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STUDY OF CARDIAC BIOMARKERS FOR THE DIAGNOSIS, PROGNOSIS IN VIEW OF AYURVEDIC SCIENCE

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ABSTRACT

Biomarkers indicates importance for guiding the clinical diagnosis and therapeutic management of all diseases because, It is useful to help predict pathogenesis of disease in subject's at risk with all aspect, improvement of diagnostic procedure by closing to below and above the range. Biomarkers are important to provide the diagnostic and prognostic information, that is useful for making therapeutic choices, assessing treatment responses and outcomes, and allow disease activity and progression to be monitored. Cardiac disorders are the diseases of heart and blood vessels so it is called as cardiovascular diseases. Biomarkers are diagnostic tools, its useful for the diagnosis and monitoring of cardiac diseases. Ayurveda described Hridroga which is similar to cardiac diseases in various means.

KEYWORDS: Hridroga, Cardiac Biomarker.

INTRODUCTION

Cardiac biomarkers are endogenous substances released into the bloodstream when the heart muscle is damaged or stressed.[1]

A biological molecule found in blood, other body fluids or tissue that is a sign of normal or abnormal process, or of a condition of disease. A biomarker may be used to see how well the body responds to a treatment for a disease or condition. Also called molecular markers and Signature molecule.

Measurement of these biomarkers is used to help diagnose, assess risk, and manage acute coronary syndrome (ACS), a potentially life-threatening condition characterized by the

sudden onset of persistent pain in the chest, one or both arms, shoulders, stomach, or jaw, shortness of breath, nausea, sweating and dizziness.[2] Cardiac enzymes have been in use since the mid-20th century in evaluating patients with suspected acute myocardial infarction (AMI). The biomarkers used back then are not clinically relevant today as more sensitive and specific biomarkers have replaced them.[3] Troponins are the key cardiac biomarkers in modern medicine for diagnosing acute myocardial ischemia.[4] In contrast to creatine kinase (CK), which usually elevates 6 to 12 hours after arriving at the emergency department, troponins show elevation in most AMI cases within 2 to 3 hours of arrival.[5]

AIM

To study the concept of cardiac biomarkers in heart diseases w.s.r. to Hridroga.

OBJECTIVE

1. To understand the concept of biomarker in heart diseases according to ayurveda science with modern aspect.
2. To understand the concept of biomarker in Hridroga through Ayurvedic perspective.

MATERIALS AND METHODS

All references regarding Hridaya were compiled and studied from Samhita, textbook of pathology, research articles and websites.

Review of Literature

Biomarkers in cardiac diseases

Wall of the heart consists mainly of myocardium. It is made up of cardiomyocytes. The myocardium is responsible for contractile function of the heart.[6] Sarcomere is the functional unit of contraction. Each sarcomere is composed of two protein filaments actin and myosin. Conduction system of heart located in the myocardium is responsible for regulating rate and rhythm.

Cardiac biomarkers in modern Science

Markers of myocardial injury CK-MB (Creatinine kinase- myocardial band), Myoglobin, troponin.

- HAEMODYNAMIC stress markers- Natriuretic peptides.
- Inflammatory &prognostic markers.
- HS-CRP, SCD40L&Homocystine.

- Biochemical markers of Cardiac Injury

-creatine kinase

-Total cκ

-Isoenzyme of CK -CK-BB, CK-MB, CK-MM

-Aspertate aminotransferase(AST)

-Lactate dehydrogenase (LDH).

-Cardiac troponins.

-Myoglobin

Creatinine kinase

It is a enzyme expressed by the tissues.

Highest activity of ck is present in striated muscle, brain, heart. Causes of increase in CK- Disorders of skeletal muscle, Trauma etc.

Disorder of heart- MI, Myocarditis.

Disorder of CNS- cerebrovascular accident, head injury.

Disorder of thyroid- Hypothyroidism.

Myoglobin

oxygen binding low molecular weight protein of cardiac and skeletal muscles cells.

Raised myoglobin level-

MI, open heart surgery, muscle dystrophy.

Troponins

Troponins are the sensitive & Specific of the available markers of myocardial necrosis.

Troponin is composed of three subunits encoded by three different genes.

1.Troponin-C (Ca binding component)

2.Troponin-I(Inhibitory component)

3.Troponin -T (Tropomyosin binding component)

Troponin-I is more specific as it is found only in heart muscles

AST (Aspertate transaminase)

Also called serum glutamic oxaloacetic transaminase.

It is widely distributed in tissues but highest level is found in heart, liver, skeletal muscles.

LDH- (Lactate Dehydrogenase)

LDH is an enzyme that is found in almost all body tissues but only a small amount of it is usually detectable in blood. when cells are damaged or destroyed however they release LDH in bloodstream.

IMA- Ischemia modified albumin

IMA is a maker of decreased oxygen availability.

Produced when circulating serum albumin contacts ischemic heart tissues.

H-FABP-Heart Type fatty acid binding protein.

