepatitis B virus

infection was the most frequent diagnosis which accounted for 28.8% of all cases. Dyspepsia (chronic gastritis, peptic ulcer disease and its complications) and appendicitis both occupied the second position at 12.3% frequency each. Benign ano-rectal diseases (hemorrhoid, anal fissure and fistula etc.), hepatocellular carcinoma, liver cirrhosis, colorectal cancer, pancreatic cancer, intestinal obstruction, gall bladder diseases, gastric cancer and several other gastrointestinal diseases followed in frequency.

Table 1. Age and sex distributions of gastroenterology clinics' attendees at LAUTECH Teaching Hospital, Ogbomosho, from 2012 to 2015

| Age group | Male (%) | Female (%) | Total |
|------------------------|---------------|---------------|-------------|
| ≤ 44 [*] | 305 (63.9) | 222 (68.9) | 527 (66.0) |
| 45 - 64 [†] | 114 (23.9) | 54 (16.8) | 168 (21.0) |
| ≥ 65 [‡] | 58 (12.2) | 46 (14.3) | 104 (13.0) |
| Total | 447 (59.7) | 312 (40.3) | 799 (100.0) |
| Mean age in years ± SD | 39.84 ± 18.27 | 37.65 ± 18.51 | 38.95±18.39 |

^{*}Young age, [†]Middle age, [‡]Old age

Table 2a. Outpatient clinics digestive diseases at LAUTECH Teaching Hospital, Ogbomosho from 2012 to 2015 (n=799)

| Rank | Diagnosis | Frequency | ICD 10 Codes [*] |
|------|---|------------|---|
| 1 | Chronic Hepatitis B [†] | 230 (28.8) | B18.1 |
| 2 | Dyspepsia [‡] | 98 (12.3) | k25, k25.1 k26, k26.1, k29, k29.0, k29.1, k29.3, k29.4, k29.5, k29.7, k29.8, k29.9, k57.1 |
| 3 | Appendicitis | 98 (12.3) | K35.3, K35.8, K36, K37 |
| 4 | Benign anorectal lesions [§] | 59 (7.4) | K60.2, K60.3, K61.2, K62.6, K62.3, K64.9 |
| 5 | Hepatocellular carcinoma | 56 (7.0) | C22.0 |
| 6 | Liver Cirrhosis | 50 (6.3) | K70.3, K74.6, |
| 7 | Hernias | 48 (6.0) | K40.0, K40.2, K40.3, K40.9, K42.0, K42.9, K43.2, K43.9 |
| 8 | Colorectal cancer | 20 (2.5) | C18.0, C18.9, C20 |
| 9 | Pancreatic Cancer | 18 (2.3) | C25.0, C25.1, C25.9 |
| 10 | Intestinal obstruction and paralytic Ileus | 16 (2.0) | K56.0, K56.1, K56.2, K56.5, K56.6 |
| 11 | Cholecystitis and cholelithiasis | 14 (1.8) | K80.0, K80.2, K81.9 |
| 12 | Gastric cancer | 14 (1.8) | C16.9 |
| 13 | Acute diarrhea and bacterial food poisoning | 11 (1.4) | A01, A03.9, A04.9, A05.9, A06.0 |
| 14 | Acute viral hepatitis | 11 (1.4) | B17.9 |
| 15 | GERD | 7 (0.9) | K21.0, K21.9 |
| 16 | Abdominal pain | 6 (0.8) | R10.0, R10.4 |
| 17 | Ill-defined intra-abdominal cancers | 6 (0.8) | C76.2 |
| 18 | Enterocutaneous fistula | 4 (0.5) | K61.2, K62.4, K62.6, K62.3 |
| 19 | Gastrointestinal bleeding | 4 (0.5) | K92.0, K92.1, K92.2 |
| 20 | Typhoid fever/typhoid perforation | 4 (0.5) | A01.0 |

^{*}International Statistical Classification of Diseases and Related Health Problems 10th Revision Codes

[†]One case of chronic hepatitis C confection, [‡]Includes chronic gastritis, peptic ulcer disease and its complication (perforation and gastric outlet obstruction), [§]Includes hemorrhoids, anal fissure, anal fistula, anorectal abscess, anal tag, rectal prolapse, anal ulcer, ^{||}Includes abdominal malignancies that could not be properly evaluated either due to clinic attendance default or financial constraint

