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*Review Article*

# Role of serum homocysteine level in various diseases

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**ABSTRACT:**

Now a days so many peoples are suffering from various cardiovascular diseases, cerebrovascular diseases and peripheral vascular diseases. This is due to unhealthy diet, sedentary lifestyle, mental stress, obesity is the major risk factor for this disease. Now a day serum homocysteine level is the lab test used for early detection of cardiovascular events. Increased level of homocysteine in the blood is called as Hyperhomocyteinemia. High levels of homocysteine results in numerous biochemical imbalances in the body, and in the brain, which causes irreparable damage to our bodies and mental health.

Vit B6, Vit B12 and folic acid which is used for to maintain normal level of serum homocysteine. Deficiency of vit B12 and Folate causes raised level of serum homocysteine.For early detection of atherosclerosis or blood clot, embolus event which is very important in stroke and ischemic heart disease.

Serum homocysteine is the best test for early detection of blood clotting or atherosclerosis or thrombosis event in our body which is more prone for IHD, Stroke, DVT, embolism, or Mental retardation etc so we can prevent them after checking this level and we start appropriate dose of vit B Complex mainly Vit B12, Vit B6 and Folate to the patient. So, there may be chances of incidence of stroke prevent.

**KEY WORDS:** Serum homocysteine, Hyperhomocyteinemia, cardiovascular diseases, cerebrovascular diseases, peripheral vascular diseases, Vit B6, Vit B12 and folic acid.

## INTRODUCTION:

Now a day's so many peoples are suffering from various cardiovascular diseases, cerebrovascular diseases and peripheral vascular diseases. This is due to unhealthy diet, sedentary lifestyle, mental stress, obesity is the major risk factor for this disease. Now a day serum homocysteine level is the lab test used for early detection of cardiovascular events.

Serum homocysteine is an amino acid. Amino acids are the building blocks of proteins. When proteins are break down elevated level of amino acid like homocysteine may be found in blood stream. Increased level of homocysteine in the blood is called as Hyperhomocyteinemia.

Homocysteine functions to maintain blood vessels, being a vital intermediate molecule in the creation of primary methyl donors. High levels of homocysteine results in numerous biochemical imbalances in the body, and in the brain, which causes irreparable damage to our bodies and mental health.

It makes a person more prone to endothelial cell injury which leads to inflammation in the blood vessels, which turns may lead to atherosclerosis (thickening and hardening of the arterial wall) and blood clot formation which can result in ischemic injury. Therefore, increased level of serum homocysteine is a possible risk factor for Coronary artery disease. So, this test is used for early detection of cardiovascular events.

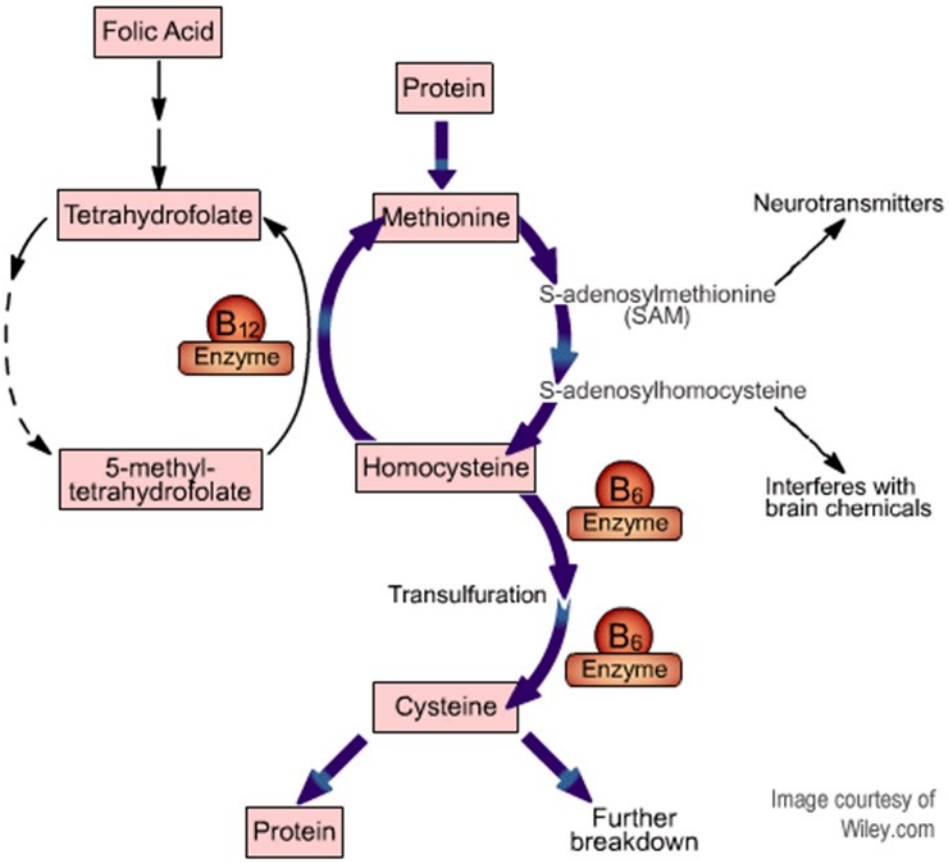
Homocysteinuria is a rare genetic disorder seen in infant, this occurs in about one in every 2 Lakh individuals. In this disorder dislocation of lens in the eyes, sunken chest, long thin body type, mental retardation, seizure and neonatal stroke may be seen.

