Original Article

Assessment of Malondialdehyde and Lipids Profile in the Patients with H. Pylori Infection in Babylon Province

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Abstract

Aim of study: Evaluation of the lipids profile and malondialdehyde in patients with "H. pylori" compared to healthy controls in Babylon province.

Background: "Helicobacter pylori (H. pylori) is a Gram-negative pathogen" causing active gastrointestinal inflammation. Not only does this microorganism cause gastric ulcers and cancer, but it also increases the risk of a heart attack (4). Individuals with H. pylori have been found to have high levels of lipid peroxides and lipids profile.

Methodology: The study design is case-control, where the sample collection according sample size equation equal (100 healthy control and 100 patients with positive H. Pylori). The samples collection depends on specific criteria. Lipids profile determined by Fuji a biochemistry apparatus and malondialdehyde by spectrophotometric methods.

Results and Discussion: The results showed a significant increase in the values of cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol, and malondialdehyde for the group of patients with H. Pylori compared to the control group. The reason for the increase in these values is due to the occurrence of digestive tract disorders, in addition to the occurrence of inflammation, which leads to an increase in the levels of "free radicals" and thus a rise in malondialdehyde.

Conclusion: The infection with H. Pylori leads to high lipids, which may be caused by digestive disorders and high levels of fat with the presence of inflammation that leads to lipids peroxidation as a result of high levels of "free radicals" in patients compared to healthy people.

Keywords: H. Pylori, MDA, Lipids profile, gastroenteritis

1. Introduction

"Helicobacter pylori is a Gram-negative bacteria that causes active gastric inflammation in the stomach". This microbe not only causes gastric ulcers and cancer but also raises the risk of coronary artery disease [1]. Excess lipid peroxides have been seen in patients with "H. pylori" infection, according to numerous studies [2][3].

Infection with H. pylori produces chronic inflammation of the stomach mucosa, which can lead to peptic ulcer and intestinal metaplasia, as well as adenocarcinoma. Overproduction of "reactive oxygen species (ROS)", also known as "oxidative stress", occurs as a result of a range of metabolic events.

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ROS has a harmful effect on normal cells, increasing the probability of mutations, chromosome abnormalities, cell death, and cancer development [4][5]. As a lipid peroxidation indicator, malondialdehyde (MDA) has the ability to harm biomolecules such as DNA, RNA or cellular proteins, thought to induce malignancy through oxidative cellular damage [6]. In In the cases with gastric mucosa infected by H. pylori, MDA levels are higher than in normal tissue, and MDA levels are dramatically reduced during H. pylori elimination [7]. MDA levels in the blood are also linked to H. pylori infection [8]. MDA levels were significantly increased in stomach tumor tissues and serum of patients with gastric cancer with regard to H. pylori infection. These data imply that ROS have a detrimental role in gastritis and carcinogenesis caused by H. pylori [9].

It is indeed that "H.pylori infection that plays a major role in atherosclerosis". Increased "low-density lipoprotein cholesterol (LDL-C)" and decreased "high-density lipoprotein cholesterol (HDL-C)" levels are important risk factors for cardiovascular disease and metabolic syndrome. In other cases, the relation between "H. pylori" positive and lipid parameters is ambiguous. As a result, a clear indication of the link between H. pylori-positive and lipid parameters is critical. Because of its effects on lipid metabolism, infection with the H. pylori bacterium, which is linked to various gastroduodenal diseases, has been associated with cardiovascular disease [10][11].

Infection with H. pylori raises total cholesterol and triglyceride levels, while H. pylori-positive people in Japan and other Asian nations have low high-density lipoprotein cholesterol (HDL-C) and raised low-density lipoprotein cholesterol (LDL-C). The impact of H. pylori infection on lipid metabolism may depend on culture [12].

2. Material And Methods

2.1: Patients

"The study design of this study is case-control", where the samples were collected from 200 people, divided into 100 control and 100 patients. Samples were collected from patients with H-pylori after their diagnosis and the appearance of "symptoms such as abdominal pain, acid reflux, and digestive disorders", where the diagnosis was made by internists as well as based on laboratory diagnosis. The similarities between the patients and the control group in terms of age, lifestyle, BMI, and smoking were taken into consideration. For a period of six months for the year 2021 from Marjan Hospital in Babil province.

2.2: "Samples Collection and Preparation"

"Samples were collected from H-pylori patients" after they were diagnosed with the infection in the laboratory, by collecting samples from patients at discharge, as well as by examining blood samples after fasting for 12 hours and centrifuged to separate serum at (3000 rpm) for (6 min.) at (5°C), and then the serum used for test. It was also confirmed that they had gastrointestinal diseases with H-pylori by taking tissue samples under their endoscope.

2.3 Measurement of serum MDA Levels

An assay of MDA has been done by the reaction with thiobarbituric acid to form a complex compound measured by the spectrophotometry method [13].

