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# BOOK OF ABSTRACTS

## THE 2ND INTERNATIONAL CONFERENCE ON CARDIOVASCULAR DISEASE

FROM GENES TO NOVEL THERAPY

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Irhamni

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# PERIODONTITIS AND CORONARY HEART DISEASE

Farida Juliantina Rachmawaty
*Microbiology Departement, Faculty of Medicine, Universitas Islam Indonesia*

Periodontitis is a serious infection or inflammation of the gums that involves the destruction of soft tissues and bones supporting the teeth. The causes of periodontitis are some species of gram-negative bacteria colonizing on dental plaque in the subgingival area. Research reports, the disease not only has local effects. Other researchers report that people with the periodontal infection have a higher risk for coronary heart disease (CHD) than those who do not suffer. Research shows that periodontitis sufferers are 1.5-4 times more likely to develop cardiovascular disease. On the other hand, coronary heart disease is the leading cause of death for non-infectious diseases. In periodontal infections there is an increase in C-reactive protein and pro-inflammatory activity, but HDL-cholesterol is lower than control. The presence of such infections affects the endothelial cells, blood coagulation, fat metabolism and monocytes or macrophages. Poor oral health will increase the incidence of periodontitis infection. Periodontitis increases the risk of coronary heart disease.

**Keywords:** periodontitis, coronary heart disease, gram-negative bacteria

# PERIODONTITIS AND CORONARY HEART DISEASE

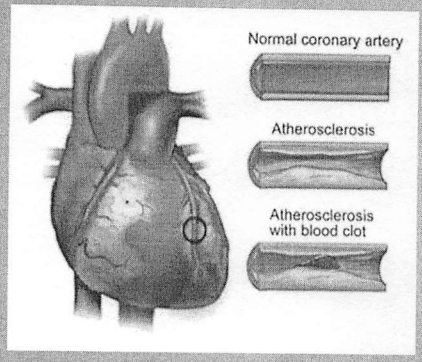
**Farida Juliantina Rachmawaty**
Department of Microbiology, Faculty of Medicine, Universitas Islam Indonesia

Periodontitis is a serious infection or inflammation of the gums that involves the destruction of soft tissues and bones supporting the teeth. The causes of periodontitis are some species of gram-negative bacteria colonizing on dental plaque in the subgingival area. Poor oral health will increase the incidence of periodontitis infection. Several studies have reported, the disease not only has local effects. Other researchers report that people with periodontal infection have a higher risk for coronary heart disease (CHD) than those who do not suffer. Research shows that periodontitis sufferers are 1.5-4 times more likely to develop cardiovascular disease. On the other hand, coronary heart disease is the leading cause of death for non-infectious diseases. The presence of such infections affects the endothelial cells, blood coagulation, fat metabolism and monocytes or macrophages. Periodontitis increases the risk of coronary heart disease.

Keywords: periodontitis, coronary heart disease, gram negative bacteria

## Coronary Heart Disease

Coronary heart disease is the number one cause of death in the world. In 2002, the World Health Organization (WHO) recorded more than 11.7 million people worldwide died from coronary heart disease (CHD). Coronary heart disease is a condition of coronary artery vessels inhibited by the presence of plaque in the coronary arteries that cause atherosclerosis. The blood vessels should be tasked with supplying blood to the heart muscles1.




Picture 1. Human Heart and Atherosclerosis2

## Periodontitis

Periodontitis is a serious infection or inflammation of the gums that involves the destruction of soft tissues and bones supporting the teeth. The causes of periodontitis are some species of gram-negative bacteria colonizing on dental plaque in the subgingival area. Poor oral health will increase the incidence of periodontitis3 infection.

## Causes and Symptoms of Periodontitis

Subgingival microorganisms in the periodontitis state are dominated by gram-negative bacteria. One of the bacteria suspected to cause periodontitis is Porphyromonas gingivalis4.

Such bacteria and their products such as lipopolysaccharide (LPS) can enter the periodontal tissues and blood circulation through the sulcus epithelium and cause changes in the inflammatory response and systemic changes that induce a vascular response.