Table 2b. Outpatient clinics digestive diseases at LAUTECH Teaching Hospital, Ogbomosho from 2012 to 2015 (n=799)

| Rank | Diagnosis | Frequency | ICD 10 Codes* |
|------|--------------------------------------|-----------|---------------|
| 21 | Chronic diarrhea | 3 (0.4) | A09.9 |
| 22 | Constipation | 3 (0.4) | K59.0 |
| 23 | Mechanical abdominal injury | 3 (0.4) | W64 |
| 26 | Abdominal tuberculosis | 2 (0.3) | A18.3 |
| 25 | Postoperative intra-abdominal sepsis | 2 (0.3) | K91.9 |
| 26 | Liver abscess | 2 (0.3) | K75.0, K77.0 |
| 27 | Pseudocyst of the pancreas | 2 (0.3) | K86.3 |
| 28 | Chronic Hepatitis, unknown cause | 1 (0.1) | K73.9 |
| 29 | Diverticulitis | 1 (0.1) | K57.9 |
| 30 | Esophageal cancer | 1 (0.1) | C15.9 |
| 31 | Esophageal candidiasis | 1 (0.1) | B37.8 |
| 32 | Fecal incontinence | 1 (0.1) | R15 |
| 33 | Hepatic hemangioma | 1 (0.1) | D18.0 |
| 34 | Irritable bowel syndrome | 1 (0.1) | K58.0 |
| 35 | Tropical splenomegaly syndrome | 1 (0.1) | K92.9 |

International Statistical Classification of Diseases and Related Health Problems 10th Revision Codes

The temporal analyses of the three most frequent outpatient diseases are illustrated in Fig. 1. These include chronic hepatitis B, dyspepsia and appendicitis which altogether made up more than half (53.4%) of all the diagnoses within the period under consideration. All the diseases generally increased in frequency in 2013 as compared to 2012. All the three conditions reduced in frequency in 2014 as compared to 2013 before rising again in 2015.

3.2 Admissions

Table 3 summarizes the demographic features of the digestive disease admissions in the years under review. The total admissions from January 2012 to December 2015 were 682. The Mean age was 41.77 ±19.02 years. The age range was 15 to 100 years. More than half of the

patients (60.3%) belonged to the young age group, 23.3% belonged to the middle age while the remaining (16.4%) belonged to the old age group. There were more male admissions (56.3%) as compared to female admissions (43.7%).

The gastrointestinal hospital admissions are outlined in Table 4a and 4b. Appendicitis was the most frequent cause of admission which accounted for 16.0% of all. Dyspepsia (chronic gastritis, peptic ulcer disease and its complications) occupied the second position at 15.0%. Acute diarrhea and bacterial food poisoning, decompensated liver cirrhosis, gastrointestinal bleeding, intestinal obstruction, hepatocellular carcinoma and several other gastrointestinal disorders followed in frequency.

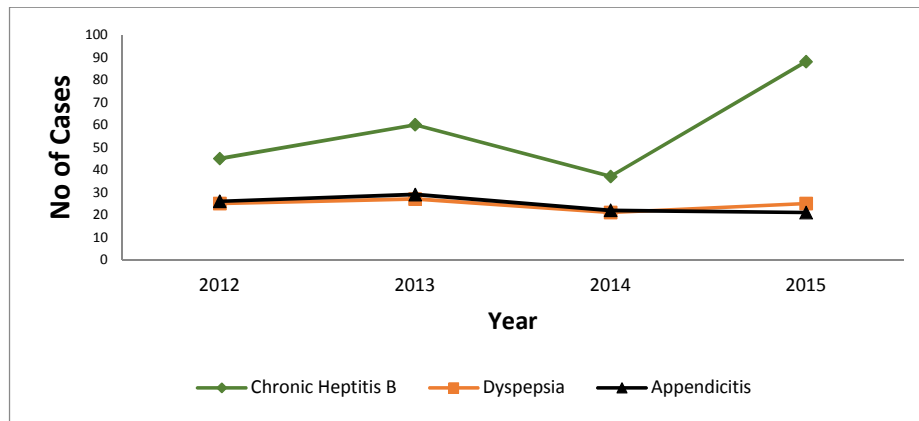


Fig. 1. Temporal analyses of the three most frequent outpatient digestive disease

