ORIGINAL RESEARCH PAPER

Volume-8 | Issue-7 | July - 2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

GLUTATHIONE PEROXIDASE (GPX) LEVELS AND ITS ASSOCIATION WITH HELICOBACTER PYLORI GASTRITIS

Gastroenterology

Frans S Sarumpaet* Department of Internal Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia *Corresponding Author

Gontar A Siregar Division of Gastroentero-Hepatology, Department of Internal Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

Leonardo B Dairi Division of Gastroentero-Hepatology, Department of Internal Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

ABSTRACT

Gastritis is inflammation of gastric mucosal and submucosa in response to acute and chronic injury which usually caused by *Helicobacter pylori (H. pylori*). Inflammation due to *H. pylori* will conduce *Reactive oxygen species* (ROS), a marker of pathogenesis and worsening of gastritis and gastric ulcer disease. ROS will increase the expression of Glutathione peroxidase (GPX), one of the endogenous antioxidants founded in mitochondria, cytosol and extracellular. The objective of this study was to evaluate level of GPX serum in gastritis patient with *H. pylori* and without *H. pylori.* This study used cross sectional study in 40 patients with gastritis at Haji Adam Malik General Hospital, Medan, North Sumatera. Diagnosis of gastritis based on inflammation of gastric mucosa in endoscopic, *H. pylori* infection was made if positive results of CLO test were found and level of GPX serum was determined by ELISA kit glutathione peroxidase paint R5505. Data were collected and analyzed using SPSS version 22. There was no significant association between level of GPX serum and gastritis patient with *H. pylori* infection

KEYWORDS

Gastritis, Helicobacter *pylori*, *Reactive oxygen species* (ROS), *Glutathione peroxidase* (GPX)

INTRODUCTION

Gastritis is an inflammatory process in the gastric mucosa and submucosa in response to injury which can be acute or chronic.[1] *Helicobacter pylori* (*H.pylori*) infection is the most common cause of active chronic gastritis throughout the world.[2] Prevalence of *H. pylori* in western countries continues to decline due to improvements in living standards, good hygiene, low density, and the use of antibiotics. While in Asia, the rate of *H.pylori* infection is very high, including in Indonesia.[3,4] Reactive oxygen species (ROS) is produced by bacteria and become one of the important factors in pathogenesis of worsening gastritis and gastric ulcer disease.[5] Gastric epithelium is continuously exposed to ROS activity in the gastric lumen. In gastritis patients with *H.pylori* infection, ROS is produced through an inflammatory process. *H.pylori* infection will cause the recruitment of neutrophils and macrophages / monocytes that increase free radicals and have implications for gastric mucosal damage.

Glutathione peroxidase (GPX) is an enzyme that functions to catalyze hydrogen peroxide (H2O2) and organic hydroperoxide in order to prevent the occurrence of lipid peroxidation in cell membranes and work as a binder of free radicals.[6] GPX can be found in mitochondria, cytosol and extracellular. In the presence of GPX, reduced glutathione (GSH) reacts with H2O2 or organic hydroperoxide (ROOH), forming glutathione disulfide (GSSG) and H2O.[7]

Previous research on GPX levels in *H. pylori* gastritis patients still varied. Verhuls et al reported that there was significantly lower glutathione levels in patients infected with *H. pylor*i than those who were not infected.[8] Otherwise Sadreddini et al found that GPX in *H. pylori* patients was lower than patients who were not infected, but it was not significantly different.[7] Meanwhile Ansari et al reported that GPX levels in gastric acid increased significantly in the case of *H. pylori* as a compensation mechanism for neutralizing free radicals.[9] The aimed of this study to determine differences in serum GPX levels between gastritis patient with *H. pylori* infection

