Dyspepsia, which by definition is the presence of one or more of the symptoms of epigastric pain, bloating, post-prandial fullness, early satiation, and retrosternal pain [1], is estimated to affect up to 50 % of individuals globally [2] with an estimated higher prevalence in low and middle income countries, particularly Africa with the highest prevalence of uninvestigated dyspepsia [3]. In one community study conducted in rural Uganda, more than 50 % of the respondents reported having had symptoms of dyspepsia [4]. The majority of dyspepsia in Africa is uninvestigated with patients often treated symptomatically. This creates a challenge as treatable diseases including malignancies are often missed only to present in very advanced stages. The paucity of information on dyspepsia in sub-Saharan Africa (SSA) also affects development of clinical and policy strategies of mitigating causes including cancer of the stomach which is the most prevalent gastrointestinal malignancy in SSA. SSA is projected to have a more than 73 % increase in gastrointestinal cancers by 2030, way more than the 59 % global estimate [5]. With uninvestigated dyspepsia masking this growing burden, there is a need to fully understand the characteristics of dyspepsia.

**ABSTRACT**

**Background and study aims** Dyspepsia is the most common presenting symptom in the gastrointestinal clinic of Mulago National Referral hospital. The etiology is essentially not fully described in our patient population. This study was therefore conducted to establish the causes of dyspepsia based on endoscopic diagnosis among patients with dyspepsia seeking care at the National Referral hospital of Uganda.

**Patients and methods** This retrospective study conducted in the endoscopy unit of Mulago hospital reviewed 356 patient endoscopy reports spanning January 2018 to July 2020 with a focus on those with a referral indication of dyspepsia. Age and sex were the independent variables of interest while the endoscopy findings as reported by the endoscopist were the outcome variable of interest.

**Results** Of the 356 endoscopy reports reviewed, 159 met the inclusion criterion of dyspepsia as the indication. Participant mean age was 47.7 years (± 16.53) with the majority (25.79 %) in the fifth decade while the male to female ratio was 1. The majority of patients had organic dyspepsia (90.57 %) while the commonest finding was gastritis 69 (43.4 %). Gastroesophageal cancers represented 18 (11.32 %) of all findings. There was a positive association between age > 50 years with gastroesophageal cancers (7.639) as well as age < 50 years and functional dyspepsia (2.794); however, all these were not statistically significant ($P = 0.006$ and $P = 0.095$, respectively).

**Conclusions** Organic/structural dyspepsia comprises over 90 % of investigated dyspepsia with 11 % comprising cancer among patients seeking endoscopy at the National Referral Hospital of Uganda.
epigastric pain in our population seeking care for dyspepsia. 
In one study in western Uganda, the majority of dyspeptic pa-
tients had gastritis [6] while in a study done in Kenya a signifi-
cant majority had functional dyspepsia [7], contrasting with a 
study in Nigeria where only 8% of the participants had func-
tional dyspepsia [8]. Other studies conducted in Uganda are 
representative of specific regions [9] and therefore non-gener-
alizable. This variability in findings, therefore, warrants a char-
acterization of dyspepsia in Uganda at a national referral center 
that receives a more diverse patient population from all regions 
Uganda. This research, therefore, characterizes the etiology 
of dyspepsia as seen on upper gastrointestinal endoscopy of pa-
tients seeking care at the National Referral Hospital of Uganda.

**Patients and methods**

This was a retrospective study conducted in the Endoscopy Unit 
of Mulago National Referral Hospital of Uganda. This hospital 
has a bed capacity 1500 at any given time and has 100% occup-
cy of referrals from other hospitals around the country. The gastrointestinal outpatient clinics 
comprise one medical and one surgical outpatient unit, which 
are attended by patients referred from other hospitals with an 
average attendance of 2500 to 3000 patients per year. It is from 
this population that patients referred for upper gastrointestinal 
endoscopy are sent to the endoscopy unit. The endoscopy unit 
also directly receives referrals from other hospitals in the re-

domy IV criteria, the patient was included in the study. Reports 
whose reason for referral was reported that did not meet the in-
clusion criteria, including some listed as dysphagia, odynoph-
gia, gastrointestinal bleeding, or screening endoscopy, all were 
excluded from the study. For referral notes in which more than 
one reason was included, such as dysphagia with dyspepsia, 
these were also included as long as the indication of dyspepsia 
was included in the referral note/endoscopy request. The end-

doscopy was performed by experienced physicians and surgeons in the 
unit.

