

## GASTROESOPHAGEAL REFLUX DISEASE AND ETIOLOGICAL CORRELATES AMONG NIGERIAN ADULTS AT OGBOMOSO

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### ABSTRACT

**Background:** Gastroesophageal reflux disease is a common disorder globally but the prevalence and severity of symptoms and complications do have ethnic and geographic variations.

**Aim:** The aim of the study was to determine the prevalence of gastroesophageal reflux disease (GERD) among adults in Ogbomoso, Southwest Nigeria, and the risk factors associated with it.

**Methodology:** The study was a hospital-based descriptive cross-sectional survey. The study population consisted of consenting male and female adults aged 18 to 87 years recruited from the outpatient departments of three health institutions in Ogbomoso, Oyo State, Nigeria. A predesigned questionnaire consisting of GerdQ and other relevant information was administered to the participants.

**Results:** A total of 772 subjects were interviewed. The prevalence of GERD was 9.3% among the subjects. There was a significant association between increasing age and GERD. Other risk factors considered showed no significant association with the disease.

**Conclusion:** GERD has a moderate prevalence among adults in Ogbomoso, Southwest Nigeria and there is a significant association between increasing age and GERD.

**Keywords:** Gastroesophageal reflux disease, Prevalence, Risk factors, Nigeria

### INTRODUCTION

Gastroesophageal reflux disease (GERD) is a condition which develops when reflux of stomach contents into the oesophagus causes troublesome symptoms and/or complications.<sup>1</sup> It typically presents as recurrent heartburn and/or regurgitation with or without endoscopic evidence of mucosal injury.<sup>1</sup>

Gastroesophageal reflux disease is a common disorder globally but the prevalence severity of symptoms and complications do have ethnic and geographic variations.<sup>2,3</sup> The prevalence rate in Western adult population ranges from 10-20% while less than 5% are affected in Asia.<sup>4</sup> It is generally believed that GERD is more common among the Caucasian population as compared to the Afro-Caribbean populations,<sup>3</sup> but recent studies among population subgroups in some parts of Nigeria suggest the contrary.<sup>5-7</sup>

The aetiology of GERD is multifactorial as both environmental and genetic factors play different roles. Studies from various populations around the world show that risk factors for GERD include age, excessive body weight, hiatal hernia, lifestyle factors (such as

smoking, alcohol intake, physical activity), diet (coffee, alcohol, chocolate and fatty meals), medications (beta-agonists, nitrates calcium channel blockers and anticholinergics), hormones (e.g. progesterone).<sup>8-12</sup> The etiological effector of GERD is excessive retrograde movement of acid-containing gastric secretion or a combination of acid and bile containing secretions from the stomach and the duodenum into the oesophagus. Frequent (functional) transient lower oesophageal sphincter (LES) relaxation or mechanical (hypotensive LES) problem of the LES which results from different combinations of the identified etiological factors is the main cause of GERD.<sup>8-13</sup>

Numerous validated patient-centred symptoms analyses-based questionnaires with varying degree of accuracy have been designed for the assessment of GERD.<sup>14</sup> Symptoms analyses method of diagnosis is a pragmatic approach to diagnosing GERD since it eliminates the use of costly diagnostic procedures such as upper gastrointestinal endoscopy and 24-hour gastric

pH-monitoring are not required in most patients who present with the typical symptoms of GERD.<sup>6,15,16</sup>

The GerdQ is a simple, patient-centred, self-assessment questionnaire which has a diagnostic accuracy similar to that of the gastroenterologist.<sup>17</sup> The questionnaire has been validated and found to be a useful tool to detect unmet therapeutic needs.<sup>17-19</sup> The contents of the questionnaire are consistent with the Montreal definition and classification of GERD as articulated in a global evidence-based consensus.<sup>1,17</sup>

This study therefore aimed at determining the prevalence rate of GERD among adults living in Ogbomoso, Southwest Nigeria, using the GerdQ, and the relationship between previously identified etiological factors and GERD among the study population.

