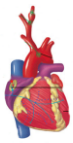

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Exercise And Homocysteine Levels

In Coronary Artery Disease

By:

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Abstract

Back ground: elevated plasma homocysteine levels are a risk factor for coronary artery disease, but the prognostic value of homocysteine levels in patients with established coronary artery disease has not been defined.

Methods:

we prospectively investigated the relation between plasma total homocysteine levels and mortality among 60 patients with angiographically confirmed coronary artery disease. At the time of angiography in 2005 or 2008, risk factors for coronary disease, including homocysteine levels were evaluated. The majority of the patients subsequently underwent exercise and drugs 30 patients (50%) percutaneous transluminal coronary angioplasty 20% and coronary - artery by pass grafting 30% .

Results:

After a median follow – up of 3 years all the patients underwent regular exercise loss of 2200 kcal /week, diet, weight reduction, L.Arginine, angiotension converting enzyme inhibitor (ACEI), statin had alived. we found a strong , graded relation between plasma homocysteine levels and over all mortality.

After 2 years, %3.8 of patients with homocysteine levels below 9 µ mol/lit had died, as compared with %30 of those with homocysteine levels of 15 µ mol/lit or higher.

All the patients came to our program, regular exercise (2200 k/cal/week) after 3 months, homocysteines levels came below 9 ± 3 µ mol/l. we managed, regular exercise with respect to extent previous myocardial infarction, the left ventricular ejection fraction and cardiac output, stroke volume, vo_2 max (volume of maximum o_2 uptake in 12 minutes) and (BMI) body mass index. The relation of homocysteine levels to mortality remained strong after adjustment for these and other potential confounders. In an analysis in which the patients with homocysteine levels below 9 µ mol/lit were used as exercise group no mortality ratios were found, 2.8 for those with levels of 15.0 to 19.9 µ mol/lit and 4.5 for those with levels of 20.0 µ mol/lit or higher. When death due to cardiovascular disease was used as the end point in the analysis, the relation between homocysteine levels and mortality was slightly strengthened.

Conclusion:

plasma total homocysteine levels are a strong predictor of mortality in patients with angiographically confined coronary artery disease. without any doubt regular exercise (2200 k ca/ week) could best effect on whole body like diabetis, hypertension , depression , sleeplessness, anorexia nervosa, obesity, immobility and could improve homocysteine levels. No specific drugs are available for decrease homocysteine levels, but total correction of body could improve the problems.

Abstract:

Introduction:

Homocysteine is an amino acid in the plasma. Excessive homocysteine in the blood (plasma) is related to a higher risk of coronary artery disease, stroke and peripheral vascular disease. A regular exercise program helps to lower high blood levels of homocysteine,according to a recent study from multiple medical centers. Every one agrees that high blood levels of homocysteine increase your risk for heart attacks, but at this time, no body knows why? more than 200 papers show high blood levels of homocysteine are associated with increased risk for heart attacks, strokes and dementia. However, three recent studies show that lowering blood levels of homocysteine does not prevent these conditions. This has disturbed many researchers because they can not explain how lowering a risk factor for a disease does not help to prevent that disease.It may be that homocysteine does not cause heart attacks, strokes or dementia, but is just a marker associated with them. For exemple homocysteine comes from methionine, an essential amino acid found primary in meat. Meat is also a rich source of saturated fats which are known to increase risk for heart attacks and stroks in people who ingest too many calories. So lowering homocysteine dose not prevent heart attacks, strokes and dementia because homocysteine does not cause these conditions however, lowering saturated fats does help prevent heart attacks and strokes. Saturated fats are harmful to a person when he gets too many calories. Dietary saturated fats go to the liver where they are broken down to 2 carbon units. If the body has enough calories, the liver uses these 2 carbon units to make cholesterol. On the other hand, if the liver does not get enough calories, the 2 carbon units are burned for energy to carbon dioxide and water and never form cholesterol. Exercise helps to burn calories. So exercise uses up calories that would otherwise have been used to manufacture cholesterol.

Results:

Today levels of homocysteine is important for our judgement a bout the CAD patients. (HOMO) may involve:

1. In virtually all of the pathogenic processes that results in arteriosclerotic plaques.
2. In blood clotting, blood platelets.
3. In a majore factor in the clotting process. this is called a coronary thrombosis which is called myocardial infarction .
4. Elevated (HOMO) causing tissue injury by mechanisms as oxidative stress, endothelial damage, and protein homocysteiny lation, is associated with increased risk of cardiovascular disease, dementia and osteoporotic fracture.
5. In our series additional adjustment of hypertension, diabetes, smoking status alchol in take, too much stress, obesity, inactivity, psychotic problems, as well as levels of folate, vitamin B_{12} , B_6 , creatinine, total cholesterol and haemoglobin seemed to influence the association.

6. The majority of our patients who have severe CAD and arteriosclerosis have cholesterol levels in the normal range, only %30 had (HOMO) abow the normal levels %15 had elevated cholestrol levels abow 250 ml/deciliter in looking at our group as a whole, among those with severe arteriosclerosis about two-thirds of the veterans had no evidence of elevated cholestrol, diabetis, hypertension.

7. the interesting point was, more (HOMO) levels accompany with severe CAD. The normal level of (HOMO) in the blood for a middle aged man is about 8 to 12 moles/lit after 2 years, only %3.8 of our patient with (HOMO) levels below 9 µmol/lit had died, as compared with %30 of those with (HOMO) levels of 15 m/mol/lit or higher. No (ACBG) or angioplasty patients without regular exercise didn't response to lower (HOMO) levels at all. All the parameters like total cholesterols, blood sugers, (HOMO) levels decreased after 3-6 months of exercise training . We managed, regular exercise with respect to extent previous myocardial infarction, the left ventricular ejection fraction, cardiac out put (CO), stroke volume (SV), vo_2 max , body mass index (BMI) in our analysis in which the patients with homocysteine levels below 9µmol/lit were used as exercise group no mortality ratios were found , %2.8 for those with levels of 15.0 to 19.9 µ mol/lit and %4.5 for those with levels of 20.0 µ mol/lit or higher.