Endoscopy reports of all patients that underwent an upper 
gastrointestinal endoscopy procedure between January 2019 
and January 2020 were reviewed. The referring doctor’s diag-
nosis or reason for recommending an endoscopy as written on 
the referral note was reviewed for inclusion in the study.

**Inclusion criteria**

Referral reports with the diagnosis or reason for referral regis-
tered as either dyspepsia or uninvestigated dyspepsia by the re-
ferring doctor were included in the study. For referral notes that 
had a different diagnosis besides dyspepsia, the diagnosis or 
reason for referral was compared to the definition of dyspepsia 
based on the ROME IV criteria [10] of having any of the follow-
ing: epigastric pain, epigastric fullness, early satiety, or burning 
epigastric pain. When the referral reason or diagnosis met the 

**Table 1** Participant demographic characteristics.

| Parameter | Frequency | Percentage or ±SD |
|-----------|-----------|--------------------|
| Age       |           |                    |
| <30       | 29        | 18.24              |
| 31–40     | 27        | 16.98              |
| 41–50     | 28        | 17.61              |
| 51–60     | 41        | 25.79              |
| 60–70     | 17        | 10.69              |
| >70       | 17        | 10.69              |
| Mean age  | 47.698    | ± 16.53            |
| Sex       |           |                    |
| Male      | 79        | 49.69              |
| Female    | 80        | 50.31              |

**Results**

In total, 356 patient endoscopy reports were evaluated and of 
these, 159 met the inclusion criteria.

The male to female ratio of the study population was one 
while the mean age was 47.70 years (± 16.53) with the majority 
(25.79%) in the fifth decade of life (Table 1). On the primary 
outcome variables of the endoscopic diagnosis, 90.57% of pa-
tients had organic dyspepsia, meaning that there was a diagno-
sis of a structural disease while 9.43% of the participants had 
normal findings despite the dyspeptic symptoms (Table 2), a 
condition referred to as functional dyspepsia.

The most common findings on endoscopy were gastritis fol-
lowed by gastroesophageal reflux disease. Gastroesophageal
cancers (gastric and esophageal cancer) comprised 11.32% of all diagnoses (Table 3). Of the 18 patients who had a diagnosis of gastrointestinal cancer, 61% had gastric cancer while the rest had esophageal cancer (Table 4).

On evaluation for the association between the two independent variables of age and sex with the primary outcome variable, age was stratified into two categories: < 50 years and > 50 years. We found no association between age and gastritis with a chi square coefficient of 0.612 while the presence of gastroesophageal cancers was strongly associated with age > 50 years with a positive coefficient of 7.639 (P = 0.006) while that of functional dyspepsia was 2.794 (P = 0.095). However, these variables were not statistically significant in our study population. In regard to the location of the cancer, there was no association with age or sex. Similarly, there was no association between sex and the overall endoscopy diagnosis.

Discussion

We conducted this study with the intention of describing endoscopy findings among patients who underwent upper gastrointestinal endoscopy for dyspepsia as it is the most common presenting symptom and indication for upper gastrointestinal endoscopy at the Gastrointestinal Surgery Clinic in Mulago National Referral hospital in Uganda.

We found that the majority of patients who presented for upper gastrointestinal endoscopy were aged 51 to 60 years. In Uganda, it is recommended but not mandatory that the presence of dyspeptic symptoms should be investigated with endoscopy in patients aged >50 years. The public health training and awareness campaigns about gastric cancer could explain the higher proportion in this age group. Globally screening for gastroesophageal cancers is recommended in dyspeptic patients aged >40 years [11, 12] and this is in keeping with our findings.

