

Prevalence of Gastroesophageal Reflux Disease and Its Risk Factors In Rural Area

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ABSTRACT

Background: Prevalence of gastroesophageal reflux disease (GERD) is escalating in Asia. The present study aimed to investigate the prevalence of GERD symptoms as well as potential risk factors associated with GERD in residents in a rural area in Jakarta.

Method: The study population consisted of subjects who aged 20 years or more and lived in rural area Kebon Bawang-Tanjung Priok, Jakarta. A self-administered questionnaire based on earlier validated questionnaire (GERDQ) was given. The questionnaire consisted of demographic characteristic, self, and environment sanitary, social and past illness history, and the symptoms score for GERD. Total score for GERD's symptoms score was 18, with a score of at least 8 was considered to have symptomatic GERD.

Results: The questionnaire was completed in 90 subjects. Of the 90 subjects, 12 (13.3%) had GERDQ score ≥ 8 which was the cut-off for defining presence of GERD. On both univariate and multivariate analysis, age > 50 years old (OR = 6.33; 95% CI: 1.1-35.6), handwashing habit before eating (OR = 6.93; 95% CI: 1.1-43.8), and raw/tap water (OR = 10.28; 95% CI: 0.8-130) were significantly associated with the presence of GERD.

Conclusion: Prevalence of GERD was high (13.3%) in rural area in Jakarta. Age > 50 years old, handwashing habit before eating, and raw/tap water were risk factors for GERD in this population.

Keywords: gastroesophageal reflux disease, prevalence, risk factors, rural area, Jakarta

ABSTRAK

Latar belakang: Prevalensi penyakit refluks gastroesofageal (GERD) semakin meningkat jumlahnya di Asia. Penelitian ini dilakukan untuk mengetahui prevalensi GERD dan faktor risiko yang terkait dengan GERD pada penduduk di daerah pinggir Jakarta.

Metode: Subjek penelitian yang diambil berusia 20 tahun atau lebih dan tinggal di daerah Kebon Bawang-Tanjung Priok, Jakarta. Kuesioner yang digunakan adalah kuesioner yang telah divalidasi sebelumnya yaitu kuesioner GERDQ. Kuesioner terdiri dari karakteristik demografi, data diri, lingkungan sanitasi, riwayat penyakit dahulu, dan skor gejala untuk GERD. Total skor GERDQ adalah 18, dengan skor minimal 8 dianggap memiliki gejala GERD.

Hasil: Dari 90 subjek, 12 subjek (13,3%) memiliki GERDQ skor ≥ 8 yang merupakan tolak ukur mengalami GERD. Dalam analisis univariat dan multivariat, usia > 50 tahun (OR = 6.33; 95% CI: 1,1-35,6), kebiasaan mencuci tangan sebelum makan (OR = 6.93; 95% CI: 1,1-43,8), dan air mentah/air keran (OR = 10,28; 95% CI: 0,8 -130) berhubungan dengan jumlah GERD secara bermakna.

Simpulan: Prevalensi GERD tergolong tinggi (13,3%) di daerah pinggir Jakarta. Usia > 50 tahun, kebiasaan mencuci tangan sebelum makan, dan air mentah/air keran merupakan faktor risiko untuk mengalami GERD pada populasi ini.

Kata kunci: penyakit refluks gastroesofageal, prevalensi, faktor risiko, daerah pedesaan, Jakarta

INTRODUCTION

Gastroesophageal reflux disease (GERD) is an upper gastrointestinal tract disease caused by reflux of gastroduodenal content into esophagus.¹ GERD are prevalent in the community throughout the world.^{1,2} Prevalence of GERD is ranging from 5% in Eastern population to 10-44% in Western population.^{3,4} There is approximately 20% of the population in the community having symptoms of heartburn or regurgitation for at least once a week and 29-44% of Western population having at least monthly heartburn.^{1,5} Epidemiologic studies in Asia show that the prevalence of GERD after year 2005 in Southeast and Western Asia (6.3-18.3%) are higher than in Eastern Asia (5.2-8.5%).⁶

A study conducted in Indonesia reported that the prevalence of GERD can be predicted as almost 3% of overall Indonesian population, with increasing rate from 5.7% in 1997 to 25.18% in 2002 in Cipto Mangunkusumo hospital.⁷ Although there is a traditional belief that GERD occurs less frequently in Asia than in Western countries, there is now emerging evidence that suggests its frequency rapidly escalating in Asia.^{3,5,8} Socioeconomic development and lifestyle changes in many developing Asian countries may favor the development of GERD there.^{3,5,8}

METHOD

We performed prospective study from January 2014 until February 2015. The study population consisted of residents in a rural area in Jakarta, Kebon Bawang in Tanjung Priok district, North Jakarta, Indonesia. It consisted of both adult males and females.