2.4 Measurement of serum lipids profiles

An assay of "total cholesterol, triglyceride, HDL-cholesterol, LDL-cholesterol, and VLDL-cholesterol" has been measured by a full automated instrument (Fuji apparatus).

2.5 "Statistical analysis"

"The data were presented as the mean ± standard deviation. T-test. A P-value of ≤ 0.05 was considered statistically significant".

2. 6 "Ethical considerations"

"This study was conducted in accordance with the laws of research ethics of the Iraqi Ministry of Health and the Iraqi Department of Training and Development".

3 Results And Discussion

The results of this study appear in the Table (3-1).

Table 3-1: The Biochemical Results for The Patients and Control.

Biochemical Parameters	Control Mean±SD	Patient Mean±SD	Confidence Interval 95%		P-Value
			Upper	Lower	
MDA (µmol/l)	24.178±4.130	29.125±5.746	7.142	2.531	0.006
Triglyceride (mg/dl)	70.82±15.63	156.32±67.32	113.18	57.81	0.001
Cholesterol (mg/dl)	126.95±31.53	176.22±64	71.92	26.62	0.001
HDL-Cholestrol (mg/dl)	54.62±22.43	46.57±18.33	21.01	5.36	0.147
LDL-Cholesterol (mg/dl)	66.12±30.27	90.47±41.62	47.31	11.53	0.001
VLDL-Cholestrol (mg/dl)	14.20±3.08	31.30±12.91	22.65	11.47	0.001

P-value ≤0.05

Free radicals and other reactive oxygen species (ROS) are produced by all aerobic cells and are known to participate in a variety of damaging processes [14]. Free radical-induced oxidative damage is thought to play a key role in the pathogenesis of H. pylori infection [15]. One of the events set in motion as a result of the production of free radicals in cells and tissues is lipid peroxidation. The onset of lipid peroxidation is thought to be the primary reason for cell membrane breakdown and cell damage [16][17].

Malondialdehyde (MDA) levels have been observed to be higher in patients infected with "H. pylori" [18]. In H. pylori-infected patients, our findings also show an increase in lipid peroxidation. Proteins, lipids, carbohydrates, and nucleic acids can all be impacted by lipid peroxidation. Lipid peroxides are particularly damaging to plasma membranes [19]. In vitro, lipid peroxides have been discovered to promote protein glycation [20], in addition to participating in these damaging processes. MDA has recently been discovered to enhance hemoglobin glycation on its own. [21].

Lipid peroxides have been linked to glycated hemoglobin in "patients with hyperthyroidism, chronic renal failure, and asthma". MDA and fructosamine were found to have a strong relationship in individuals with nephrotic syndrome, "non-diabetic asthma, rheumatoid arthritis, and chronic renal failure" [22][23].

There is a relation between H. pylori infection and lipid levels. As a result, a clear relationship between H. pylori-positive H. pylori and lipid parameters is crucial. Infection with H. pylori which is connected to a variety of gastroduodenal illnesses has been linked to cardiovascular disease for its effects on levels of lipids [24].

H. pylori infection elevates total cholesterol and triglyceride levels, while H. pylori-positive patients in Japan and other Asian countries have low HDL-C and high low-density lipoprotein cholesterol (LDL-C). Culture may enhance the effects of H. pylori infection upon hyperlipidemia [24].

Excessive "ROS generation has been documented in H. pylori-infected gastric mucosa", with "neutrophils, vascular endothelial cells, gastric mucosal cells", and H. pylori itself being potential sources of ROS. The oxidative stress caused by H. pylori infection may disrupt gastric epithelial cell signaling and result in DNA damage, which is the most likely cause of gastric carcinogenesis [25]. MDA is a lipid peroxidation product that is produced during the breakdown of lipid hydroperoxides and is thought to be the most cancer-causing of the lipid peroxidation products. [25].

A significant elevated levels of MDA as a result of free radical damage for cell membrane. In H. pylori-infected gastric epithelium, MDA levels are higher than in normal histology, and "H. pylori" play a key role in ROS generation by beginning neutrophil infiltration and cells destruction [25].

In addition to the "stomach mucosa" serum MDA levels in H. pylori patients are much greater than in healthy people. Lipid peroxidation has been identified as a major source of endogenous mutations in humans, which may play a role in the development of gastrointestinal malignant tumors and contribute to cancer incidence [9].

4. Conclusion

H. pylori from the cause of hyperlipidemia due to gastroenteritis for the patients and also lead to elevated MDA because of inflammation and increases in the levels of ROS.

The elevation of MDA, cholesterol, triglycerides, VLDL-cholesterol, and LDL-cholesterol cause many diseases such as atherosclerosis, hypertension, diabetes Mellitus and immune diseases, so must be the patients with H-pylori adherence to a proper diet and lifestyle.

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