8. A dietary imbalance between too much methionine from dietary protein and too little of the three B vitamins which are needed to break down or get ride of excess levels of (HOMO): namely vitamin B_6 , B_{12} and folic acid. Genetic factor or inherited factors are extremely important.

It has been estimated that as many as out of eight of the population in general carries a hidden genetic defect in a reductase enzyme that causes them to require more folic acid than normal people would require to prevent elevation of (HOMO) levels. Diet, genetic, aging, hormonal factors cigarette there are toxic factors. There are also a number of important drugs which can elevate the (HOMO) levels such as methotrexate, nitrous oxide, azaribine. Cobalamin c disease, a very rare genetic disease in which an abnormality of vit B_{12} metabolism prevents the methylation or conversion of homocysteine to methionine. Cystathionine is also extracted in the urine in this disease. This congenital abnormality had a form of rapidly progressive arteriosclerosis, due to different enzyme defects, responsible is homocysteine it self was damaging the arterial wall.

Material and Method:

We analyzed our patients as below :

1. Body composition analyser showed:
   body mass index (BMI) , fat mass, lean mass, requirement calorie per day , total body water (TBW).
   %60 of our patients were over weight, low lean/mass, high fat mass, total body water (TBW) below normal.

2. Pulmonary function studies: Test was normal in %70 of our patients. We investigated slow vital capacity (SVC), force vital capacity (FVC), maximum voluntary ventilation (MVV).

3. Muscle investigation :
   %70 patients had knee problems.
   %30 patients had low back pains.
   %10 patients had neck problems.

4. Volume of maximum o_2 uptake in 12 minutes (vo_2 max) test. %90 could not tolerate the procedure.

5. ECG:
   only %10 had some arrhythmia in ECGS.

6. Wire less stress test:
   %70 of our patients could not tolerate the procedure. (12/ minutes ex)

7. Impedance cardiography (cardioscreen)
   A. %60 had low stroke volume.
   B. %40 had low cardiac out put.
   C. %30 had high systolic time ratio.
   D. %30 had low ejection fraction.
   E. %50 had high systemic vascular resistance (SVR), and systemic vascular resistance index (SVRI).

   Base in our program due to toleration was:

   regulare exercise With best try, 2000-2200 k cal/week with aerobic and anaerobic together every week.

   Lab investigation for homocysteine levels:

   High - performance liquid chromatography with fluorescence detection.(HPLC)

Discussion

Homocysteine is produced from the amino acid methionine which is normal dietary protein. your body naturally turns homocysteine in to one of two beneficial substances: glutathione (the body most important antioxidant) and SAME (a very important " intelligent" neutrient for both brain and body). Increasing dietary and supplemental levels of vitamin B_6 and vit B_{12} and folic acid can normalize homocysteine levels. It's estimated that taking a multivitamin with B- complex vitamins could prevent %10 of death from heart disease. An elevated blood homocysteine level is a powerful risk factor for CAD. Prominent researchers now believe that plasma homocysteine elevations may be just as important, if not more so, than cholesterol elevations in the geneses of atherosclerosis and CHD. First you receive methionine, protein from your diet. That is converted into homocysteine this goes one or two ways depending on which B- vitamin you consume. If you consume folate, B_{12} , B_2 , zinc homocysteine converts to methlytrans ferase. This converts to (MTHFR) and B_{12} which then become SAME. If you consume vitamin B_6 , B_{12} , zinc homocysteine becomes cystathionine lyase. Cysthathionine lyase becomes cystathionine beta, synthase with the same nutrients thus resulting in glutathione.

Conclusion:

Homocysteine causes the most common form of heart disease in human populations, that is arteriosclerotic heart disease. Homocysteine was discovered to cause the fibros and fibrocalcific plaques in children with homocystinuria. It has now been implicated in the most common form of CAD in the human population. Elevation of the homocysteine level in the blood is an independent risk factor for CAD and arteriosclerosis.Homocysteine caused CAD by injuring the lining of the coronary arteries and by thickening the wall of the arteries, regardless of the level of cholestrol in the blood. Homocysteine interfers with the way cells use oxygen, resulting in a build up of damaging free radicals. These reactive chemical forms can oxidize low – density lipo protein (LDL) producing oxycholestrols and oxidized fat and proteins within developing plaques.

Also, homocysteine stimulates growth of smooth muscle cells, causing deposition of extracellular matrix and collagen, which causes a thickening and hardening of artery walls. Homocysteine is involved in virtually all of the pathogenic processes that result in arteriosclerotic plaques. It is crucially involved in blood clotting blood platelets. Also homocysteine causes the binding of lipoprotein to fibrin in very low concentrations, Lipprotein has also been linked to the thrombotic events in CAD . Homocysteine is involved in other important clotting factor including protein c, factor 7, factor 12 and other clotting factors. Homocysteine in vivo damage the endothelial cells which line the arteries of animals and causes a proliferation of the smooth muscle cells in the walls of the arteries. Homocysteine also has the ability to stimulate the growth of cultured smooth muscle cells. The production of fibrous tissues of sulfated glycosaminogly cans and destruction of elastin fibers in the wall of the artery lead to the formation of fibrous plaques.

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