METHOD

Patient Selected

There were 40 samples obtained through consecutive sampling. Determination of dyspepsia based on Porto Alegre Dyspeptic Symptoms Questionnaire (PADYQ) scoring. Scores range from 0 (asymptomatic) to 44 (severe). Patients with a total score of 6 or more are diagnosed as dyspepsia. Gastritis was ensured by endoscopy (Olympus, Tokyo, Japan). Mucosa undergoes edema, erythema (spotted, patchy, linear), exudate, bleeding, erosion and histopathology (marked by inflammatory cells in the gastric mucosa) is diagnosed with gastritis. *H.pylori* is established through a change in color from yellow to red, magenta, pink, and orange in the examination of Campylobacter Like Organism test (CLO). GPX examination using an ELISA kit glutathione peroxidase paint R5505 (Randox Laboratory LTD, United Kingdom). Measurements using the Advia 1800 instrument (Siemens Healthcare, GmbH, Germany)

Data analysis

Data analysis of GPX on patients with *H.pylor*i gastritis were univariate included (*H. pylori* infection, demographic, clinical characteristics of *H. pylori*) and bivariate to assess GPX levels in gastritis patients with *H. pylori* and without *H. pylori* infection using independent t-test and analysed using SPSS 22 version. A value of $p < 0.05$ with a 95% confidence interval was considered statistically significant.

RESULT

The proportion of gastritis sufferers was more in men (62.5%) than in women (37.5%). Based on ethnicity, the highest proportion of gastritis sufferers was Batak (23;57.5%), and the lowest was Acehnese (5;12.5%). Based on the occupation, the highest was housewives (16;40%) and civil servants (4;10%) become the lowest. Based on education, the highest proportion of patients is at high school level (28;70%) and the lowest proportion at the University level (2;5%). (**Table 1**)

Table 1 . Baseline and clinical characteristics of subjects

	N=40
Gender	
Male	25 (62.5%)
Female	15 (37.5%)
Ethnicity	
Batak	23 (57.5%)
Jawa	12 (30.0%)
Aceh	5 (12.5%)
Occupation	
Private employees	12 (30.0%)
Housewives	16 (40.0%)
Enterpriser	8 (20%)
Civil Servantas	4 (10%)
Education	
Elementary	3 (7.5%)
Middle school	7 (17.5%)
High School	28 (&0%)
University	2 (5.0%)

Based on the etiology, gastritis patients with positive *H.pylori* were (21;52.5%) and negative were (19;47.5%) (**Table 2**). It was found that no significant associations between levels of glutathione peroxidase with *H. pylori* infection (T**able 3**)

Table 2. Status of *H. pylori* infection

H. Pylori	N = 40
Positive	21 (52.5%)
Negative	19 (47.5%)

Table 3. Difference of Glutathione peroxidase level in gastritis with and without *H. pylori* infection

H. pylori	GPX			95% CI	T	p
	N	Mean	SD			
Negative	19	127.53	20.08	-3.43– 25.15	1.53	0.394
Positive	21	116.67	24.13			

DISCUSSION

ROS such as superoxide (O2-) anion, hydrogen peroxide (H2O2), hydroxide radicals (OH) and reactive nitrogen species (RNS) such as nitric oxide (NO) and peroxynitrite (OONO-) is produced excessively by inflammation in gastric tissue. Normally, ROS is still produced in small amounts and has a protective effect. Small amounts of ROS can modulate the body's defense mechanism against pathogens. Excessive production of ROS can cause an inflammatory process. ROS has an important role in the pathogenesis of chronic inflammation of the gastrointestinal tract, including gastritis caused by *H. pylori*, esophagitis reflux, Barrett esophagtis, inflammatory bowel diseases such as ulcerative colitis and Crohn's disease. Long-term *H.pylori* colonization causes the formation of reactive oxygen species (ROS) that exceed the antioxidant capacity in neutralizing free radicals, resulting in cell damage. Glutathione peroxidase (GPX) is one of the body's antioxidants that serves to eliminate excessive ROS production.[10,11]