Table 3. Age and sex distributions of digestive disease admission at the LAUTECH Teaching Hospital, Ogbomoso, from 2012 to 2015

| Age Group | Male (%) | Female (%) | Total (%) |
|------------------------|-------------|---------------|--------------|
| ≤ 44 | 215 (56.0) | 196 (65.8) | 411 (60.3) |
| 45 - 64 † | 103 (26.8) | 56 (18.8) | 159 (23.3) |
| ≥ 65 ‡ | 66 (17.2) | 46 (15.4) | 112 (16.4) |
| Total | 384 (56.3) | 298(43.7) | 682 (100.0) |
| Mean age in years ± SD | 43.31±18.65 | 39.80 ± 19.34 | 41.77 ±19.02 |

[†]Young age, [‡]Middle age, [‡]Old age

The temporal analyses of the three most frequent admissions are illustrated in Fig. 2. These include appendicitis, dyspepsia and diarrhea, which altogether made up about 43% (293 cases) of all the admissions within the period under consideration. All the diseases generally declined in frequency in 2013 as compared to 2012. Appendicitis maintained the same frequency in 2014 before rising in 2015. Both dyspepsia and acute diarrhea diseases rose in frequency in 2014 and maintain the rise till 2015.

There was a total of 86 mortalities in the years under review as shown on Table 5; 61.6% of these were male while 38.4% were females. Hepatocellular carcinoma was the leading cause of mortality at 22.1%. Decompensated liver cirrhosis occupied the second position at

19.81%. Intestinal obstruction, colorectal cancer, upper gastrointestinal bleeding, perforated peptic ulcer disease, typhoid perforation and other gastrointestinal disorders followed sequentially in frequency.

3.3 Digestive Cancers

The gender and age distribution of gastrointestinal cancers are illustrated by Tables 6 and 7. There were a total of 188 digestive cancer cases, involving 115 (61.4%) males and 73 (38.6%) females. Hepatocellular carcinoma was the commonest cancer with a frequency of 43.4%. Colorectal cancer occupied the second position at a frequency of 20.6%. Pancreatic carcinoma, gastric cancer, ill-defined abdominal

Table 4a. Gastrointestinal diseases' admissions at LAUTECH Teaching Hospital Ogbomoso from 2012 to 2015 (n= 682)

| Rank | Diagnosis | Frequency | ICD 10 Codes* |
|------|--|------------|---|
| 1 | Appendicitis | 109 (16.0) | K35.3, K35.8, K36, K37 |
| 2 | Dyspepsia [†] | 102 (15.0) | K25.1, K26.1, K29.0, K29.1, K29.3, K29.4, K29.5, K29.7, K29.8, K29.9, K57.1 |
| 3 | Acute diarrhea and bacterial food poisoning | 82 (12.0) | A01, A03.9, A04.9, A05.9, A06.0 |
| 4 | Decompensated liver cirrhosis | 61 (8.9)) | K70.3, K74.6 |
| 5 | Hernias | 54 (7.9) | K40.0, K40.2, K40.3, K40.9, K42.0, K42.9, K43.3, K43.9 |
| 6 | Gastrointestinal bleeding | 52 (7.6) | K92.0, K92.1, K92.2 |
| 7 | Intestinal Obstruction and paralytic ileus | 48 (7.0) | K56.0, K56.1, K56.2, K56.5, K56.6 |
| 8 | Hepatocellular carcinoma | 43 (6.3) | C22.0 |
| 9 | Pancreatic Cancer | 22 (3.2) | C25.0, C25.1, C25.9 |
| 10 | Colorectal cancer | 21 (3.1) | C18.0, C18.9, C18.4, C20 |
| 11 | Typhoid fever and perforation | 19 (2.8) | A01.0, K63.1 |
| 12 | Abdominal pain | 11 (1.6) | R10.0, R10.4 |
| 13 | Stomach cancer | 9 (1.3) | C16.9 |
| 14 | Acute viral hepatitis | 8 (1.2) | B17.9, B16.9 |
| 15 | Ill-defined intra-abdominal cancers [‡] | 7 (1.0) | C76.2 |

International Statistical Classification of Diseases and Related Health Problems 10th Revision Codes

[†]Includes chronic gastritis, peptic ulcer disease and its complication (perforation and gastric outlet obstruction)

[‡] Includes abdominal malignancies that could not be properly evaluated either due to clinic attendance default or financial constraint

