

Characteristics of Gastroesophageal Reflux Disease (GERD) Patients at RSUP Dr. M. Djamil Padang during 2018-2021 Period: A Cross-Sectional Study

Mentari Adinda Setiawan¹, Ulya Uti Fasrini², Arni Amir³, Masrul²,
Saptino Miro⁴, Endrinaldi⁵

¹Undergraduate program in Medicine, Faculty of Medicine, Universitas Andalas, Padang, West Sumatra, Indonesia

²Department of Nutrition Sciences, Faculty of Medicine, Universitas Andalas, Padang, West Sumatra, Indonesia

³Department of Physiology, Faculty of Medicine, Universitas Andalas, Padang, West Sumatra, Indonesia

⁴ Department of Internal Medicine, Faculty of Medicine, Universitas Andalas, Dr. M. Djamil Central General Hospital, Padang, West Sumatra, Indonesia

⁵Department of Biochemistry, Faculty of Medicine, Universitas Andalas, Padang, West Sumatra, Indonesia

Corresponding author:

Ulya Uti Fasrini. Department of Nutrition Sciences, Faculty of Medicine, Universitas Andalas. Jl. Perintis Kemerdekaan No. 94 Jati, Padang, West Sumatra, Indonesia. Phone: +62-751-31746. E-mail: ulyautifasrini@med.unand.ac.id

ABSTRACT

Background: The incidence of gastroesophageal reflux disease (GERD) is increasing and affecting the individual's quality of life. However, data on GERD epidemiology in Indonesia and West Sumatra is scarce. This study aims to describe the characteristics of GERD patients at Dr. M. Djamil Central General Hospital.

Method: This cross-sectional study used data from patients' medical records that involved 111 GERD patients, excluding chronic disease and pregnancy. Data were analyzed using univariate analysis using an SPSS program.

Results: The results indicated that demographically, most of the patients were of productive age (94.59%), female (54.05%), secondary school level (72.08%), housewives (27.92%), and residing in Padang City (35.13%). The main symptoms were heartburn (62.16%), followed by vomiting, nausea, and dysphagia (4.50%, 2.70%, and 1.80%), respectively. Most patients underwent outpatient care for two visits (18.02%). Clinically, the number of obese patients was higher (43.25%). The levels of plasma triglycerides and serum total cholesterol of GERD patients were mainly normal (60.60% and 61.80%). In contrast, the levels of HDL and LDL of GERD patients were primarily abnormal, with lower HDL (97.80%) and a higher LDL (72.70%).

Conclusion: Most GERD patients were of productive age, female, middle level of education, housewives, and residing in Padang. Clinical characteristics of GERD patients included mainly obesity, main symptom heartburn, and treatment as an outpatient. Triglyceride and total cholesterol were primarily normal, while serum HDL and LDL were abnormal.

Keywords: Epidemiology, lipid profile, West Sumatra

ABSTRAK

Latar belakang: Kejadian penyakit refluks gastroesofagus (GERD) semakin meningkat dan memengaruhi kualitas hidup individu. Namun, data mengenai epidemiologi GERD di Indonesia dan Sumatra Barat masih sedikit. Penelitian ini bertujuan untuk mendeskripsikan karakteristik pasien GERD di Rumah Sakit Umum Pusat Dr. M. Djamil, Padang.

Metode: Penelitian potong lintang ini menggunakan data dari rekam medis pasien yang melibatkan 111 pasien GERD, tidak termasuk penyakit kronis dan kehamilan. Data analisis menggunakan analisis univariat dengan menggunakan program SPSS.

Hasil: Hasil penelitian menunjukkan bahwa secara demografi, sebagian besar pasien GERD berusia produktif (94,59%), berjenis kelamin perempuan (54,05%), berpendidikan menengah (72,08%), ibu rumah tangga (27,92%), dan berdomisili di Kota Padang (35,13%). Gejala utama yang dirasakan adalah nyeri ulu hati (62,16%), diikuti oleh muntah, mual, dan disfagia (4,50%, 2,70%, dan 1,80%). Jumlah kunjungan rawat jalan terbanyak adalah dua kunjungan (18,02%). Secara klinis, jumlah pasien yang mengalami obesitas lebih banyak (43,25%). Kadar trigliserida plasma dan kolesterol total serum pasien sebagian besar normal (60,60% dan 61,80%). Sebaliknya, kadar HDL dan LDL pasien sebagian besar tidak normal, dengan HDL lebih rendah (97,80%) dan LDL lebih tinggi (72,70%).