This was a prospective cross-sectional observational study. Each subject was asked to fill a questionnaire containing items elicited the demographic, self and environment sanitary, social and past illness history, and the symptoms score for GERD. The diagnosis of GERD was based on GERD Questionnaire (GERDQ), an instrument that has been validated and declared

reliable.⁴ GERDQ contains six questions asking about the frequency of heartburn, regurgitation, epigastric pain, nausea, and disturbed sleep due to heartburn, consumption of additional over the counter drugs for heartburn or regurgitation over the past 7 days. Each question can be given score ranging from 0 to 3; thus, the final score ranged from 0 to 18. The presence of GERD was defined as a score ≥ 8 .

The following definitions were used to identify the symptoms of GERD: (1) Heartburn was defined as burning sensation behind the breastbone; (2) Regurgitation was defined as gastric content (fluid or solid food) coming up to the throat or into the mouth; (3) Epigastric pain was defined as pain in the middle upper quadrant of the abdomen.

Categorical variables are presented as frequencies and continuous variables as mean (standard deviation). Discrete variables were tested using Fisher's exact test; continuous variables were tested using Mann-Whitney U. To assess the association of presence of GERD with potential risk factors each independent variable was tested by univariate and multivariate analysis using logistic regression. All determinants with P values < 0.10 were entered together into binary logistic regression model. Odds ratios (OR) and 95% confidence interval (CI) were used to estimate the risk of GERD occurrence with the respective independent variable. A p-value of < 0.05 was considered significant. The SPSS statistical software package version 17.0 (SPSS, Inc., Chicago, IL, USA) was used for analysis.

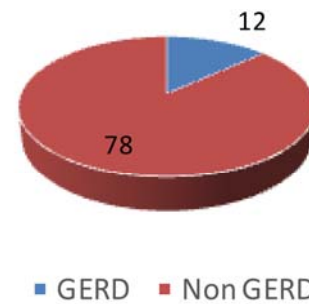
RESULTS

A total of 90 patients (76 female and 14 male; mean age of 44.7 ± 11.7 years) were recruited including 17 patients aged > 20 years and < 34 years, 55 patients aged 35-54 years, and 18 patients aged > 55 years. The baseline characteristics of these patients are shown in Table 1.

Table 1. Baseline demographic characteristics

Parameter	n (%)
Sex	
Male	14 (15.6)
Female	76 (84.4)
Marital status	
Married, both working	19 (21.1)
Married, either one working	45 (50)
Not married/divorced, working	8 (8.9)
Not married/divorced, not working	10 (11.1)
Married, both not working	8 (8.9)
Ethnic groups	
Ambonese	2 (2.2)
Batak	3 (3.3)
Batavian	19 (21.1)
Javanese	49 (54.4)
Medan	1 (1.1)
Padang	2 (2.2)
Sundanese	14 (15.6)
Monthly income	
< 185 USD	69 (76.7)
185-370 USD	16 (17.8)
> 370 USD	5 (5.6)
Education	Patient's
Uneducated	9 (10)
Elementary school	25 (27.8)
Junior High School	16 (17.8)
Senior High School	36 (40)
Diploma 1-3	2 (2.2)
Bachelor	1 (1.1)
Postgraduate	1 (1.1)
Occupation	Patient's
Not working	26 (28.9)
Labor worker	6 (6.7)
Entrepreneur	7 (7.8)
Private sector employee	8 (8.9)
Government employee	6 (6.7)
Housewife	30 (33.3)
Student	7 (7.8)

Of 90 subjects, 12 (13.3%) had GERDQ score ≥ 8 which was the cut off for defining presence of GERD. GERD symptoms were present in 10 (13.2%) of 76 females as compared to 2 (14.3%) of 14 males ($p = 1.000$). In both univariate and multivariate analysis, age > 50 years old, handwashing habit before eating, and raw/tap water consumption were significantly associated with the presence of GERD (Table 2).

