CASE STUDY

Hyperglycaemia to Heart attack - A Case Study

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ABSTRACT

Diabetes mellitus and Cardiovascular disease (CVD) often go hand in hand, it is common co morbidity in type 2 diabetes mellitus. People with diabetes are 415 million according to international diabetes federation of which 91% have type 2 diabetes mellitus. CVD is found more in type 2 diabetes mellitus as compared to non- diabetes subject. It increases continuously with rising fasting plasma glucose level, even before reaching level sufficient for a diabetes diagnosis.

Although there has been significant advances in the care of many of the extra pancreatic manifestation of diabetes, acute Myocardial infarction continuous to be a major cause of morbidity and mortality in diabetic people. In person with type 2 diabetes mellitus, the death rats were 15.4% for those with no prior myocardial infarction and 42% in patient having a history of myocardial infarction. Researchers have found over 90% of people with type 2 diabetes mellitus, have high risk if fatal heart attack disease or stroke within 10 years. A case of diabetes has undertaken to interpret the biochemical changes in pathology; which causes diabetes and in due course of its development can cause heart attack too.

Key Words *Myocardial Infarction, Diabetes Mellitus, Hyperglycaemia, Pathophysiology.*

INTRODUCTION

Hyperglycaemia from any reason when sustain for long period, become a cause of many Santarpanottha Vikara. As per Ayurveda it is a variety of Ama can deposit in suitable site and because of KhaVaigunya can establish some other independent disease. Journey of disease from one state to next is needed to break by change in diet, lifestyle or by Shodhana. Shodhana Chikitsa is best to control co-morbid condition. Ama goes on changing its form of presentation and some time become fatal. In this work the pathology of hyperglycaemia (a variety of Ama) has tried to understand and explain about its change in form of presentation in heart attack. Clinically sugar level remains control by anti-glycaemic allopath treatment but internal pathology go on developing; which to be prevented from sudden rise of kidney failure or heart attack like problem.

Diabetes-A metabolic Complexity

Diabetes is the chronic disease that occurs when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. It is of two types; like Type 1 & Type 2 Diabetes mellitus.

Type 1 Diabetes Mellitus: - also known as Insulin – dependent, juvenile or childhood - onset diabetes characterized by deficient insulin production. Hyper sensitivity response/cell – mediators; where a person attacks own T-cells to pancreas. Genetic abnormality less self-tolerant T- cells targeting β cells less insulin more glucose level in blood as it cannot directly enter body cells.Symptoms[1-3] are like Polyphagia(feels more hungry), Glycosuria(sugar in urine), Polyuria (increase in urine) and Polydipsia (dehydrated /thirsty).

Type2 Diabetes Mellitus was previously known as non – insulin depends or adult – onset diabetes, results from body's ineffective use of insulin. It is largely result of excess body weight, physical inactivity and genetics. Symptoms may be similar to those of Type 1 diabetes, but less marked. As a result, the disease might diagnose several years after onset, once complications have already arisen[3-5].

Complications of Diabetes mellitus:-

1. DKA (Ketoacidosis) and ketones

2. Neuropathy: a) Peripheral neuropathy   b) Autonomic Neuropathy

3. Skin Complication: a) Bacterial infection b) Fungal infection

4. Eye complication:

a) Glaucoma

b) Cataract

c) Retinopathy

5. Foot Complication: a) Neuropathy b) Skin changes c) Calluses d) Poor circulation e) Foot ulcer f) Amputation

6. Nephropathy: Kidney diseases

7. Cardio vascular diseases: a) Atherosclerosis b) Heart failure   c) Arrhythmias

AIMS & OBJECTIVES

Understanding the continuity of pathological journey from Hyperglycaemia to cardiovascular disease in Diabetes Mellitus patient was the aim of this work

What is Coronary heart disease?

Heart diseases are a catch – all phrases for a variety of conditions that affect the heart structure and function. Coronary heart disease is a type of heart diseases that develops when the arteries of the heart cannot deliver enough oxygen rich blood to heart condition within this category are stable angina pectoris, unstable angina pectoris, myocardial infarction and sudden cardiac death. A coronary artery disease affects the large arteries on the surface of the heart. Coronary micro vascular disease affects the tiny arteries in the heart muscles.