It is one of the intracellular protein. It plays a major role in transport of lipid to compartments of cell, for membrane synthesis, etc. It is a biomarker of acute myocardial injury.

Haemodynamic stress markers

NP- Natriuretic peptides

A natriuretic peptide is a peptide which induces natriuresis- the excretion of sodium by the kidneys

Known natriuretic peptide includes

1.Atrial Natriuretic peptide (ANP)

2.Brain natriuretic peptide (BNP)

3.C-Type natriuretic peptide (CNP)

B-Type natriuretic Peptide has emerged as an important biomarker with an established role. In congestive cardiac Failure. This is released from myocardial cells of left ventricle wall.

Inflammatory and prognostic markers

HS-CRP (High sensitivity C-reactive Protein)

CRP is a non-specific marker of inflammation produced by hepatocyte after stimulation by IL-1 and IL-6.

It is acute phase protein & becomes abnormal during early stage of acute coronary syndrome.

SCD40 LIGAND

Soluble CD40 ligand is contained in platelet granules and thus its presence in the blood is a marker of platelet activation.

Several recent studies have demonstrated that sCD40L is a powerful and independent predictor of outcome in ACS.

Pathogenic factors in various cardiac Disorders

Hridroga (Heart diseases) is one of the major causes of death in india. Hridraga means cardiac disorders in Ayurveda, It is needed to review the concept of Hridroga and it's management according to Ayurvedic perspectives with its present updates, So one can prevent these conditions. Ayurveda explains in detail regarding how Ayurveda is afflicted with vitiated vata, pitta and kapha with its Symptoms and clinical management.

Pathogenic phase of (Ras, Rakt) serum, blood all 7 dhatu components with others most of all biomolecules in human body which might have responsible for several Disorders or variety of cardiac Disorders.

According to ayurveda, it is a site of mana (mind), chetana (consciousness) and origin of Rasavaha and pranavaha Strotas (body channels).

In ayurveda Heart originates from Rakta Dhatu and Kapha.[7] It is a site of vyan vayu, sadhaka pitta, Avalambak Kapha, Oja, Ras Dhatu and Rajta Dhatu.

Vyan vayu is responsible for distribution of nutrients, oxygen and essential components all over body. Sadhak pitta is responsible for proper action of Hridroga a indirectly Circulation and functions of nervous system. Avalambak kapha gives support to heart.

Probable sign and symptoms of cardiac Disorders

Common sign and symptoms of cardiac Disorders are cyanosis, unconsciousness, fever, cough, breathlessness, fainting, thirst, vomiting, pain.

Vataj Hridroga

Aggravated vayu entering into the heart produces severe Disorders. In Vataj heart disease the symptoms are trembling, cramps, Stiffness, fainting, vacant look, tearing Pain and aggravation of pain when the food is digested.[8]

Pittaj Hridroga

Hot, sour, salty, alkaline and pungent food, eating during indigestion, wines, anger and the sun vitiate the Pitta. In this Pittaj heart disease this symptom appear, burning sensation in

cardiac region, bitterness in mouth, bitter and sour eructation, exhaustion, thirst, fainting, giddiness and perspiration.[9]

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Kaphaj Hridroga

Kaphaj heart disease is caused by excessive intake, use of heavy and unctous Substances, little mental and physical work and indulgence in sleep in this the patient suffer from drowsiness and anorexia, feeling of numbness, cold and weight in the cardiac region as if it is pressed with stone.[10]

Sannipataj Hridroga

when causative factors and symptoms of all doshas are combined together it is Sannipataj Hridroga.[11]

Krimij Hridroga

In this Patient feels pain as if the heart is pierced by needles or cut by weapons, itching and intense pain.[12]

DISCUSSION

Normal interaction between Dosha and Dhatu are essential for maintaining good health. Accordingly individuals with abnormal Doshas and Dhatus are more vulnerable to pathogenic conditions. Therefore alteration in bodily components occurs and it results in disease manifestation and these conditions can be indicated well by biomarkers. Sustained and collaborative efforts between ayurvedic physicians and clinicians regarding unexplored concept of biomarkers may lead to a deeper understanding of certain modern and traditional principles. Understanding to various Boimarkers in Heart diseases and Hridroga has been discussed through Ayurvedic and modern perspectives.

CONCLUSION

Biomarkers are increase or decrease in the constituents of tissues of body fluids that are associated with the Dosha and Dhatu, also with some subjective parameters that could be caused as Ayurvedic biomarkers in various aspects. Reporting of Biomarker indicates imbalance of their status of biomolecules or biomarker as a substances of body components in other words Dhatu components. Intervention of principles of traditional system of medicine could be developed into hypothesis and concept should be validated in light of modern scientific methods that may lead to the development of various unexplored concepts

like biomarker in Ayurveda. Early diagnosis of heart diseases continues to be a challenge. Some biomarkers are not specific and Some are not widely used due to technical Problems and they are time consuming as well as expensive, the biomarkers considered for Hridroga are more specific and cost effective and help in Early diagnosis of disease.

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