



“Erosive Effect Of Aspirin On Primary Teeth Enamel In Children With Heart Disease: In vivo and In vitro study”

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

لَسْبَحَانَكَ لَا يَعْلَمُ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْعَظِيمُ

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elders,
Especially those who are very close to our heart.**

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List of abbreviations

ASA	: Acetyl salicylic acid
CCD	: Cyanotic congenital heart disease
CHD	: Congenital heart disease
CID	: Chemical Industrial development
gm	: Gram
HD	: Heart disease
kg	: Kilogram
mg	: Milligram
ml	: Milliliter
NSAID	: Non steroidal-anti-inflammatory drug
RHD	: Rheumatic heart disease

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INTRODUCTION

Heart disease is one of the most common developmental abnormalities among children, occurring in approximately 8 to 10 in 1,000 births.⁽¹⁾

Heart diseases observed in children and adolescents are mainly congenital heart disease and acquired heart disease.⁽¹⁾

Many studies showed that, children with heart disease have higher enamel hypoplasia and caries prevalence than normal children, and that could be due to many reasons such as their attitude and knowledge toward oral hygiene measures, sugary diet and medications that could increase their susceptibility to caries and acidic drugs that cause erosion.⁽²⁾

In children, dental erosion become a major problem in past years, recent studies showed that the prevalence of dental erosion is increasing.⁽³⁾

Studies have reported prevalence rates of dental erosion ranging from 13% to 75% among 12-year-old children.⁽⁴⁾

The frequent use of acidic medications such as aspirin which is used as anticoagulant in children with heart diseases and come in direct contact with teeth is identified as an extrinsic etiologic factor in dental erosion, not only for adults but also for children.^(5, 6)

ASPOCID 75 mg chewing tablets is the usual drug used in children with heart disease, this medicine is available in Egyptian markets and accessible by the public. Each tablet of ASPOCID contains 75 mg acetylsalicylic acid and its pH= 3.

Children with heart diseases take aspirin in chewable tablets which comes in direct contact with their teeth especially occlusal surfaces and that increase their susceptibility to dental erosion, usual doses are 75 - 100 mg/kg/day divided on 4 doses for 2- 6 weeks to treat inflammation in children with rheumatic heart disease (RHD) and 5 mg/kg/day in single dose daily for life long to act as antiplatelet in children with congenital heart disease (CHD).⁽²⁾

This study was conducted to compare the prevalence of dental erosion in different groups of children with heart diseases and to evaluate the effect of chewing aspirin on the micro hardness of primary teeth and comparing it with the effect of soluble form of aspirin.

REVIEW OF LITERATURE

According to World Heart Foundation cardiovascular disease in children and youth is divided into Congenital Heart Disease and Acquired Heart Disease.⁽⁷⁾

Congenital heart Disease (CHD) is divided into two main groups: Cyanotic Heart Disease (CCD) and Acyanotic Heart Disease depending on whether the child has the potential to turn bluish in color⁽⁷⁾.

Acquired Heart Disease is divided into Rheumatic Heart Disease (RHD) and Kawasaki Disease.⁽⁷⁾

Congenital heart disease (CHD).

Congenital heart disease is the type of heart disease that a child is born with. it is a defect, or abnormality of the heart or blood vessels near the heart, and not a disease, so many people use the term “congenital heart defect”⁽⁸⁾.

The majority of children born today with CHD survive and with proper treatment are able to lead a normal or near-normal life. Some kinds of CHD are mild and may not be diagnosed in infancy. Other types of CHD are severe and will be diagnosed soon after birth. Some would also be diagnosed in prenatal screening⁽⁹⁾.