Types:

1. Obstructive Coronary artery diseases

2. Non Obstructive Coronary artery diseases

3. Coronary micro vascular disease

Cause:-

The cause depends on the type of coronary heart diseases

Obstructive coronary heart diseases means the heart's arteries are more than 50% block. The blood flow may eventually be completely blocked in one or more of the 3 large coronary

CASE STUDY

arteries. In Non obstructive coronary artery disease, the large arteries may be narrowed by plaque, but not as much as in obstructive disease.

1. Atherosclerosis:

When blood flow doesn't take place properly, here in case of Atherosclerosis blood vessels stiffen and become narrow due to fatty plaque build – up, which takes place over many years. The lack of blood flow can lead to your heart without oxygen.

2. Heart failure:

This form of CVD occurs when the muscles in the heart becomes too weak to pump blood properly and your heart becomes unable to supply enough blood to all parts of your body

3. Arrhythmias:

An irregular heartbeat is caused when structural changes or damage to the heart to disrupt electrical message that keep the heart beating .At its worst , arrhythmias can cause death via cardiac arrest, to loss of blood flow to the heart .

The risk factors which can help to make the cardiovascular system more suitable to bad prognosis are high Blood pressure, high Blood cholesterol, unhealthy life style, old age, family history and genetic predisposition, race and ethnicity, air Pollution and obesity etc.

Easily the plaque formation will be and patient can develop fatal signs.

Signs, symptoms and complications:

An acute coronary event, such as heart attack, may cause following symptoms[5-8].

➤ Angina, which can feel like pressure, squeezing, burning and lightness during physical activities. The pain or discomfort usually starts from the breast born, but it also can occur in the arms, shoulder, jaw, throat or back. The pain feels like indigestion. Cold sweat , dizziness ,light headedness ,Nausea, Neck pain, sleep disturbance, weakness, Shortness of breath

Woman are somewhat less likely than man to experience chest pain, they may also have no symptoms of coronary heart diseases. Some of the serious complications include the following:

➤ Acute coronary syndrome, Heart failure, Cardiogenic shock and Sudden cardiac arrest etc.

Pathophysiology between Diabetes mellitus and heart diseases[8-11].

Due to causative factors, over the time glucose increases

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High Glucose level can damage tiny blood vessels

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In arterioles, a process called hyaline arteriosclerosis, takes place

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Where the walls of arteries, develop hyaline deposits (deposits of protein make them hard and inflexible

In capillaries, the basement membrane can thicken and make it hard for oxygen to easily move from capillary to tissues

↓

Causing hypoxia

↓

Causes medium and large arterial wall damamge

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CASE STUDY

Atherosclerosis

↓

Leading to heart attack

Diagnostic stools:

1. IC test:

The AIC test measures your average blood sugar level over the past 2 or 3 months. An AIC below 5-7% is normal

5.7 – 6.4 % pre diabetes

6.5 & higher – diabetes

2. Fasting blood sugar test:

This measures your blood sugar after an overnight fast (no food). A fasting blood sugar level

99mg/dl lower – normal

100 – 125mg/dl – pre diabetes

126mg/dl & high - diabetes

3. Glucose Tolerance Test:

This measures your blood sugar before & after you drink a liquid that contains glucose. You will fast overnight before the test & have your blood drawn to determine your fasting blood sugar level. Then you will drink the liquid & have your blood sugar level checked 1 hr 2 hrs. & possibly 3 hrs. After ward

At 2hrs , blood sugar level: 140 – 199mg/dl – pre diabetes

200mg/dl or high – diabetes

4. Random Blood Sugar Test:

This measures your sugar at the time you are tested. You can take this test at any time and don't need to fast (not eat) first.

200mg/dl or higher – diabetes

5. ECG (Electrocardiogram):

Quick and painless test that records the electrical signals in heart is the ECG. It can spot abnormal heart rhythms too.