Table 4b. Gastrointestinal diseases' admissions at LAUTECH Teaching Hospital, Ogbomoso from 2012 to 2015 (n= 682)

| Rank | Diagnosis | Frequency | ICD 10 Codes* |
|------|--|-----------|----------------------|
| 16 | Benign anorectal diseases [†] | 6 (0.9) | K61.2, K64.9 |
| 17 | Cholecystitis and cholelithiasis | 5 (0.7) | K80.0, K80.2, K81.9, |
| 18 | Mechanical abdominal injuries | 5 (0.7) | W34, W49 |
| 19 | Esophageal cancer | 4 (0.6) | C15.9 |
| 20 | Amoebiasis | 3 (0.4) | A06.0, A06.4† |
| 21 | Pancreatitis | 3 (0.4) | K85.9, K86.1 |
| 22 | Enterocutaneous fistula | 2 (0.3) | K63.2 |
| 23 | Postoperative intra-abdominal sepsis | 2 (0.3) | K91.9 |
| 24 | Constipation | 1 (0.1) | K59.0 |
| 25 | Esophageal stricture | 1 (0.1) | K22.2 |
| 26 | Gastroesophageal Reflux disease | 1 (0.1) | K21.9 |
| 27 | Periampullary carcinoma | 1 (0.1) | C24.1 |

*International Statistical Classification of Diseases and Related Health Problems 10th Revision Codes

[†]Includes hemorrhoids and anorectal abscess

cancers and esophageal cancers followed sequentially in frequency. The group that was tagged “ill-defined abdominal cancers” consisted of abdominal malignancies that did not have definitive diagnoses either because patients defaulted or patients could not have the required diagnostic evaluation because of financial difficulty. In regard to cancer distribution by age, hepatocellular carcinoma was commoner among the young age group (≤ 44years) as compared to

the older age groups (≥ 45 years); whereas colorectal cancer, pancreatic cancer, and gastric cancer were more frequent among the older age groups. Cancer deaths represent 37.3% of the total in-hospital digestive disease mortality (Table 5). Hepatocellular carcinoma had the highest mortality rate (59.4%) among all the five cancers that constituted the digestive cancer mortality (Fig. 3).

Table 5. Digestive diseases' mortality by gender and age at LAUTECH Teaching Hospital, Ogbomoso from 2012 to 2015

| Rank | Diagnosis | Male | Female | Total | Mean age ±SD | Age range |
|------|---|-----------|-----------|-----------|--------------|-----------|
| 1 | Hepatocellular carcinoma | 11 (57.9) | 8 (42.1) | 19 (22.1) | 50.58 ±15.86 | 30 – 83 |
| 2 | Decompensated liver cirrhosis | 13 (76.5) | 4 (23.5) | 17 (19.8) | 47.29 ±17.32 | 19 – 80 |
| 3 | Intestinal obstruction | 8 (72.7) | 3 (27.3) | 11 (12.8) | 60.64 ±20.12 | 25 – 90 |
| 4 | Colorectal cancer | 4 (50.0) | 4 (50.0) | 8 (9.3) | 67.88 ±16.86 | 41 – 85 |
| 5 | Upper gastrointestinal bleeding | 2 (33.3) | 4 (66.7) | 6 (7.0) | 60.33 ±15.59 | 30 -72 |
| 6 | Perforated peptic ulcers | 4 (80.0) | 1 (20.0) | 5 (5.8) | 46.80 ±15.01 | 21 - 60 |
| 7 | Typhoid perforation | 3 (80.0) | 2 (20.0) | 5 (5.8) | 34.80 ±9.68 | 25 - 48 |
| 8 | Pancreatic Cancer | 2 (50.0) | 2 (50.0) | 4 (4.7) | 68.75 ±6.24 | |
| 9 | Acute diarrhea and bacterial food poisoning | 0 (0.0) | 3 (100) | 3 (3.5) | 58.67 ±8.08 | 50 – 66 |
| 10 | Appendicitis | 1 (50.0) | 1 (50.0) | 2 (2.3) | 33.00 ±16.97 | 21 – 45 |
| 11 | Enterocutaneous fistula | 1 (100) | 0 (0.0) | 1 (1.2) | 40.00 | 40- |
| 12 | Fulminant hepatic failure | 0 (0.0) | 1 (100) | 1 (1.2) | 80.00 | 80- |
| 13 | Acute abdomen | 1 (100) | 0 (0.0) | 1 (1.2) | 40.00 | 40- |
| 14 | Mechanical abdominal injuries | 1 (100) | 0 (0.0) | 1 (1.2) | 26.00 | 26- |
| 15 | Chronic pancreatitis | 1 (100) | 0 (0.0) | 1 (1.2) | 86.00 | 86- |
| 16 | Periampullary cancer | 1 (100) | 0 (0.0) | 1 (1.2) | 47.00 | 47- |
| | Total | 53 (61.6) | 33 (38.4) | 86 (100) | 53.22 ±18.21 | 19 – 90 |