## **MATERIALS AND METHODS**

### ***Study design***

The study was a hospital-based descriptive cross-sectional survey. The study population consisted of 772 consenting male and female adults aged 18 to 87 years recruited from the outpatient departments of three health institutions in Ogbomoso, Oyo, State, Nigeria (LAUTECH Teaching Hospital, Ogbomoso, LAUTECH Health Centre, Ogbomoso, and Bowen University Teaching Hospital, Ogbomoso). Exclusion criteria included proven diagnosis of abdominal cancer in subject, presence of gross ascites, recent gastrointestinal surgery and pregnancy.

### ***Data collection***

A 23-item questionnaire consisting of socio-demographic data (10-items), the GerdQ (6-items), aggravating factors (3-items) and relieving/remedial factors (4-items) was administered by well-trained research assistants to each of the participants. Weight and height were measured by means of standard instruments in kilogram and meters respectively. The Body Mass Index (BMI) of each subject was calculated by dividing the weight in kilogram by the square of the height in meters.

### **The GerdQ**

The GerdQ contains 6 questions with symptoms frequency score (counted in days) of 0 to 3 and a one week symptoms recall period. The questions are divided into two groups. The first group consists of four positive predictors of GERD: heartburn and regurgitation (the two major reflux symptoms), sleep disturbance because of the two reflux symptoms and use of over the counter (OTC) medications in addition to that prescribed; while the second group consists of two negative predictors of GERD, i.e. epigastric pain

and nausea. A score range of 0 to 3 applies to the positive predictors, while a range from 3 to 0 (reversed order, where 3 = none) applies to negative predictors. The GerdQ score is calculated as the sum of these scores, giving a total score range of 0 to 18.

The GerdQ can be used to diagnose GERD with diagnostic accuracy comparable to that of the gastroenterologist at a cut-off of 8 out of 18 points [sensitivity (64.6%) and specificity (71.4%)].<sup>17</sup> In addition to diagnosis, the GerdQ also has the ability to assess the impact of the disease on the life of the patient. Patients with a total score of 3 or more (out of 6) on sleep disturbance plus OTC medication use are those most likely to be more impacted by the disease. This feature assists in the choice of treatment where there is a need for more effective treatment.

### ***Data analysis***

Data analysis was done with the IBM- Statistical Package for Social Sciences (SPSS), version 20. Continuous variables were presented as means  $\pm$ S.D. Categorical variables were expressed as frequencies and percentages. The strength of the associations between independent variables (known etiological factors) and the dependent variable (GERD) was evaluated by univariate and multivariate analysis as occasion demanded. Variables with odds ratio (OR)  $>1$  and  $p$ -value  $<0.05$  were considered significant risk factors.

### **Ethical consideration**

Ethical clearance was obtained from the Ethics Review Committees of the LAUTECH Teaching Hospital, Ogbomoso, and the Bowen University Teaching Hospital, Ogbomoso. Written informed consent was obtained from participants. All information and data obtained from participants were treated with utmost confidentiality.

## **RESULTS**

The demographic characteristics of participants are presented in Table 1. A total of 772 subjects were interviewed. More than half of the participants were female 406 (52.6%) with males making up the remaining 366 (47.4%). The age range was 18 to 87 years with a mean of 39.2 ( $\pm 16.5$ ) years. The mean BMI of the participants was 24.8 ( $\pm 5.2$ ) Kg/M<sup>2</sup>. With regard to ethnicity, 737 (95.6%) of the participants were Yoruba from the south-western part of the country while the remaining 35 (4.4%) were of Igbo, Hausa and a few minority tribes from Nigeria. A total of 459 (59.5%) subjects were married, 308 (39.9%) were unmarried, while the remaining 5 (0.6%) subjects were separated. With regard to the level of formal education attainment, 633 (82%) subjects had at least secondary