6. Coronary Angiography:

Also called cardiac catheterisation may be done after heart attack or angina .A special dye is injected into coronary arteries & an X-ray is taken. This x-ray shows where & how much of the coronary arteries are blocked or clogged

CASE STUDY

A case X of 54 year old man was presented to Goa Medical College on 16th July 2020 with feeling of numbness and persistent pain in the chest region. The finding in routine check up in the same day-

HDL =46, LDL= 121, VLDL = 21, BP = 124/70, Fasting blood sugar = 252mg/dl

Post prandial = 298mg/dl and HbA1C = 11. 2

He was diagnosed with two vessel atherosclerosis, CAD.

The patient was undergone treatment with-

1. Successful Percutaneous Coronary Intervention (PCI) was done to proximal mid left anterior descending artery (LAD) with 2.50x48mm, on 23rd July 2020.

2. Rescue PCI was done to right coronary artery with drug Eluting stent.

After the fresh investigated report was done and compared with previous one ; which was -

CASE STUDY

HbA1C = 9 , Post prandial = 137 and Fasting blood glucose = 142

History:

He is known case of type 2 diabetes mellitus since 14 years, and at that time his symptoms included frequent urination, often hungry, pricking pain in feet, shivering, and dryness in throat(as the routine diabetes patient have). He was under oral agents for the management of his blood sugar level by the Allopathic Physician, However the patient neglected the condition and so symptoms gradually developed and worsened in severity over the course of 14 years.

Family History: His father and brother both were diabetic and died from Nephropathy

On 3rd November 2020, patient had causality for angina which was precipitated by straining of stools. Which then subsided by its own and no further episode seen; even that time patient was under allopath medication.

The patient was under a special diet, life style instruction too along with routine medicine for sugar control. Detail of instruction about diet and all are followed by the patient was-

1. **Follow a healthy diet :**

Eat more fresh fruits and vegetables and bean, proteins and whole grains eat fewer processed food (such as chips, sweets and fast foods) drink more water, few sugary drinks and less alcohol.

Include: timely meal schedule, have freshly prepared. Churned butter milk and boiled – cooled water to drink. Cooked vegetables, broken wheat (Daliya) millets and Jowar should be included.

Avoid: Refrigerated, deep oily fried, salty, spicy and canned food items Curd, Paneer, cheese m, sweets and sour food. Reduce excess usage of potatoes, cauliflower, Rajma, green peace, Chana, peanut and Maida products.

2. **Aim for healthy weight:**

If one is overweight, loosing even a modest amount of weight can lower your triglycerides and blood sugar. Modest weight loss means 5% to 7% of body weight. Moderate level of exercise daily could be recommended focusing on life style activity (like using stairs instead of elevators, walking instead of riding), avoiding day time sleep. Being physically active makes your body more sensitive to insulin, which helps manage your diabetes.

3. **Manage your ABCs :**

A: get a regular A1C test to measure your average blood sugar level over 2 to 3 months; aim to stay in your target range as much as possible.

B: Try to keep your blood pressure below 140/90 mm hg

C: manage your cholesterol level

S: Stop smoking

4. **Manage stress:**

Stress can raise your blood pressure and also lead to unhealthy behaviour, such as drinking too much alcohol or over eating .instead visit a mental health councillor, try meditation or de breathing, get some physical activity

DISCUSSION

CASE STUDY

Heavy glucose level in blood increases breakability to capillaries, walls of arteries, develop hyaline deposits Make them hard and inflexible. The increase thickness to basement membrane restricted blood as well as oxygen supply; further lead to ischemic to cardiac muscle and death. Rutu Shodhana like applications is needed to encourage for cleansing internal morbid content. High sugar value in blood made the body suitable for fatal condition.

CONCLUSION

The relationship between fasting glucose level and CVD risks generally followed J shaped curve, with lowest risk in the glucose range of 85-99mg/dl. As fasting glucose level increased to > 100 mg/dl risk for CVD, ischemic hard diseases myocardial infarction and thrombotic stroke progressive increased[11].

Both low glucose level and impaired fasting glucose should be considered as predicators of risk for stroke and coronary heart diseases.

An optimal blood sugar level that may start to minimize the risk of having another stroke , heart attack and any other vascular problems and its said to be 6.8 % to 7% range of HbA1C.

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