Our study reveals a very high prevalence of organic dyspepsia of >90% which could imply that by the nature of our study setting being a national referral hospital, the most severe and persistent symptomatic patients could possibly be the ones seeking care at the national referral hospital, and hence, likely to have more organic causes. This, therefore, is a potential source of bias. Second the majority of referrals often come late, due to either financial constraints associated with the procedure or perceptions such as disease progression after biopsy. All these could explain the high rate of organic dyspeptic findings being representative of late presentation. However, when the prevalence of organic dyspepsia among patients with dyspepsia is compared with studies conducted in the African region, there is a striking similarity. In Kenya, the prevalence was slightly lower at 8% [7], implying a 92% prevalence of organic dyspepsia. While in a similar study in Ibadan, Nigeria, the prevalence of functional dyspepsia among dyspeptic patients was lower at 6% [13], implying a prevalence of organic dyspepsia of 94%. Overall, the global prevalence of functional dyspepsia is approximately 11% to 29.2% [3]. Our findings along with the studies in SSA demonstrate that the majority of dyspepsia is due to an organic cause.

The finding that gastritis was the most prevalent condition in our study population was not surprising as it is similar to the described findings in other regions of Uganda [6] and SSA [14, 15]. Not surprisingly, there was no association between the age and sex in gastritis or any other endoscopic findings among the study population.

Gastroesophageal cancer presentation, especially in early stages, mimics any other benign causes of dyspepsia [16], hence increasing the likelihood of missed early diagnosis [17] in patients with dyspepsia. In our study population, the preval-

| Table 2: Endoscopic findings. |
|--------------------------------|
| Diagnosis            | Frequency | Percentage |
| Normal findings      | 15        | 9.43       |
| Gastritis            | 69        | 43.4       |
| Gastric ulcers       | 3         | 1.89       |
| Duodenal ulcers      | 5         | 3.14       |
| Hiatal hernia        | 4         | 2.52       |
| GERD                 | 31        | 19.5       |
| Gastric cancer       | 11        | 6.92       |
| Esophageal cancer    | 7         | 4.40       |
| Esophagitis          | 2         | 1.26       |
| Others               | 12        | 7.55       |

GERD, gastroesophageal reflux disease.

| Table 3: Dyspepsia classification. |
|------------------------------------|
| Dyspepsia classification  | Frequency | Percentage |
| Functional dyspepsia           | 15        | 9.43       |
| Organic dyspepsia             | 144       | 90.57      |

| Table 4: Location of gastroesophageal malignancies. |
|---------------------------------------------------|
| Tumor type and location | Frequency (N) | Percentage (%) |
| Esophagus (7)           |              |               |
| Proximal third          | 1            | 5.56          |
| Mid third               | 5            | 27.78         |
| Distal third            | 1            | 5.56          |
| Stomach (11)            |              |               |
| Upper stomach (cardia and upper body)             | 3            | 16.67         |
| Middle stomach (angle, middle body)               | 3            | 16.67         |
| Lower stomach (lower body, antrum, pylorus)       | 5            | 27.78         |
ence of gastroesophageal cancers among patients with dyspepsia was rather strikingly high at 11.32% when compared to larger studies in Hong Kong [18] and Canada [19], in which the prevalence was less than 1%. However, it should be noted that the above studies had a significantly larger sample size. Nevertheless, these findings raise a red flag for a potentially higher prevalence of gastroesophageal malignancies among dyspeptic patients in Uganda. This further emphasizes the need for more purposeful investigation for gastroesophageal malignancies in patients in SSA who present with dyspepsia, especially in the fourth decades and above.

Its projected that SSA will have the highest burden of gastroesophageal cancers globally by 2030 [5] and this is a red flag our results seem to agree with. Typically esophageal cancer presents with dysphagia and patients with dysphagia were excluded; however, it’s important to recognize that dyspepsia, especially retrosternal pain, may point towards early esophageal cancer, hence requiring early screening [20].

Conclusions

More than 90% of dyspepsia in patients seeking care in Mulago hospital is associated with a structural/organic lesion, including gastritis, among other causes. There is a higher prevalence of gastroesophageal cancer among patients with dyspepsia who are aged >50 years. We recommend that patients aged >50 years who have dyspepsia that has not been investigated undertake a mandatory endoscopic evaluation as the likelihood of having a gastroesophageal malignancy in this population is very high.

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Competing interests

The authors declare that they have no conflict of interest.

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