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A REVIEW ON ASPIRIN, MECHANISM OF ACTION AND PREVENTION

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Abstract— Aim is to study about brief history of aspirin and mechanism and action of aspirinand their effects on body and provides all details regarding to aspirin which is used in cardiovascular disease preventionor cancer prevention and management Primary disease prevention,Secondary Prevention in Stroke, Primary Prevention in Specific Populations Balance of uses and harm.

Keywords:Aspirin, Prevention, Mechanism, Disease

I. INTRODUCTION

Salicylic acid is a natural compound and linked to synthetic aspirin andutilised in herbal therapy preparations,Egyptian texts also mention that the use of this relief joint pain or inflammation.

When Reverend Edward Stone successfully employed willow bark to cure fever "ague" in his parishioners, he conducted the investigation of the advantages of willow bark. In a letter written in 1763 to the Royal

Society's president, he describes this.Salicin was extracted from bark in 1828 at the University of Munich. Numerous researchers sought to improve the procedure, but thewas Professor Hermann Kolbe who discovered salicylic acid's molecular structure and produced it synthetically for the first time in 1859. It was unfortunate that it tasted bad and upset the stomach.

This is a benzene ring and composed of a phenol (HO) group and a carboxylic acid (COOH) group.He received encouragement and inspiration for this study including Wilhelm Siebel, Arthur Eichengrün, and Carl Duisberg. With Dr. Hoffman's discovery, aspirin was created for the first time ever, and the pharmaceutical industry was also born. Professor Heinrich Dreser, gives successful clinical trials on humans.

On February 1st, 1899, that timewas given the name aspirin and registered name also. Spirea ulmaria is a plant that is a natural source of salicylic acid.

Fig.1. Aspirin original powder form

II. MECHANISMS OF ACTION

Previous the year 1971, the mechanism of action of this tiny this tablet remained a mystery to science while being widely acknowledged as a potent painkiller and fever-reducer. Aspirin was referred to as "the wonder drug that nobody understands" by the New York Times in 1966.

Ulf von Euler and Glodblatt discovered prostaglandins in 1935, and Bergstrom later identified them of arachidonic acid. They were a crucial role in a number of physiological processes and to have a direct impact on the regulation of pain, inflammation, and temperature.Vane would describe the prostaglandin synthesis to non-steroidal anti-inflammatory medications. He would share the Nobel Prize in Medicine.

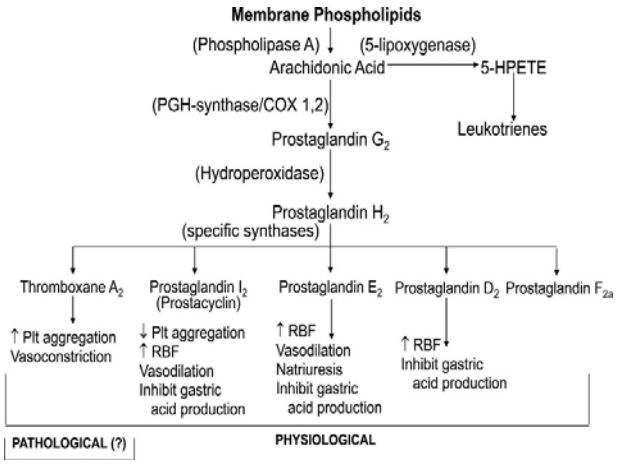

Fig.2. The formation of prostaglandins from arachidonic acid and their physiological effects

Cyclooxygenase (COX) and was successfully separated in year1976and is now understood to be the target for aspirin. There are three different isoforms of COX, a membrane- joint with hemoprotein and glycoprotein (COX-1, -2, and -3).

In addition to the rush to pinpoint the aspirin's anti-inflammatory characteristics, scientists started paying attention to aspirin's other biological impacts in the 1970s. Samuelsson identified thromboxane A2, a powerful vasoconstrictor and activator of platelet aggregation, as the substance Piper and Vane had previously referred to as "rabbit aorta contracting substance". Aspirin was shown to be an efficient antithrombotic drug by blocking

thromboxane A2-dependent platelet aggregation.