**Figure 1. Prevalence of GERD in rural area in Jakarta**

DISCUSSION

GERD used to be considered as a disease of affluent people.² However, due to rapid globalization and development in developing countries, such as

Table 2. Association of gastroesophageal reflux disease (GERD) and risk factors

	GERD n (%)	Non GERD n (%)	p	Univariate OR (95% CI)	Multivariate OR (95% CI)
Age					
>50 years old	8 (26.7)	22 (73.3)	0.018	5.091 (1.4-18.6)	6.33 (1.1-35.6)
≤ 50 years old	4 (6.7)	56 (93.3)			
Sex					
Male	2 (14.3)	12 (85.7)	1.0	1.1 (0.2-5.6)	-
Female	10 (13.2)	66 (86.8)			
BMI					
Overweight	8 (16.7)	40 (83.3)	0.37	1.9 (0.5-6.8)	-
Normoweight	4 (9.5)	38 (90.5)			
Ethnic					
Javanese	8 (16.3)	41 (83.7)	0.53	1.805 (0.5-6.5)	-
Non-Javanese	4 (9.8)	37 (90.2)			
Education					
Low educated	8 (16)	42 (84)	0.54	1.714 (0.5-6.2)	-
High educated	4 (10)	36 (90)			
Income					
< 185 USD	11 (15.9)	58 (84.1)	0.281	3.79 (0.5-31.3)	-
≥ 185 USD	1 (4.8)	20 (95.2)			
Rawfood					
Yes	7 (24.1)	22 (75.9)	0.05	3.56 (1.0-12.4)	-
No	5 (8.2)	56 (91.8)			
Handwash before eating					
Seldom-Never	4 (26.7)	11 (73.3)	0.1	3.04 (0.8-11.8)	6.93 (1.1-43.8)
Always-Often	8 (10.7)	67 (89.3)			
Drinking Coffee					
Always-Often	6 (20)	24 (80)	0.2	2.25 (0.6-7.7)	-
Seldom-Never	6 (10)	54 (90)			
Boiled Water					
No	3 (75)	1 (25)	0.007	25.67 (2.4-273.5)	10.28 (0.8-130)
Yes	9 (10.5)	77 (89.5)			
Smoking					
Yes	1 (7.7)	12 (92.3)	1.0	0.5 (0.06-4.2)	-
No	11 (14.3)	66 (85.7)			

Indonesia especially Jakarta as its capital, prevalence rates of GERD are rapidly escalating. Hence, this study was designed to bring forth objective data regarding prevalence and risk factors of dyspepsia and GERD in rural area in Jakarta. GERD can be diagnosed based on symptoms in validated questionnaire (GERDQ) without invasive tests for epidemiological studies.

Prevalence of GERD in this study (13.3%) is quite high, conforming studies that said prevalence of GERD is increasing recently in Asia, including Indonesia. Prevalence of GERD in Cipto Mangunkusumo Hospital escalated from 5.7% in 1997 to 25.8% in 2002.⁷ In Singapore its rate increased from 5.5% in 1994 to 10.5% in 1999 and from 3.5% (2000) to 8.5% (2005) in Korea. However, prevalence rates in China (Hong Kong) and Iran were decreasing from 4.8% (1996) to 2.5% (2002) and from 39.7% (1999) to 33% (2006), respectively, with similar sample size between study years.^{6,10}

This study did not find any association of sex/gender with GERD. The effect of sex/gender on the prevalence of GERD is inconsistent in literature. Most studies have reported no gender difference while some studies have found that GERD is more common in women and another in men.^{3,7,9,10}

The association of BMI and GERD has remained inconsistent. The present study shows that body mass index was not related to GERD which is in accordance with the data from southern Iran.¹⁰ However, other researchers have shown significant association of prevalence of GERD with increasing BMI, one study conducted in Indonesia showed the most frequent characteristic of GERD was patient with normal BMI, another study conducted in Korea showed risk factor for non-erosive reflux disease was low BMI.^{3,7,11}

This study shows age > 50 years old had association with GERD, which is in line with some studies showed older age was risk factor and associated with GERD.^{3,6,10} On the other hand, a study from Indonesia found that the most frequent characteristic of GERD was patient with age less than 40 years old.⁷ Further study is needed to elaborate the reason behind this finding.