**Table 1:** Socio-demographic characteristics of participants (n=772)

Variable	Frequency (%)
<b>Gender</b>	
Male	366(47.4)
Female	406(52.6)
<b>Ethnicity</b>	
Yoruba	737 (95.6)
Others	35 (4.4)
<b>Marital status</b>	
Married	459 (59.5)
Unmarried	308(39.9)
Separated	5 (0.6)
<b>Educational attainment</b>	
≥ Secondary School	633 (82.0)
< Secondary School	139 (18.0)
<b>BMI Group</b>	
<25	472 (61.1)
≥ 25	298 (38.6)
<b>Smoking</b>	
Yes	37(4.8)
No	735(95.2)
<b>Alcohol</b>	
Yes	129(16.7)
No	643(83.3)
<b>Caffeine</b>	
Yes	155(20.1)
No	617(79.9)
<b>Mean Age in years (SD) = 39.2 (±16.5)</b>	
<b>Mean BMI in Kg/m<sup>2</sup> (SD) = 24.8(±5.2)</b>	

*BMI: Body Mass Index*

school education while the remaining 139 (18%) either had primary education or no formal education.

Concerning social habits that could predispose to developing GERD, a total of 37 (4.8%) smoked cigarette regularly as of the time of the survey, 129 (16.7%) took alcohol, while 155 (20.1%) consumed caffeine-containing substances, namely coffee and kola nut.

The frequencies of the symptoms of GERD among the subjects are depicted in Table 2. Among the four positive predictors of GERD (heartburn, regurgitation, sleep disturbance because of the two reflux symptoms and use of OTC medication), heartburn had the highest frequency as 15.7% experienced the symptom at least one day in the last week of their lives. This was followed by regurgitation which had a frequency of 9.8%. Sleep disturbance because of heartburn and regurgitation has the least occurrence (4.4%). Epigastric pain had the higher occurrence (12.3%) of the two negative predictors of

GERD (epigastric pain and nausea). Nausea had a frequency of 10.5%.

Following GERD scores computation (Table 3), 9.3% of the participants were diagnosed with GERD (scored between 8 and 18), while (87.2%) of the participants were within GERD score range 3-7.

Table 4 depicts the univariate and multivariate analysis of the association between known etiological factors and GERD. The independent variables (risk factors) tested were the age of participants, the BMI [divided into “no excess weight” (< 25k/m<sup>2</sup>) and “excess weight” (≥ 25kg/m<sup>2</sup>)], gender, caffeine consumption, alcohol consumption, and cigarette smoking. After univariate analysis, increasing age and excess weight had significant odds ratios while the other factors did not. Following adjustment for potential confounder by a binary logistic regression, only the age of the participants maintained a positive statistically significant relationship with GERD [OR= 1.02 (95% CI 1.00-1.03), P = 0.042]. All the other independent variables

**Table 2:** Frequency of symptoms among participants (n= 772)

Symptoms	Frequency (%)				
	0 day	1 day	2-3 days	4-7 days	Total positive
Heartburn <sup>†</sup>	84.3	9.6	4.4	1.7	15.7
Regurgitation <sup>†</sup>	90.2	5.8	2.8	1.2	9.8
Epigastric pain <sup>‡§</sup>	87.7	4.9	2.8	4.4	12.3
Nausea <sup>‡§</sup>	89.5	3.2	3	4.3	10.5
Sleep disturbance <sup>†</sup>	95.6	2.7	1	0.6	4.4
OTC drugs <sup>†</sup>	94.6	23.1	1.6	0.8	5.4

<sup>†</sup>Positive GERD predictors, <sup>‡</sup>Negative GERD predictors, <sup>§</sup>Received reverse scores in the questionnaire

**Table 3:** GERD scores and prevalence (n= 772)

Variable	Frequency (%)
<b>GERD score group</b>	
0-2	27 (3.5)
3-7	673 (87.2)
8- 10	54 (7.0)
11-18	18 (2.3)
<b>GERD status</b>	
Positive	72 (9.3)
Negative	700(90.7)

GERD: Gastroesophageal reflux disease

did not have statistically significant relationships with GERD.