Kesimpulan: Mayoritas pasien GERD berada pada usia produktif, berjenis kelamin perempuan, berpendidikan menengah, ibu rumah tangga, dan berdomisili di Padang. Karakteristik klinis pasien GERD sebagian besar adalah obesitas, gejala utama nyeri ulu hati, dan berobat jalan. Trigliserida dan kolesterol total sebagian besar normal, sedangkan HDL dan LDL serum tidak normal.

Kata kunci: Epidemiologi, profil lipid, Sumatera Barat

INTRODUCTION

Gastroesophageal reflux disease (GERD) is a pathological reflux of stomach content into the esophagus, which causes heartburn and regurgitation. It can occur due to internal factors, such as an imbalance between the defensive and offensive factors of the gastrointestinal tract, or external factors, such as lifestyle.¹ GERD can interfere with daily activities and decrease individual life quality. Research by the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) in 2017 revealed that GERD impacted life quality due to disability, called years lost due to a disability (YLD) up to 67.1%.²

Globally, GERD prevalence increased by 77.53% from 1990 to 2019.³ However, there is limited data on Indonesia's GERD epidemiology. Some local studies on GERD described an increase in GERD prevalence from 1997 until 2018.⁴⁻⁶ In 2002, Syam *et al.* reported a rise in the incident from 5.7% in 1997 to 25.18% in 2002⁷ in Dr. Cipto Mangunkusumo, the national referral hospital. Abdullah *et al.* in 2015 reported that 9.35% of 278 respondents had GERD.⁵ However, in 2017, Syam *et al.* reported that 57.6% of 2,045 respondents met the criteria for GERD based on an online GERD questionnaire.⁴ Another study from Darnindro *et al.* supported the findings by reporting the

prevalence of GERD in Fatmawati hospital was 49%.⁸

Previous studies on GERD have discussed some prevalence and risk factors globally and locally.^{2,4,5,9-11} However, the studies lack some profiles on the inpatients and outpatients of clinically diagnosed GERD patients, particularly in West Sumatra. Therefore, this study aimed to describe the characteristics of GERD patients in Dr. M. Djamil Padang Central General Hospital as the tertiary referral hospital.

METHOD

This cross-sectional study collected data on patients' medical records in Dr. M. Djamil Padang Hospital from 2018 to 2021. This study included all patients diagnosed with GERD and excluded patients with chronic disease or pregnancy. Based on these criteria, 111 patients fulfilled the eligibility criteria. Demographic data include age, sex, education, occupation, and residence. Clinical data was comprised of body mass index, chief complaint, hospitalization status, and lipid profile. All patients' relevant data were collected with approval from the Health Research Ethical Committee of Dr. M. Djamil Padang Hospital (No.: LB.02.02/5.7/467/2022).

Age was defined as a period from birth to the date of data collection, in whole year, and categorized

into productive and non-productive ages. The age categorization follows age categorization in the central statistics agency (*Badan Pusat Statistik, BPS*). Sexes in the current study were categorized into male or female. Education level was based on the law of the national education system that divides it into three levels of education, namely primary education, secondary education, and higher education. The categorization in this study was 1) not attending school, 2) primary education, 3) secondary education, 4) higher education, and 5) 'not available' (N/A) was used for the empty education column in the patient's medical record. Occupations recorded in the patient's medical record were 11 occupations, and the empty column was coded with N/A. To identify the home region of patients, we included all 19 cities or regencies along with 'outside West Sumatra' and N/A in data coding.