Acquired heart disease

Acquired heart disease, this type of heart disease is not present at birth. Two major types of acquired heart disease in children are.^(10, 11)

- **Rheumatic heart disease (RHD)**
- **Kawasaki disease.**

Rheumatic heart disease

RHD is the most common acquired heart disease in many countries of the world, especially in developing countries. It is a condition where the heart muscle and heart valves are damaged due to rheumatic fever.⁽¹²⁾

The global burden of disease caused by rheumatic fever and RHD currently falls disproportionately on children and young adults living in low-income countries and is responsible for about 233,000 deaths annually. At least 15.6 million people are estimated to be currently affected by RHD with a significant number of them requiring repeated hospitalization and, often unaffordable, heart surgery in the next five to 20 years. The worst affected areas are sub-Saharan Africa, south-central Asia, the Pacific and indigenous populations of Australia and New Zealand. Up to 1 per cent of all schoolchildren in Africa, Asia, the Eastern Mediterranean region, and Latin America show signs of the disease.⁽¹⁾

Rheumatic fever is caused by streptococcal bacteria, and usually begins as a consequence of strep throat in children that were undiagnosed or were not treated or undertreated.⁽¹³⁾

Infection with this organism results in a diffuse inflammatory disease of the heart, joints, brain, blood vessels and subcutaneous tissue. Carditis is not seen at the time of the streptococcal infection and appears only after a latent period of about three weeks. This serves as evidence against the direct role of streptococcal products in the pathogenesis of rheumatic fever. This latent period parallels the time required for development of an immune response.⁽¹⁴⁾

The study done by **Abraham (1991)** found that , The molecular mimicry between certain parts of the streptococcus and tissues of the host

may lead to a cross-reactive immunity, in which the immune system produces an antibody response to various components of the streptococcal organism, as well as to certain tissues of the patient, particularly the heart. Immunological hyper-responsiveness in some patients, together with disturbed helper and suppressor T-cell function, leads to a complex immune system disturbance, which results in acute Rheumatic fever and consequent cardiac damage.⁽¹⁵⁾

More recently **Yegin (1997)** found that, the pathogenic role of inflammatory cytokines in Rheumatic fever in the form of tumor necrosis factor (TNF)-alpha, interleukin (IL)- 8 and IL-6 has been described. Substantial evidence pointing to the inflammatory nature of the disease has resulted in use of anti-inflammatory agents such as corticosteroids and aspirin to treat the disease.⁽¹⁶⁾

Kawasaki disease

Kawasaki disease is characterized by fever, rash, swollen hands and feet, bloodshot eyes, swollen lymph nodes, a strawberry appearance to the tongue, and an acute inflammation of the blood vessels, especially the coronary arteries.⁽¹⁾

The cause is unknown but may be due to some kind of infectious agent, it occurs in young children less than 5 years old, and occurs more in boys than in girls.^(1, 11)

Kawasaki disease is most common in Japan, but has been seen in virtually every country in the world and is the leading cause of acquired heart disease among children in developed countries. In some children, especially those who are undiagnosed or untreated or not treated soon enough, serious heart damage can occur.^(1, 11)

Management of heart diseases in children

Congenital heart diseases

Congenital heart defect may have no long-term effect on child's health — in some instances, such defects can safely go untreated. Certain defects, such as small holes, may even correct themselves as the child ages.
(17, 18)

Some heart defects, however, are serious and require treatment soon after they're found. Depending on the type of heart defect, congenital heart defects could be treated with.^(17, 18)

- Procedures using catheterization. Some children and adults now have their congenital heart defects repaired using catheterization techniques, which allow the repair to be done without surgically opening the chest and heart. Catheter procedures can often be used to fix holes or areas of narrowing.^(17,18)
- Open-heart surgery. Depending on the child's condition, he or she may need surgery to repair the defect. Many congenital heart defects are corrected using open-heart surgery. In open-heart surgery, the chest has to be opened.^(17,18)

A study done in **U.K (2004)** to measure the survival rate after surgery or therapeutic catheterization for congenital heart disease in children in the United Kingdom was done by collecting data since April 2000 from all 13 UK tertiary centers. Altogether 3666 surgical procedures and 1828 therapeutic catheterizations were performed, central tracking of mortality identified 469 deaths, 194 deaths within 30 days. For surgery overall survival at 30 days was 94.9% falling to 91.2% at one year, for therapeutic