Table 5 shows the impact of GERD on the lives of sufferers, the aggravating factors and the remedial

measures taken by the sufferers of GERD. The disease had a high impact on the lives of 22.2% of the sufferers. The commonest aggravating factor of GERD symptoms among the participants who had it was food intake (58.3%), which could be any type of food or restricted to particular food types (fried foods, beans, carbonated drinks etc.). Other identified aggravating factors of symptoms of GERD were lying down (23.6%) and bending forwards (12.5%).

Avoidance of offending foods was the commonest remedial measure taken by GERD sufferers (36.1%). Other relieving or remedial measures taken by subjects included ingestion of antacid (34.7%) and ingestion of milk (20.8%). Some of the GERD sufferers (13.6%), however, claimed they had no idea of what to do to relieve themselves of the symptoms.

**Table 4:** Association between known risk factors and GERD among participants (n =772)

Probable risk factor	No (%) positive	Unadjusted odds Ratio	P-value	Adjusted odds Ratio	P- value
<b>Age in years (n=772)</b>	72 (9.3)	1.02 (1.01-1.03)	0.006	1.02 (1.00-1.03)	0.042
<b>BMI</b>					
<25 (n=472)	35 (7.4)	1(reference)			
≥25 (n=298)	36 (12.1)	1.716 (1.05-2.80)	0.031	1.42 (0.84-2.39)	0.193
<b>Gender</b>					
Female (n=406)	37 (9.1)	1(reference)			
Male (n=366)	35 (9.6)	1.06 (0.65-1.71)	0.830	-	-
<b>Caffeine</b>					
No (n=617)	52 (8.4)	1(reference)			
Yes (n=155)	20 (12.9)	1.61 (0.93-2.79)	0.089	-	-
<b>Alcohol</b>					
No (n=643)	55 (8.6)	1(reference)			
Yes (n=129)	17 (13.2)	1.62 (0.91-2.90)	0.102	-	-
<b>Smoking</b>					
No (n=735)	70 (9.5)	1(reference)			
Yes (n=37)	2 (5.4)	0.54 (0.13-2.31)	0.408	-	-

BMI: Body Mass Index

**Table 5:** GERD impact, aggravating factors and remedies (n=72)

Variable	Frequency (%)
<b>Impact on life</b>	
Low impact	56 (77.8)
High impact	16 (22.2)
<b>Aggravating factors</b>	
Food intake	42 (58.3)
Lying down	17 (23.6)
Bending forward	9 (12.5)
<b>Relieving/Remedial factors</b>	
Antacid intake	25 (34.7)
Milk ingestion	15 (20.8)
Avoidance of offending food	26 (36.1)
No idea	12 (16.7)

GERD: *Gastroesophageal reflux disease*

## DISCUSSION

That GERD is a common medical disorder globally is not in doubt. Akere *et al.*, previously obtained a prevalence of 28.1% for adults with GERD symptoms (heartburn and regurgitation) in a hospital-based survey conducted in Ibadan, Southwest Nigeria, to determine the association between BMI and GERD.<sup>5</sup> The disparity between our study prevalence (9.3%) and that of Akere *et al.*, (28.1%) probably stemmed from the fact that all participants with GERD symptoms (heartburn and regurgitation) and yearly, monthly, weekly and daily occurrences were included in the prevalence obtained from their study as they did not indicate any specific cut-off point of symptoms frequency for arriving at GERD diagnosis like the GerdQ that we used. Another study by Onyekwere *et al.*, in Lagos, also in the south-western part of Nigeria, yielded higher prevalence of symptoms of GERD among both asthmatics (36%) and controls (30%).<sup>7</sup> It is possible that the higher prevalence in the asthmatic population as compared to our study may be related to the fact that GERD sometimes presents with extra-oesophageal manifestations such as hoarseness of voice, cough, and wheezing which could mimic asthma, thereby causing a dilemma of which of the diseases comes first.<sup>20</sup> The 30% prevalence in the control group of the study can also not be adequately compared to our study because the sample size of 78 that was used is rather small in comparison to ours which was 772. However, prevalence values obtained among non-pregnant women (9.7%) in a previous study conducted to test the effect of pregnancy on GERD in south-western Nigeria<sup>21</sup> and among the adult population (9.2%) in Abidjan, Côte d'Ivoire, for symptoms that occurred once a week are similar to our finding.<sup>22</sup> Notwithstanding the disparities in the prevalence rates