Vit B6, Vit B12 and folic acid which is used for to maintain normal level of serum homocysteine. Deficiency of vit B12 and Folate causes raised level of serum homocysteine[8].

**Need of study:**

Serum homocysteine is the best test for early detection of blood clotting or atherosclerosis or thrombosis event in our body which is more prone for IHD, Stroke, DVT, embolism, or Mental retardation etc so we can prevent them after checking this level and we start appropriate dose of vit B Complex mainly Vit B12, Vit B6 and Folate to the patient. So, there may be chances of incidence of stroke prevent.

**Table No. 1: Information about homocysteine and biosynthesis and biochemical roles**




Homocysteine can be synthesized from methionine and then converted back to methionine via SAM (S-adenosylmethionine) cycle or used to create cysteine and alpha-ketobutyrate.

Methionine receives an adenosine group from ATP.

↓

A reaction catalysed by S-adenosyl-methionine synthetase to give S-adenosylmethionine (SAM)

↓

SAM then transfers the methyl group to an acceptor molecule

↓

The adenosine is then hydrolysed to yield L-homocysteine

↓

L-homocysteine has two primary fates: conversion via tetrahydrofolate (THF) back into L-Methionine or conversion to L-cysteine.

**Role of vit B6 and Vit B12 and Folic acid**

In this process, is homocysteine is converted in the body to cysteine with vit B6 facilitating this reaction of methionine are transferred into homocysteine in the blood stream. And homocysteine can also be recycled back into methionine using vit B12 (cobalamin) related enzymes.

**Role of cysteine in the body**

Cysteine is an important protein in the body. It is involved in the way proteins within cells are folded, maintain their shape and link to each other. It is a source of sulphide and is part of the metabolism of different metals in the body including iron, zinc and copper. Cysteine acts as an antioxidant.

**Normal range:** Less than 15 mcmol/L

**Abnormal range:**

Moderate: 15-30 mcmol/L
Intermediate: 30-100 mcmol/L
Severe: >100 mcmol/L

**Symptoms and signs of increased serum homocysteine level**

1. Symptoms of vit B 6 and vit B 12 and folic acid deficiency
   - Easy fatiguability, weakness, dyspnoea, and efforts tolerance.
   - Hyperdynamic circulation due to anaemia may lead to palpitation, tinnitus, and headache, dizziness.
   - Atrophic glossitis and neurologic symptoms.
   - Degeneration of spinal cords it manifests as symmetrical neuropathy with paraesthesia, ataxia, spasticity, paraplegia.
   - Memory loss, irritability, dementia.
   - Tingling sensation in hands, arms, feet, or legs.
   - Folate deficiency causes depression, irritability, poor judgment, forgetfulness and sleep deprivation have seen in some patient.
   - Anorexia and occupational diarrhoea.
2. Increased level affects the interior lining of blood vessels in the body. Increasing the risk of atherosclerosis or narrowing of blood vessels. This can lead to early heart attack and stroke.
3. Risk of deep vein thrombosis and pulmonary embolism.
4. Osteopenia and broken bones in old age.
5. Alzheimer's disease and dementia
6. Homocysteinuria is a rare genetic disorder seen in infant, this occurs in about one in every 200000 individuals. In this disorder dislocation of lens in the eyes, sunken chest, long thin body type, mental retardation, seizure, neonatal stroke may be seen.
7. In pregnant women foetal abnormality, early term abortions, pre-eclampsia, neural tube defect in foetus, etc.

**Risk factors for raised homocysteine level**

1. Dietary deficiency of vit B6, vit B12 and Folic acid
2. Smoking
3. Genetic factor
4. Tobacco chewing
5. Strict vegetarians
6. Malabsorption syndrome
7. Alcoholic
8. Malignancy
9. Inflammatory bowel syndrome
10. Tropical and non -tropical sprue
11. Stress and depressed patients
12. Pancreatitis
13. High homocysteine levels may also be due to low levels of thyroid hormone**, psoriasis,** and coffee consumption.

**Test preparation**

Patients do not eat 6-8 hrs any kind of food. Fasting blood sample is required for this test.

**Uses of this test**

1. For early detection of atherosclerosis or blood clot, embolus event which is very important in stroke and ischemic heart disease.
2. To prevent neurological and vascular diseases such as DVT, peripheral neuropathy.
3. For detection of cause of recurrent abortion in early pregnancy.

**How to maintain serum homocysteine level normal?**

1. Vit B6, Vit B12 and Folic acid supplementation should be given.
   - Vit B 6 (Pyridoxine): 30-100 mg/day
   - Vit B12: 2mg/day oral and 1000µg /month parenteral route
   - Folic acid: 5-15 mg /day
2. Diet rich in iron, zinc, folate, micronutrients such as cereals, beans, vegetables, liver, yeast, meat, eggs, milk and milk products etc.
3. Exercise
4. Yoga and meditation for stress management
5. Proper sleep

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