Some studies have investigated the association of GERD symptoms with socioeconomic class. In this study, monthly income and education level of patient were not related with prevalence of GERD. Studies from India, Iran, and Spain reported the same result.^{3,12,13} Two different studies in Iran and one large population-based study in Norway reported positive association between low socioeconomic status based

on patient's occupation and education with higher prevalence of GERD.^{10,14,15} This probably reflects the unhealthy life style habits or less ability to change such habits. Only one study conducted in Malaysia reported high education as one of risk factors for GERD.¹⁶

We found that GERD was more common in Javanese group but there was no significant association between GERD and ethnicity. Only few studies have investigated the association of reflux symptoms with ethnicity. The present study did not find any association between prevalence of GERD with ethnic groups. A prospective survey of 40 patients diagnosed with GERD in 3 cities in Indonesia reported GERD was more common in people of Javanese ethnicity. Studies from Singapore by Ho et al found that GERD is more common in Indian population than in Malay and Chinese populations.¹⁷ GERD is also more frequent in Caucasian than in Asian populations.⁹

Hand hygiene was found associated with the prevalence of GERD. These factors have not been studied by other researchers in Indonesia. The possible reason for this is bad hand hygiene can increase the risk of gastrointestinal infection that can induce higher gastric acidity and risk for reflux. These risk factors are important to be further investigated in a larger population-based study because these factors are modifiable.

Dietary habit has been associated with the prevalence of GERD in many literatures. Dietary habit such as consumption of fruits and vegetables, low-fat diet, and intake of greasy or sweet foods were most commonly investigated, but not home cooked foods and/or raw/uncooked foods that were studied in this research. No association was found between prevalence of GERD and dietary habit of non-home cooked foods and raw/uncooked foods in this study. Mostaghni et al found higher prevalence of reflux symptoms in those who consumed fruits and vegetables more frequently, while Saberi-Firoozi et al reported protective effects of fruits and vegetables on reflux symptoms.^{10,18} Nocon et al reported that fruit consumption has protective effect, while consumption of vegetables had no significant association.¹⁹ Low-fat diet of Asian was found to be related with the lower prevalence of GERD compared to Western populations.⁶ Li et al reported increase intake of greasy or sweet foods and excessive eating as risk factors for GERD.²⁰

This study revealed that there was no association of GERD with coffee consumption and smoking status. Studies have shown that smoking was a risk factor for GERD and according to Nocon et al it was dose-

dependent.^{3,6,10,19} This may be related to reduction of the lower esophageal sphincter pressure during smoking.²¹ However, a study of 2,500 subjects in Spain did not find that smoking predisposes to reflux symptoms.¹² As for coffee consumption, this study's result is in line with Nocon et al's study.¹⁹

Significant association of GERD and drinking water source from raw/tap water was found. Source of drinking water from tap water was found to be risk factor for GERD. Nouraie et al also found that GERD prevalence was significantly associated with the history of unpurified water consumption.²² The possible explanation for this is raw/tap water in Jakarta might be more polluted by some microorganisms such as *H. pylori* compared to cooker/mineral bottled water. Some studies stated that drinking water is a main pathway for transmission of *H. pylori*.^{22,23} Several mechanisms have been suggested for contribution of *H. pylori* in pathogenesis of GERD. There are some concepts that support this theory. On the other hand, some studies have proposed that *H. pylori* might protect against GERD.²²

In conclusion, prevalence rates of GERD (13.3%) are high in rural area in Jakarta which may be due to lower socioeconomic status and education level of these people. However, these numbers cannot be extrapolated to general population in Jakarta because of inadequate number of samples. Future longitudinal studies and follow ups with greater number of subjects needed to clarify other possible risk factors and association with GERD so that the study's result can be extrapolated to general population.

The strength of this study is that we used a validated and reliable questionnaire for GERD symptoms which evaluates not only cardinal symptoms of GERD (heartburn and regurgitation) but also another clinical features (epigastric pain, nausea, disturbed sleeping, consumption of over-the-counter drugs) of GERD and quantifies not only frequency but also severity of symptoms in the form of symptom score.⁹ The weakness of this study is small sample size; hence, it is not a true community-based study. To extrapolate this result to general Indonesian population, further study with larger sample size in community-based rural and urban settings is needed. Another weakness of this study is the shortcoming of self-administered questionnaires, such as misinterpretation of the symptoms when responder fills the questionnaire.

CONCLUSION

Prevalence of GERD was high (13.3%) in rural area in Jakarta. Age > 50 years old, handwashing habit before eating, and raw/tap water were risk factors for GERD in this population.

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