Clinical data of body mass index was following WHO Asia Pacific Region, namely 1) Obesity (≥ 25 kg/m²), 2) Overweight (23-24.9 kg/m²), 3) Normal (18.5-22.9 kg/m²), 4) Underweight (< 18.5 kg/m²), and 5) N/A (for empty column). The chief complaints were heartburn, regurgitation, nausea, vomiting, shortness of breath, bloating, dysphagia, and N/A. Outpatient, inpatient, and untreated identified treatment status. Categorization of total cholesterol is 1) not normal (≥ 200 mg/dL), and 2) normal (< 200 mg/dL). Triglyceride level was categorized into 1) not normal (≥ 150 mg/dL), and 2) normal (< 150 mg/dL). High-density lipoprotein (HDL) categorizations were 1) not normal (< 60 mg/dL), and 2) normal (≥ 60 mg/dL). Low-density lipoprotein (LDL) was categorized as 1) not normal (≥ 100 mg/dL), and 2) normal (< 100 mg/dL). GERD was classified based on digestive tract endoscopy and the assessment using GERD-Q, namely 1) erosive esophagitis (EE) and 2) Non-erosive reflux disease (NERD).

Data obtained were presented descriptively. We summarized the results, then found the pattern seen in the data, and displayed the data using tables and charts using a computer program.

RESULTS

The highest frequency of GERD patients was in 2018 (37 patients), while a significant decrease was noted in 2020 (7 patients) during the first outbreak of Covid-19 (Figure 1). Most of the patients in this study (100 out of 111) were classified as NERD.

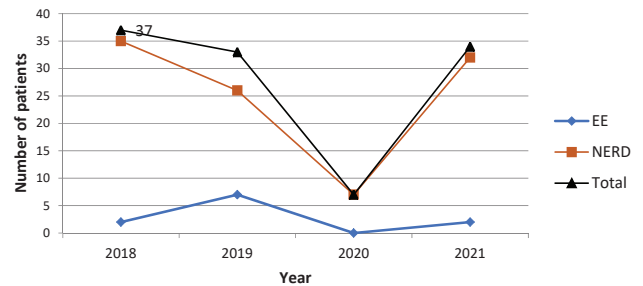


Figure 1. Distribution of GERD patients in Dr. M. Djamil Central General Hospital during 2018–2021

(EE: erosive esophagitis; NERD: Non-erosive reflux disease)

Table 1. Demographic characteristics of GERD patients

Demographic characteristics	GERD classification		Total (N = 111)
	EE (n = 11)	NERD (n = 100)	
Age, n (%)			
Productive age	11 (9.91)	94 (84.68)	105 (94.59)
Non-productive age	0	6 (5.41)	6 (5.41)
Gender, n (%)			
Male	5 (4.50)	46 (41.44)	51 (45.95)
Female	6 (5.41)	54 (48.65)	60 (54.05)
Education, n (%)			
Not-attending school	0	7 (6.31)	7 (6.31)
Primary education	5 (4.51)	22 (19.82)	27 (24.33)
Secondary education	3 (2.70)	50 (45.05)	53 (47.28)
Higher education	2 (1.80)	17 (15.31)	19 (16.9)
N/A	1 (0.90)	4 (3.60)	5 (4.50)
Occupation, n (%)			
Government employee	1 (0.90)	13 (11.71)	14 (12.61)
Private employee	1 (0.90)	14 (12.61)	15 (13.51)
Self-employed	0	7 (6.31)	7 (6.31)
Housewife	4 (3.60)	27 (24.32)	31 (27.92)
Farmer	2 (1.80)	5 (4.50)	7 (6.30)
Fisherman	0	1 (0.90)	1 (0.90)
Retired civil servant	0	3 (2.70)	3 (2.70)
Student	0	8 (7.21)	8 (7.21)
Laborer	1 (0.90)	6 (5.41)	7 (6.31)
Trader/merchant	0	2 (1.80)	2 (1.80)
Unemployed	1 (0.90)	11 (9.91)	12 (10.81)
N/A	1 (0.90)	3 (2.70)	4 (3.60)
Region of residence, n (%)			
Lima Pulu Kota Regency	0	2 (1.80)	2 (1.80)
Agam Regency	1 (0.90)	2 (1.80)	3 (2.70)
Dharmasraya Regency	0	0	0
Padang Pariaman Regency	0	3 (2.70)	3 (2.70)
Pasaman Regency	0	1 (0.90)	1 (0.90)
Pasaman Barat Regency	2 (1.80)	3 (2.70)	5 (4.50)
Pesisir Selatan Regency	1 (0.90)	6 (5.41)	7 (6.31)
Sijunjung Regency	0	5 (4.50)	5 (4.50)
Solok Regency	1 (0.90)	3 (2.70)	4 (3.60)
Solok Selatan Regency	0	2 (1.80)	2 (1.80)
Tanah Datar Regency	0	6 (5.41)	6 (5.41)