obtained from these studies, the figures obtained show that GERD is not as uncommon among black Africans as previously thought.

Comparing our study's prevalence to what obtains in the Caucasian and Asian populations, a systematic review showed that approximately 10-20% of the western world population suffer from the symptoms of GERD at least weekly while less than 5% are affected in Asia.<sup>4</sup> The prevalence of 9.3% obtained from this study implies that, though GERD's prevalence may truly be lower in this environment than in the Western population, it is not an uncommon finding. It may also suggest that the frequency of GERD in our population is in-between that of the Western and the Asian populations in general.

Several studies from different parts of the world have demonstrated various risk factors for GERD.<sup>8-12</sup> We observed that only increasing age, among the risk factors considered, had a positive statistically significant relationship with GERD. The positive association between increasing age and GERD in our study is similar to the finding of Du *et al.*, in China that observed a rising incidence of GERD with increasing age.<sup>6,23</sup> Different studies from across the world have reported contradictory associations between age and GERD. There are reports of no association, positive association, and negative association.<sup>3,6,23</sup> Differences in the age pattern of the study populations could account for these disparities. Our observation of no significant association between gender and GERD is supported by studies from other parts of the world that examined the influence of gender on the prevalence of GERD symptoms but found no difference.<sup>3,24,25</sup>

There are few local studies to which we could compare our findings in regard to the association between the considered risk factors and GERD. A study from the south-eastern part of Nigeria found only the consumption of caffeine containing substances (coffee and kola nut) among all the factors considered in the study (gender, age, BMI, cigarette smoking, alcohol consumption, NSAID ingestion, coffee and kola nut consumption) to be significantly associated with GERD.<sup>6</sup> Akere *et al.*, in their study also found no statistically significant association between BMI and GERD.<sup>5</sup> Our study and the two local studies cited in this regard are in tandem with that of a cross-sectional study that evaluated the association between obesity and GERD, and their interactions with race and gender in a large cohort that included 111,639 patients (79% white, 13% black, 4% Asian) which found no association between BMI and GERD among blacks and Asians.<sup>26</sup> The study, however, found an

independent association between obesity and GERD symptoms among the white population.<sup>26</sup> Obesity appears to be an important risk factor for GERD as demonstrated by several investigators in North America, Europe, and Asia,<sup>24,27,28</sup> but some studies found no association between excess weight and GERD.<sup>27</sup> Why excess weight had no positive association with GERD in our study cannot be immediately explained. One reason that may be added to the non-association between the other established risk factors (smoking, alcohol, and caffeine) and GERD observed in our study could be the low consumption rates of these putative substances among our study population as depicted in Table 1.

The finding that about a quarter of our study participants diagnosed with GERD was highly impacted by the disease is important in that it helps to know beforehand the proportion of GERD patients in this environ that may need a more aggressive treatment plan. The aggravating factors of GERD identified by the patients may need proper consideration in their management, apart from medication use.

In conclusion, this study shows that GERD has a moderate prevalence among adults in Ogbomoso, Southwest Nigeria and there is a significant association between increasing age and GERD. One of the limitations of this study is that it was hospital based. A population-based study is desirable.

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