Table 6. Gender distribution of digestive cancers at LTH*, Ogbomosho from 2012 to 2015

| Diagnosis | Male (%) | Female (%) | Total (%) | M:F Ratio |
|-------------------------------|------------|------------|-------------|-----------|
| Hepatocellular carcinoma | 47 (56.6) | 36 (43.4) | 84 (44.1) | 1.3:1 |
| Colorectal cancer | 27 (69.2) | 12 (30.8) | 39 (20.7) | 4.5:2 |
| Pancreatic Cancer | 16 (55.2) | 13 (44.8) | 29 (15.4) | 1.2:1 |
| Gastric cancer | 14 (73.7) | 5 (26.3) | 19 (10.1) | 2.8:1 |
| Ill-defined abdominal cancers | 7 (58.3) | 5 (41.7) | 12 (6.4) | 1.4:1 |
| Esophageal cancer | 3 (60.0) | 2 (40.0) | 5 (2.7) | 1.5:1 |
| Peri-ampullary carcinoma | 1 (100.0) | 0 (0.0) | 1 (0.5) | |
| Total | 116 (61.4) | 73 (38.6) | 188 (100.0) | 1.6:1 |

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†Includes abdominal malignancies that could not be properly evaluated either due to clinic attendance default or financial constraint

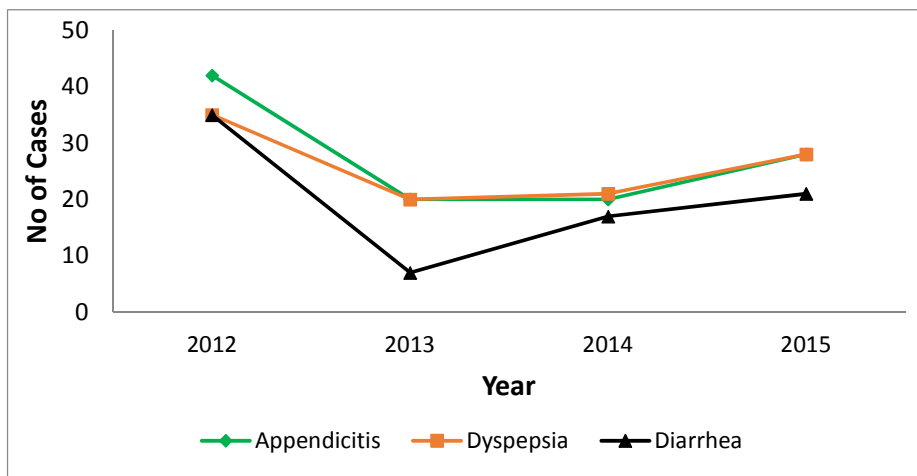


Fig. 2. Temporal analyses of three most frequent digestive disease admissions

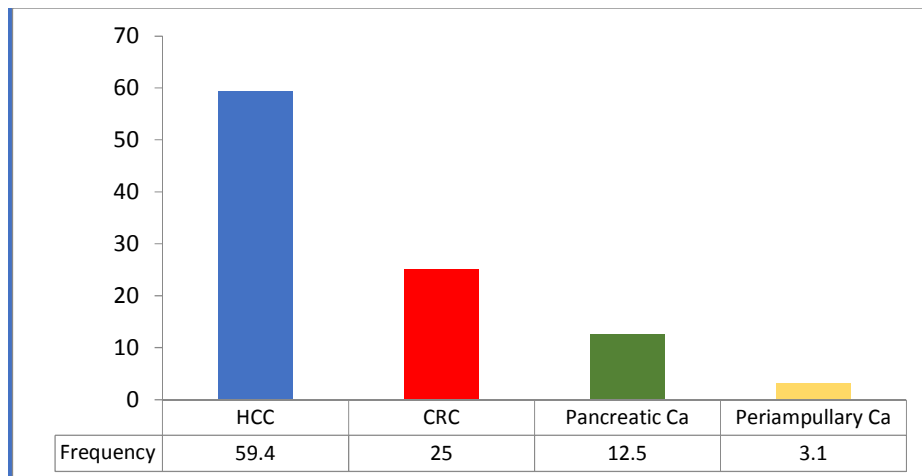


Fig. 3. In-hospital digestive cancer mortalities (%)