The results of this study indicate that gastritis sufferers with positive H.pylori infection had a mean glutathione peroxidase level of 116.67 ± 24.13; whereas patients with negative H.pylori infection had a mean glutathione peroxidase level of 127.53 ± 20.08. The results of previous studies have similar result $p = 0.062$.[12] Suzuki et al shown that glutathione peroxidase activity increased significantly at week 6 and stabilize at week 12 in gastritis patient with *H. pylori*. It will be significant increase in total GPX when examined at week 12. Higher levels of glutathione peroxidase in patients without H. pylori infection are thought not only to depend on an increase in the form of glutathione disulfide or oxidation, but also increase form of reduced glutathione or sulfhydry.[13]

CONCLUSION

There were no significant association between levels of glutathione peroxidase with status of *H.pylori* in gastritis patient.

REFERENCES

1. El-Zimaity HMT. Recent advances in the histopathology of gastritis. Current Diagnostic Pathology. 2007;13:340-8
2. Rugge M, Genta RM. Staging and grading of chronic gastritis. Humanpathology. 2005;36:228-33.
3. Rehnberg-Laiho L, Rautelin H, Koskela P, Sarna S, Pukkala E, Aromaa A, et al. Decreasing prevalence of helicobacter antibodies in Finland, withreference to the decreasing incidence of gastric cancer. Epidemiol Infect. 2001;126:37-42.
4. Matsukura N, Yamada S, Kato S, Tomtitchong P, Tajiri T, Miki M, et al. Genetic differences in interleukin-1 betapolymorphisms among four Asian populations: an analysis of the Asian paradox between H. pylori infection and gastric cancer incidence. J Exp Clin Cancer Res. 2003;22: 47-55.
5. Arend A, Loime L, Roosaar P, Soom M, Loivukene K, Sepp E.Helicobacterpylori substantially increases oxidative stress in indomethacin exposed ratgastric mucosa.Medicina. 2005; 41(4):343-7
6. Kohen R, nyska A. invited review: Oxidation of biological systems : oxidative phenomena, Antioxidant, redox reactions, and methods for their quantification. J sage 2002
7. Toppo S, Flohé L, Ursini F, Vanin S, Maiorino M. Catalytic mechanisms and specificities of glutathione peroxidases: Variations of a basic scheme.Vol. 1790, Biochimica et Biophysica Acta - General Subjects. 2009. p.1486–500
8. Verhulst ML, van Oijen AH, Roelofs HM, Peters WH, Jansen JB. Antral glutathione concentration and glutathione S-transferase activity in patients with and without Helicobacter pylori. 2000 Mar;45(3):629-32
9. Ansari M, Rahbani-Nobar M, Dolatkhah H, Fattahi E, Aghazade M, Mojtabaii-Motlag S. Comparison of levels of nitric oxide, superoxide dismutase, and glutathione peroxidase of gastric juice in infected and non-infected patients with Helicobacter pylori. Acta Medica Iranica. 2006; 44(3): 159-66.
10. Na, H.K., Woo, J.H. Helicobacter pylori Induces Hypermethylation of CpG Islands Through Upregulation of DNA Methyltransferase : Possible Involvement of Reactive Oxygen/Nitrogen Species. Journal of Cancer Prevention, 19 (4) : 1-6.
11. Kim, Y.J., Kim, E.H., Hahm, K.B. Oxidative Stress in Inflammation-Based Gastrointestinal Tract Diseases : Challenges and Opportunities. Journal of Gastroenterology and Hepatology, 2012 ; 27 : 1004-1010.
12. Tala, Z.Z., Siregar, G.A., Siregar, G.P. Glutathione Peroxidase Level in Patients with Helicobacter Pylori-Associated Gastritis. IOP Conf Series : Earth and Environmental Science, 2018 ; 125 (2) : 2-6.
13. Suzuki et al. Roles of Oxidative Stress in Stomach Disorders. J.Clin. Biochem. Nutr, 2012 ; 50 (1) : 35-39.