A second, inducible COX gene was found by Dan Simmons and colleagues in 1991. The COX-2 is a type of gene present in inflammatory cells as opposed to the constitutive COX-1 gene, could be activated by mitogens, growth factors, tumour promoters, and lipopolysaccharides. It then produced prostaglandin E2.The prostaglandins produced by COX-1, on the other hand, are mostly involved in physiological functions including protecting the stomach mucosa and physiologically necessary platelet aggregation. With low dosages of aspirin administered once day, COX-1-dependent platelet activity can be inhibited.

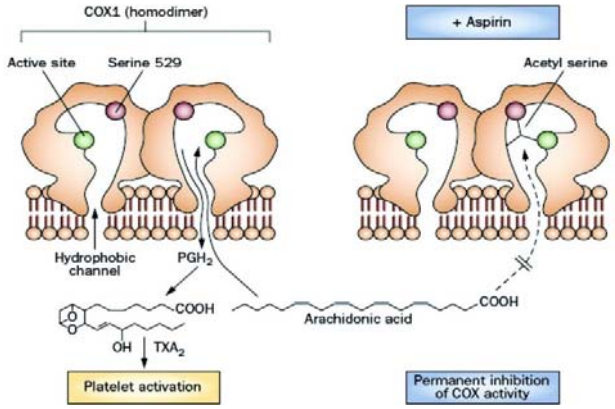

Fig. 3. Mechanism of action of Aspirin

III. ROLE OF ASPIRIN IN VARIOUS DISEASE PREVENTION

Aspirin in Cardiovascular Disease Prevention

The use of aspirin to prevent vascular events was first documented by California general practitioner Laurence Craven in the 1950s.Patients aged between42 to 64 who were may be at risk of having a heart attack because of their overweight or inactive lifestyles were advised to take aspirin, according to Craven.In addition, none of Craven's aspirin-using patients experienced a stroke. Our knowledge of how aspirin affects platelet function is the result of the work of many different scientists. In the late 1960s, Dr. Harvey Weiss discovered that aspirin showed a quick and permanent reduction of platelet aggregation. The first researchers to identify the function of prostaglandins in hemostasis were Sir John Vane's team. In a 1971 article published in Nature, Vane demonstrated how aspirin inhibits the production of prostaglandins.

He won the Nobel Prize in Medicine in 1982 with the help of his research team, Carlo Patrono demonstrated in 1985 that low dose aspirin permanently suppresses thromboxane.

Aspirin in prevention of cancer

In the year 1988 Aspirin users had a 40% decreased chance of acquiring large intestine cancer, according to Professor Gabriel Kune. This discovery has been confirmed by additional study, and it has been seen that the incidence of colorectal cancer has decreased over time. Aspirin's function in assisting carriers of hereditary colorectal cancer in preventing cancer was demonstrated by Sir John Burns in 2011.

To completely comprehend the role of aspirin in this prevention, particularly the role of this drug in lowering the risk of metastatic

metastasis in cancer that has already spread, more research is being done.

Primary type of disease prevention

In this prevention trial findings from studies have generated a lot of discussion and controversy and led to the refinement of additional research investigations. The importance of a personalized approach thorough indicating all types of factors is becoming more and more clear. To fully take advantage of this remarkable drug's possibly life-saving benefits, individualized dosing regimens will be required. The use of a once-daily aspirin regimen can result in "unblocked" platelets in the blood when certain illness states, such as diabetes, have enhanced platelet turnover, and factors like body weight can affect how well aspirin works.

Aspirin Prevention in Stroke

Aspirin's cardiovascular efficacy was conducted in this prevention. In the Canadian Cooperative Study Group (CCSG) trial, 585 these types of patients were randomly randomized to take these drug or sulfinpyrazone for 26 months, either separately or together. Aspirin was concluded to be an effective medication for males with threatening stroke after the authors discovered that it decreased the risk 31% (P0<.05), however benefits were sex dependent. However, it should be noted that adequately powered studies eventually disregarded the gender in this second type of preventive study with these drug.