HCC = Hepatocellular Carcinoma, CRC = Colorectal cancer, Ca = Cancer

Table 7. Age distribution of digestive cancers at LTH*, Ogbomoso from 2012 to 2015

| Diagnosis | Age group | | | Mean age | Age range |
|------------------------------------|-----------|-----------|-----------|--------------|-----------|
| | ≤ 44 (%) | 45 -64(%) | ≥ 65 | | |
| Hepatocellular carcinoma (83) | 35 (42.2) | 26 (31.3) | 22 (26.5) | 50.31 ±18.24 | 17 - 100 |
| Colorectal cancer (39) | 6 (15.4) | 18 (46.2) | 15 (38.5) | 59.54 ±14.48 | 18 - 85 |
| Pancreatic Cancer (29) | 4 (13.8) | 14(48.3) | 11 (37.9) | 57.03 ±13.40 | 19 - 75 |
| Gastric cancer (19) | 2 (10.5) | 12 (63.2) | 5 (26.3) | 61.11 ±14.34 | 39 - 90 |
| Ill-defined abdominal cancers (12) | 7 (58.3) | 3 (25.0) | 2 (16.7) | 45.50 ±17.10 | 23 - 78 |
| Esophageal cancer (5) | 1 (20.0) | 2 (40.0) | 2 (40.0) | 64.00 ±28.15 | 30 - 100 |
| Periampullary carcinoma (1) | 0 (0.0) | 1 (100) | 0 (0.0) | | 47- |
| Total (188) | 56 (29.6) | 76 (40.2) | 57 (30.2) | 54.29 ±17.21 | 17 - 100 |

LAUTECH Teaching Hospital

[†]Includes abdominal malignancies that could not be properly evaluated either due to clinic attendance default or financial constraint

4. DISCUSSION

The pattern of digestive diseases occurrence varies from one region of the world to another depending on nature and nurture. Although, our findings from this study may not be the complete picture of the pattern of digestive diseases in the Nigerian general population because the study was a single hospital based study, there are however very important observations emanating from it.

The first very important observation is the fact that chronic hepatitis B (CHB) was the commonest clinic presentation in the study, constituting about a third of all the outpatient cases. Combining this with liver cirrhosis and hepatocellular carcinoma, which are mostly CHB related in Nigeria [7–10], translates to 44.5% of all the outpatient cases. This provides an insight to the huge burden chronic hepatitis B infection poses to the nation considering that over 80% of the total study population were within the productive age bracket (≤64 years).

It could be deduced from our study that the pattern of digestive diseases occurrence in our locality is completely different from what obtains in the western world. While it has been observed that there was a dramatic shift in the incidence, prevalence and impact of digestive diseases in the western world (just like it has been observed in other system specific diseases) as a result of improved sanitation, food supply, research and healthcare quality, this cannot be confidently asserted in our study population based on our findings [11]. Whereas, gastroesophageal reflux disease is the commonest digestive disease in the western world, [1] CHB infection and its sequelae were the commonest digestive diseases presenting to our center.

Gastroesophageal reflux disease constituted only 0.9% (7 cases) of all the cases that presented during the period under consideration.

Of note is the rarity of cases of inflammatory bowel diseases, irritable bowel syndrome (IBS) and diverticular diseases that are adjudged to be common in the western world [1]. We found no definitive case of inflammatory bowel disease and a single case each of IBS and diverticular disease among all the cases that presented over a period of the four years under consideration. Despite that a community cross-sectional study conducted in Nigeria showed IBS to be relatively common in the community [12], a previous survey of Nigerian physician showed a rarity of hospital diagnosis of IBS [13].