Demographic characteristics	GERD classification		Total (N = 111)
	EE (n = 11)	NERD (n = 100)	
Mentawai Islands Regency	0	2 (1.80)	2 (1.80)
Bukittinggi City	0	3 (2.70)	3 (2.70)
Padang City	2 (1.80)	37 (33.33)	39 (35.13)
Padang Panjang City	0	0	0
Pariaman City	0	4 (3.60)	4 (3.60)
Payakumbuh City	0	1 (0.90)	1 (0.90)
Sawahlunto City	0	2 (1.80)	2 (1.80)
Solok City	1 (0.90)	2 (1.80)	3 (2.70)
Outside of West Sumatra	1 (0.90)	13 (11.71)	14 (12.61)
N/A	2 (1.80)	3 (2.70)	5 (4.50)

GERD: gastroesophageal reflux disease; EE: erosive esophagitis; NERD: non-erosive reflux disease; N/A: Data not available

Table 2. Clinical characteristics of GERD patients

Clinical characteristics	GERD classification		Total (N = 111)
	EE (n = 11)	NERD (n = 100)	
Body mass index (BMI), n (%)			
Obesity (≥ 25 kg/m ²)	8 (7.21)	40 (36.04)	48 (43.25)
Overweight (23-24.9 kg/m ²)	1 (0.90)	7 (6.31)	8 (7.21)
Normal (18.5-22.9 kg/m ²)	2 (1.80)	20 (18.02)	22 (19.82)
Underweight (< 18.5 kg/m ²)	0	12 (10.81)	12 (10.81)
N/A	0	21 (18.92)	21 (18.92)
Main symptom, n (%)			
Heartburn	10 (9.01)	59 (53.15)	69 (62.16)
Regurgitation	0	0	0
Nausea	0	3 (2.70)	3 (2.70)
Vomit	0	5 (4.50)	5 (4.50)
Shortness of breath	0	1 (0.90)	1 (0.90)
Bloating	0	1 (0.90)	1 (0.90)
Dysphagia	0	2 (1.80)	2 (1.80)
N/A	1 (0.90)	29 (26.13)	30 (27.03)
Treatment status, n (%)			
Outpatient (n=55)	8 (7.7)	47 (42.3)	55 (49.50)
Inpatient (n=25)	1 (0.90)	24 (21.60)	25 (22.50)
1—7 days	1 (0.90)	18 (16.20)	19 (17.10)
> 7 days	0	6 (5.4)	6 (5.4)
Untreated (n=31)	2 (1.8)	29 (26.1)	31 (27.9)
Number of return visits (outpatient) (n=55)			
One time	4 (3.60)	7 (6.31)	11 (9.91)
Two times	1 (0.90)	19 (17.12)	20 (18.02)
Three times	2 (1.80)	9 (8.11)	11 (9.91)
Four times	1 (0.90)	5 (4.50)	6 (5.40)
Five times	0	3 (2.70)	3 (2.70)
Six times	0	2 (1.80)	2 (1.80)
Seven times	0	2 (1.80)	2 (1.80)

GERD: gastroesophageal reflux disease; EE: erosive esophagitis; NERD: non-erosive reflux disease; N/A: Data not available

Demographically, as shown in Table 1, most of the GERD patients were in the productive age group (94.59%), with an average age of 40.42 ± 16.319 year, ranging from 10 to 90 years old. More than half of the subjects were female (54.05%). Most subjects had completed their secondary education (72.08%), working as housewives (27.92%), and residing in Padang City (35.13%). However, five patients have no record of their education level and the residency region, while four patients missing records of their occupation.