Aspirin and Vein Graft Occlusion

This drug was beneficial in preventing CVD. Prior to the 1980s, It is a significant contributor to post-coronary artery bypass surgery likeangina, myocardial infarction (MI), and impaired left ventricular function.Knowing that this drug was improved shortened platelet survival and targeting the mechanism of postoperative thrombotic and intimal proliferative blockage of aorto-coronary bypass grafts.

Aspirin and Second type of Prevention in Acute Coronary Syndromes

In light of earlier studies that declared the drug's antiplatelet and antithrombotic effects that promote atherosclerotic plaque rupture in this prevention, aspirin is an essential in the instant therapieswhich used in treating patients with this syndromes as well as a measuring ofthis prevention. The groundbreaking (ISIS-2) trial convincingly demonstrated the effectiveness of giving aspirin to patients who survive with an acute MI within 24 hours.

Aspirin has been proven to have a considerable secondary prevention benefit in patients with these diseases.The Food and Drug Administration approved aspirin's usage in 1985 for the primary and secondary prevention of acute MI. These findings are further supported by the 2009 Antithrombotic Trialists' Trial (ATT) cooperation.

Aspirin in Primary Prevention care of CVD

Aspirin-like compounds may be helpful in preventing an early "coronary occlusion," according to prior experiences with the drug that preceded the 1950s and 1960s discoveries

about its antithrombotic capabilities. In six sizable, randomized, controlled, primary prevention studies as well as in meta-analyses, the effectiveness of aspirin for the primary prevention was examined. The researchers discovered that patients taking aspirin had a statistically significant (44%;P0<.00001) reduction in their chance of experiencing their first MI after 5 years of treatment. Cardiovascular events were discovered among aspirin-using participants in three further randomized clinical trials.

According to the analysis, the overall result of any significant vascular was reduced by 25% among patients who were given antiplatelet medication (mainly aspirin). The authors further assert that the benefits of significant extra cranialhaemorrhage outweighed the risks in each instance for each of these high-risk populations. Aspirin for Prevention in some types of Populations. Diabeticsis aclinical benefits of this drug usage in this prevention also apply to certain group populations. Aspirin may assist diabetic patients according to evidence from six primary prevention trials, evidence from other morerandomized trials taken (POPADAD, JPAD, AAA) that only included a small number of diabetes patients is less encouraging. This was based on a thorough analysis of randomized controlled studies assessing the effectiveness of this drug as primary prevention in people with diabetes mellitus. Aspirin's effectiveness in individuals with diabetes mellitus for the main uses of cardiovascular events is currently unknown, with research so far yielding inconsistent findings. Aspirin should not be used in thisconditions.

Stroke Prevention

In a cooperative group-analysis published by the ATC in the year of 2002, it was shown that aspirin is helpful at preventing ischemic stroke. Antiplatelet therapy among high-risk patients decreased the combined result of any severe vascular event by ≈25% and nonfatal stroke by 25%. The most extensively researched antiplatelet drug, aspirin, contributed to a 25% relative risk decrease in nonfatal stroke compared to placebo. The 2009 ATT joint review of all significantly prevention studies with this drug re-examined the benefit of this drug in prophylaxis for stroke in light of the shortcomings of the initial 2002 -analysis that were previously stated.

IV. BALANCE OF USEFUL AND HARM

The absolute benefit of aspirin antiplatelet prophylaxis increases along with the likelihood of having a serious vascular incident. In support of this is the 2009 ATC. As previously indicated, aspirin treatment resulted in a slight absolute decrease in major vascular types of problems. The risk of hemorrhagic stroke and major extra-cranial haemorrhage increased in absolute terms at the same time (0.02%/y, P=0.04; and 0.02%/y, P0<.0001). The incidence of hemorrhagic stroke was found to be 0.16%/y with aspirin compared to 0.08%/y with placebo among secondary prevention patients treated with aspirin. It's significant to note that the patients who had the greatest absolute risk reduction of major vascular types

of problems with aspirin also had the highest risk of hemorrhagic stroke.

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