A number of reasons could be responsible for the observed high proportion of CHB and its sequelae among Nigerians with digestive diseases. First, Nigeria belongs to the group of countries that have a high prevalence of HBV infection, with an estimated exposure rate of about 75% [14,15]. A recent meta-analysis of 46 studies yielded a pooled CHB prevalence of 13.6% in Nigeria (95% CI: 11.5% - 15.7%), although there is a divergence of prevalence rates among population groups in the country [16]. With an estimated population of over 180 million people in 2015 [17], this implies that more than 24 million Nigerians presently has CHB infection. Second, important laboratory tests for the assessment and management of CHB and drugs for treating the disease became substantially available in Nigeria in less than a decade ago and these are still beyond the reach of many indigent Nigerians with CHB. Third, unlike patients with HIV/AIDS that are taken care of by a national program at no or little cost in Nigeria, CHB patients still pay out of pocket for

their cost of care. Many of these patients who are indigent often abscond from clinic follow-up because they are unable to afford the high cost of the laboratory tests and drugs required to treat the disease. A study that has been accepted for publication in another journal showed a clinic attendance default rate of 87.4% among CHB without HIV coinfection at the same health facility where this study was conducted [18]. It was observed that 61.8% of the defaulters did so after their first clinic visit. Financial constraints and inadequate knowledge of HBV infection stood out as the major reasons why the defaulters did so. Fourth, HBV vaccine was incorporated into the National Program on Immunization in Nigeria only in 2004 [19]. Vaccine administration in the country is generally fraught with the challenge of cold chain maintenance because of erratic electric power supply. According to a WHO estimate, HBV vaccine coverage at the twenty-fourth hour after birth and the percentage of surviving infants who received the third dose of hepatitis B containing vaccine following the birth dose were 32% and 49% respectively in 2016 [20].

We believe that a national survey of the prevalence of the sequelae of CHB infection (cirrhosis and HCC) is necessary to help bring to light the burden of the disease on Nigeria.

The distribution of the frequencies of outpatient digestive diseases is notably different from the admission frequency distribution. Whereas the five leading diseases noted at the outpatient clinics were chronic hepatitis B, dyspepsia, appendicitis, benign anorectal conditions and hepatocellular; appendicitis, dyspepsia, acute diarrhea diseases, decompensated liver cirrhosis and gastrointestinal bleeding were the leading causes of admission. This difference can be easily explained in that acute or decompensated cases often constitute the bulk of hospital admissions.

Acute pancreatitis, calculus cholecystitis, diverticulitis and noninfectious gastroenteritis/colitis are some of the leading causes of digestive disease admissions in the western world [1], but we found these diseases to be very rare or non-existent among our admissions. Calculus cholecystitis and pancreatitis constituted only 0.8% (5 cases) and 0.5% (3 cases) respectively of the total digestive disease admissions in the years under review. There was no single case of diverticulitis or

noninfectious gastroenteritis/colitis among our admissions.

In regard to digestive diseases mortality, hepatocellular carcinoma, liver cirrhosis, intestinal obstruction, colorectal cancer and upper gastrointestinal bleeding were the five leading causes and this is comparable to what obtains in the western world [1].

Hepatocellular carcinoma was by far the leading digestive cancer in our study making up 42.2% of the total cancer frequency; the next was colorectal cancer at 30.8%. This finding is different from a report from the Ibadan and Abuja population-based cancer registries in Nigeria which showed a higher incidence of colorectal cancer than liver cancer as the leading digestive cancers in their various catchment areas in Nigeria [21]. The report, however, indicated that liver cancer was the leading digestive cancer among the young age group (<45 years).

The strength of the present study is that, to the best of our knowledge, it is the first comprehensive audit of the digestive diseases presenting at any particular health institution in Nigeria. It can therefore serve as a template and an objective reference for future research activities in this respect.

The limitations of this study are those generally related to retrospective studies such as missed or inappropriate data entry, inadequate medical record keeping and underreporting of cases. There is the additional limitation of possible diagnostic error because of diagnostic evaluation constraint in a resource-poor setting like ours. This often results from either the perennial unavailability of some critical diagnostic facilities and lack of finance to undertake such when available or the frequent refusal of post mortem by relatives of the deceased.

5. CONCLUSION

A very important finding from this study is fact that CHB and its attendant sequelae constituted a substantial proportion of the digestive diseases presentation in our study population. Digestive diseases are common and the burden on the society considerable, but the specialty is poorly understood and often attracts little attention from a policy perspective [2]. There is, therefore, the need to establish digestive disease registries both at regional and national levels in order to

appreciate the actual burden this group of diseases poses to Nigeria.

CONSENT

It is not applicable.

ETHICAL APPROVAL

All authors hereby declare that study protocol has been examined and approved by the ethics review committee of the LAUTECH Teaching hospital, Ogbomosho and have, therefore, performed the study in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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