Most GERD patients were categorized as obese (43.25%), as seen in Table 2. The main symptom or chief complaint is mostly heartburn (62.16%) and treated as an outpatient (49.50%). Most outpatients underwent the treatment within two visits (18.02%). There was quite a lot of unrecorded data in these categories. The missing data was found in BMI and the main symptoms in 21 and 30 patients, respectively. In the treatment status, 31 patients were recognized as untreated because we found no information on the treatment records. Nineteen out of 25 patients (17.10%) were inpatients hospitalized within one week (1-7 days). However, apart from the chief complaints, we did not find any record of patient indication for hospitalization. Furthermore, not all recorded GERD patients underwent the same laboratory test procedures. Only one-third of patients (33/111) had their lipid profile tested, as described in Table 3.

Table 3. Lipid profile of GERD patients

Lipid profile (mg/dL)	GERD classification		Total (N = 33)
	EE (n = 2)	NERD (n = 31)	
Triglyceride, n (%)			
Abnormal (≥ 150 mg/dL)	0	13 (39.40)	13 (39.40)
Normal (< 150 mg/dL)	2 (6.10)	18 (54.50)	20 (60.60)
Total cholesterol, n (%)			
Abnormal (≥ 200 mg/dL)	1 (2.90)	12 (35.30)	13 (38.20)
Normal (< 200 mg/dL)	1 (2.90)	20 (58.80)	21 (61.80)
High-density lipoprotein, n (%)			
Abnormal (< 60 mg/dL)	1 (3)	28 (84.80)	29 (87.80)
Normal (≥ 60 mg/dL)	1 (3)	3 (9.20)	4 (12.20)
Low-density lipoprotein, n (%)			
Abnormal (≥ 100 mg/dL)	1 (3)	23 (69.70)	24 (72.70)
Normal (< 100 mg/dL)	1 (3)	8 (24.30)	9 (27.30)

GERD: gastroesophageal reflux disease; EE: erosive esophagitis; NERD: non-erosive reflux disease

Table 3 describes the triglyceride and total cholesterol levels of GERD patients, which mainly were normal (60.60% and 61.80%, respectively). Most of GERD patients in this study had abnormal high-density lipoprotein (HDL) and low-density lipoprotein (LDL) levels (87.80% and 72.70%, respectively). This result is confirmed by Table 4, which shows HDL and LDL are higher than normal.

Table 4. Mean and median of lipid profile on GERD patients

Lipid profile (mg/dL)	Mean (SD)	Median	Min	Max
Triglyceride		130.00	65	336
Total cholesterol		184.50	138	275
High-density lipoprotein (HDL)	42.88 (12.60)		21	67
Low-density lipoprotein (LDL)		114.80	77	202

DISCUSSION

The present study showed a significant decrease in 2020 (7 patients) compared to the previous year (33 patients). This study is similar to Khoerina *et al.* (2020), which stated that most patients did not come to health services during the pandemic.¹² A significant decrease in 2020 was due to the COVID-19 pandemic in Indonesia since the beginning of 2020. The pandemic has made people hesitate to come to health services and get checked out, although their illness was unrelated to COVID-19. This condition may be caused by some concerns, such as fear of being infected by COVID-19, deemed COVID-19 as a dangerous disease, so people are apprehensive about going to health services. However, an increase in GERD cases still occurs in patients seeking healthcare. Based on research conducted by Al-Momani *et al.* from January to May 2021, there was an increase in GERD incidents compared to before the pandemic. This condition is associated with an increase in positive GERD predictors such as heartburn and regurgitation.¹³

GERD patients' age characteristics revealed that most were in the productive age group (94.59%). This result is similar to the epidemiological data of GERD patients in Dr. M. Djamil Padang Hospital in 2016–2017 based on the GERD 2019 consensus that GERD mostly occurred in patients aged less than 60 years old.¹⁴ It contradicts the theory on the relationship between age and GERD, indicating that older adults are at risk for increased GERD incidence. Old age impacted mechanical factors such as peristaltic movement of the esophagus and

the decrease in lower esophageal sphincter (LES) function. GERD incidence is increasing in the productive age group due to multifactorial causes.⁹ Productive ages can be affected by lifestyle, which potentially causes GERD. According to the American College of Gastroenterology (ACG), lifestyles that may likely cause GERD were having a meal right before sleeping, lying down immediately after eating, eating quickly, and consuming food that can trigger GERD, such as food with high fat, chocolate, and caffeine.¹⁵