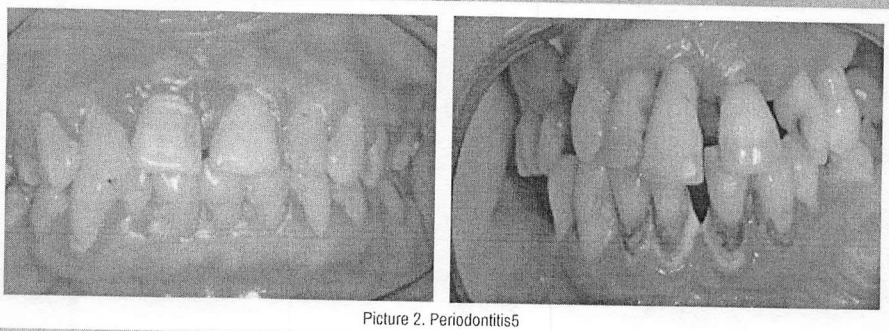
Signs and symptoms of periodontitis may include:

1. The gums are swollen
2. Gums are bright red or purplish
3. Gums that feel pain when touched
4. Gums are reduced in height so that, making the teeth look longer than usual
5. The cavity is formed between the teeth
6. Tummy between teeth and gums
7. Breath smells
8. Bad taste in mouth
9. Teeth loose, and
10. Tooth changes when biting (wobbly teeth).

There are several classes of periodontitis, namely chronic periodontitis and aggressive periodontitis. Chronic periodontitis is the most common type, affecting adults in general, but can also affect children. Aggressive periodontitis usually appears in childhood or early adulthood and attacks only a small proportion of people.

## Conclusion

Periodontitis increases the risk of coronary atherosclerosis lesion marked by coronary artery wall thickening, endothelial disintegration, lipid deposition, atheroma, stenosis, intimal collagen disintegration, and embolism fatty.



Picture 2. Periodontitis5

## Mechanism

Periodontitis begins with the formation of plaque attached to the tooth surface. Dental plaque is a thin layer of multi-species biofilms containing bacterial colonization, bacterial products, and food waste6.

At the heart, atherosclerosis is an inflammatory reaction. This process involves the interaction between immune mechanisms and some metabolic substances accompanied by accumulation of lipids in the walls of the coronary arteries7. The hypothesis of atherosclerosis, a response to injury, suggests that the onset of lesion formation is characterized by endothelial dysfunction. Endothelial dysfunction may be due to increased levels of Low Density Lipoprotein (LDL-ox) oxidation, free radical from cigarette smoke, and microorganism infections. Injury that occurs in blood vessels induces endothelial cells to form cytokines and growth factors. Inflammatory responses stimulate proliferation and smooth muscle cell migration to the inflammatory area, resulting in thickening of the artery wall8.

## Periodontitis and Coronary Heart Disease

Epidemiological studies have proven that periodontal infection is associated with an increased risk of cardiovascular disease. In another study, it showed that patients suffering from periodontitis had a 19% greater risk of developing cardiovascular disease than patients without periodontitis4.

Experimental studies conducted by injecting Porphyromonas gingivalis suspension (0.5 McFarland / 1.5x108 CFU / ml) on the left mandibular left or right gingival molar gingiva 3 times a week for 4 weeks indicated the occurrence of arterosclerosis. The lysis enzymes produced by bacteria are thought to cause direct periodontal tissue damage. Other bacterial products, such as endotoxin, activate complementary systems that can lead to the formation of active proteins. Activation of immune cells by bacteria and their products stimulates the production of enzyme derivatives, cytokines, and other inflammatory mediators that ultimately lead to the destruction of alveolar bone and connective tissue such as periodontal ligaments. The results showed that periodontitis increased the thickness of the arterial wall, the disintegration of intimal collagen, lipid deposition, embolic fatty, atheroma, stenosis, and endothelial disintegration of the coronary artery9,10.

Response to bacterial infections is considered an important inflammatory stimulus that causes atherosclerosis (the hypothesis of response to injury). Bacteria and its products can invade the blood vessels and cause damage to endothelial cells, affecting fat metabolism, blood coagulation, and thrombogenesysis process11. The bacteria that cause periodontitis disease can spread through the bloodstream, increase intravascular inflammation, aggravate atherosclerosis in a short time3.

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on 21–22 March 2018, at Prime Plaza Hotel, Yogyakarta, Indonesia

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