More than half of the GERD patients in this study were females (54.05%). This condition is similar to Radjainin *et al.*, who performed a study on GERD patients in Dr. Soetomo Surabaya Hospital, which showed a slightly higher incidence of GERD in females than males (53.4% vs. 46.4%).¹⁰ A research from Yamasaki *et al.* described that GERD patients were consistently slightly higher in females than males. There is no significant difference between patients' gender.⁹ However, a study conducted by Sang Yoon *et al.* even though it showed a significantly higher incidence of GERD in males, nevertheless, GERD symptoms were more dominant in females.¹⁶ Menopause may aggravate GERD symptoms in females.

Most of the GERD patients in this study had a middle level of education (72.08%) that supported Rathi *et al.* in 2018 (41%).¹⁷ Education level impacted the knowledge of disease etiology, prevention, therapy, and control. Patients with high educational levels tend to have extensive knowledge of the disease and be willing to seek additional information.¹⁸ Recent finding from Xuening Zhang *et al.* supports that genetically predicted higher educational attainment has a protective effect on GERD and is partly mediated by reducing adiposity, smoking, and depression.¹⁹ Another study from Abdullah *et al.* shows that the prevalence of GERD in the urban population of Indonesia was 9.35%. Education level is one of the most significant factors associated with GERD in this study.⁵

Occupational characteristics revealed that most GERD patients were housewives (27.92%). Jeong *et al.* also had a similar conclusion, where 31.20% of GERD patients were housewives, followed by professional workers (19.97%).¹⁸ Problems arising at home often cause discomfort and stress, which may lead to a psychological disorder in

housewives.²⁰ Psychological conditions, such as anxiety, potentially increase acid reflux with a decrease in LES function, esophageal motility disturbances, and an increase in gastric acid secretion.^{14,17}

GERD patients in this study mainly live in Padang City (35.13%), in the same city as Dr. M. Djamil Hospital. As a referral hospital in Central Sumatra, patients from other hospitals in Padang or other Sumatra provinces may be referred to Dr. M. Djamil Hospital if further treatment is required, including ensuring diagnosis through endoscopy or rule out other differential diagnoses.

The main result shows that more than half of patients with GERD had a body mass index categorized as obesity (43.25%). This condition is similar to research by Baeg *et al.*, which showed that 30.3% of patients with GERD also presented with obesity.²¹ Obesity can increase the risk of GERD through an increase in intra-abdominal pressure and the formation of hiatal herniation.¹⁴ Increased intra-abdominal pressure can facilitate LES relaxation, allowing reflux to occur. Furthermore, high intra-abdominal pressure can be a predisposition to hiatal herniation. Hiatal herniation will interfere with LES function and decrease motoric ability and esophageal clearance.²²

Patients in this study often presented with heartburn (62.16%). Alzahrani *et al.*, in 2019, also stated that 81.6% of GERD patients complained of heartburn.²³ Heartburn typically presents in GERD cases besides regurgitation. Heartburn is often defined as a burning sensation from the pit of the stomach and travels into the chest area during anamnesis, and the general population can understand it. Heartburn is caused by decreased LES function and increased intra-abdominal pressure; gastric acid may surge into the esophagus. Gastric acid can stimulate and activate chemoreceptors in the esophagus.¹⁴

Most GERD patients in this study were managed as outpatients (49.50%) and inpatients (22.50%). Almost all inpatients were hospitalized for 1–7 days. This result is similar to Patala *et al.* in 2021, where 65 patients (90.28%) were hospitalized. Patala *et al.* mentioned that the length of stay might decrease if they were treated accordingly with appropriate indication, drug, and dose.²⁴ However, 27.9% of patients were considered untreated because there was no further information on their medical record on the treatment

or medication. There are two possibilities: unkept outpatient appointments or discharge against medical advice.^{25,26} However, in this study, we did not explore these potential causes.

Triglyceride in patients with GERD was normal in more than half of the subjects enrolled (60.60%) compared to abnormal (39.40%). This study is similar to Wei *et al.* in 2019, where 75.37% of GERD patients came with normal triglyceride.²⁷ A systematic review by Mohammadi *et al.* concluded that 29.9% of GERD patients had abnormal triglyceride levels.²⁸ Triglyceride blood level positively correlated with apo-C III. An increase of apo-C III in obesity may increase triglyceride levels. Obesity can cause an increase in apo-C III, which may inhibit triglyceride breakdown in adipose tissue by lipoprotein lipase (LPL). Triglyceride accumulation in adipose tissue can cause an increase in inflammation factor secretion, for example, IL-1, IL-6, and TNF- α . This condition stimulates inflammation of LES and decreases LES function, which causes the surge of gastric acid into the esophagus.^{29,30}

Total cholesterol in GERD subjects was normal in 21 patients (61.80%) compared to abnormal in 13 patients (38.20%). Wei *et al.* also concluded that 61.88% of GERD patients had normal total cholesterol.²⁷ Kumar *et al.* depicted that 80.5% of GERD patients had normal blood cholesterol levels with a mean of 176.98 mg/dL.³¹ Blood cholesterol level can impact GERD incidence. A continuous increase of total cholesterol in plasma will be distributed into lipid droplets, a cholesterol reservoir, and acylglycerol in adipose tissue.³² This condition will cause an accumulation of adipose tissue in the abdominal cavity, increase intra-abdominal pressure, and cause gastric acid reflux into the esophagus. Moreover, an increase in cholesterol level will lead to an increase in rich-cholesterol bile excretion into the duodenum, inducing an increase in duodenum motility. This condition will cause atypical GERD symptoms, such as bloating, nausea, and vomiting.³³

In this study, blood HDL levels were abnormal in 29 patients (87.80%). This finding supported Kallel *et al.*, which found 61.1% of GERD patients had abnormal HDL levels.³⁴ Obesity in GERD may induce an alteration of lipid metabolism. Adipose tissue had a significant impact on increasing cholesteryl ester transfer protein (CETP) production. CETP may precipitate the release of cholesterol ester from HDL and triglyceride binding in HDL. Triglyceride-rich HDL will be excreted through the liver, thus decreasing HDL levels in the blood.^{35,36}

Similar to HDL, blood LDL in subjects enrolled in this study was abnormal in 24 subjects (72.70%). Mocanu *et al.* described the mean LDL level in GERD patients as 112 mg/dL, above the normal level.³³ Hypertriglyceridemia is the leading cause of other lipid disruption due to late triglyceride-rich lipoprotein clearance and the formation of small dense LDL. Obesity can disturb lipolysis with a decrease of LPL in adipose tissue.³⁵ Produced LPL hydrolyzed triglyceride that binds with chylomicron and very low-density lipoprotein (VLDL). Its residual product is small-dense LDL with higher affinity. This small-dense LDL needs a longer time to be metabolized. Therefore, it can be detected at a high level in plasma.^{35,36}

Limitations in this study include data collected from medical records with different numbers in each studied variable, hence the difference in sample numbers. The pandemic has forced the transition of healthcare services to use technology, including patient medical records. During the pandemic, Dr. M. Djamil Padang Central Hospital migrated its manual records to computerized ones within the hospital's network of information systems. This migration resulted in some data not being found or lost. Unavailable data was also caused by patients who canceled their treatment but did not reconfirm, while the data was recorded in the service on the same day. Another weakness of the data collected is that not all patients have baseline data. The examinations performed are also not equal for all patients. This procedure raises the question of what fixed procedures should be in place for all GERD patients at the referral hospital. Regardless of this limitation, this study had a wide time range and can describe GERD patients' condition in Dr. M. Djamil Padang Central Hospital.

CONCLUSION

In this study, most GERD patients were in the productive age group, female, middle level of education, housewives, and residing in Padang. Clinical characteristics of GERD patients included most were categorized as obese according to their body mass index, the chief complaint of heartburn, and being treated as an inpatient. Triglyceride and total cholesterol were mostly normal; blood HDL and LDL were abnormal.

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