

Vitamin C Rich Fruits Can Prevent Heart Disease

Praveen Sharma

Published online: 14 June 2013

© Association of Clinical Biochemists of India 2013

New Light on an Old Belief

Heart disease is one of the major killers in the world today, ranking first as the cause of death in people above 65 years of age in the USA. Contrary to the old belief, it is no longer confined to affluent societies, nor is it restricted to the elderly. We now often see many young men suddenly knocked down by a heart attack. Medical scientists are trying hard to find out what is the ultimate cause of this malady threatening the lives of so many all over the world today.

Basically heart disease is a progressive narrowing and hardening (atherosclerosis) of the two coronary arteries which supply blood to the heart itself. It would, therefore, be more appropriate to call it coronary heart disease (CHD). The damage can begin early in life with deposition of cholesterol in the wall of arteries. The narrowing naturally reduces the amount of oxygen and nourishment supplied to the heart muscle and its work capacity is hampered. We cannot live for more than a few minute once the heart stops pumping blood. And what a pump it is! At rest it pumps about five litres of blood per minute. In a man's life time this would add up to as much 150–250 million litres of blood pumped, without stopping for any repair or replacement.

Whenever there is any discrepancy between the amount of oxygen needed by the heart and the amount available through the coronary arteries, severe chest pain results (angina pectoris). If this continues for a while, the heart muscle gets permanently damaged (myocardial infarction), often leading to sudden death.

Although we do not exactly know what is the ultimate cause of CHD, we now know what factors put us on a high risk. Of the factors which seem to predispose to CHD, quite a few are directly or indirectly related to what we eat, like too much of fat in the blood (hyperlipidemia/hypercholesterolemia), obesity diabetes and high blood pressure. The food we eat has, therefore, an important bearing on our vulnerability for heart disease.

Cholesterol and Heart Disease

It has a long been known that the most prominent feature of CHD is the deposition of cholesterol in the wall leads to their gradual narrowing. From where does this cholesterol come?

Cholesterol is a form of fat or lipid, widely disturbed in animal tissues; blood normally contains 150–250 mg/dl. Being a fatty material it is not soluble in water and is carried in the blood packaged with protein. Low density lipoprotein (LDL) is the richest in cholesterol and the most dangerous for coronary arteries.

On the other hand, high density lipoprotein contains very little of cholesterol and has a definite protective role. There is incontrovertible evidence now that a high level of cholesterol and fat in the blood is associated with high risk of CHD. The cholesterol is though partly synthesised in our body but largely comes from the diet. One egg alone contains as much as 200 mg cholesterol, while not more than 300 mg a day would be the right amount for consumption.

Interestingly, plants do not contain any cholesterol as such. In addition, plants contain a large number of nutrients which can lower blood cholesterol and fats in us. One of the most interesting among these is vitamin C (chemically ascorbic acid) and its role in the prevention of CHD is receiving considerable attention over the five decades now.

P. Sharma (✉)
Department of Biochemistry, All India Institute of Medical
Sciences, Jodhpur 342005, India
e-mail: praveensharma55@gmail.com; editor@ijcb.co.in

Vitamin C Protects the Heart

Vegetarian food, particularly fruits like orange, lemon, mango guava, etc. are very rich in vitamin C. Perhaps the richest source of vitamin C is Amla (*Phyllanthus embica/ Emblica officinalis*) which grows abundantly in India. But most people hardly care to look at it because of its sour, unpleasant taste. The amount of vitamin C present in 100 g of fresh fruits is:

Apple	10 mg
Orange	500 mg
Lemon	50 mg
Guavas	242 mg
Amla	600 mg

No wonder Amla has been highly praised in ‘Ayurveda’—the ancient Indian system of medicine being continuously practised even today through more than 25 centuries of many Ayurvedic formulations for the heart and general restoratives or tonics.

The importance of vitamin C for health and in the treatment of a number of disease from common cold to cancer has also been emphasised by Nobel Laureates Szent Gyorgyi and Linus Pauling. The normal requirement of vitamin C for a healthy man is 50–100 mg per day. Being water soluble it is not stored in the body and daily intake is necessary.

Our own scientific observations based on laboratory studies as well as clinical trials on human subjects have shown that vitamin C rich food can help in keeping the blood cholesterol low.

The evidence is manifold.

As we advance in years, our blood cholesterol tends to rise, while the amount of vitamin C in the blood falls progressively. This could be the combined outcome of age and affluence. Our food preference shifts from raw fruits and vegetables to soft fat-rich recipes, while the amount of physical activity also declines. It has been shown that vitamin C, given daily in the form of a 500 mg tablet, has produced a measurable fall in blood cholesterol in a month.

Furthermore, volunteers who put on extra fat or cholesterol on their diet soon begin to show high blood cholesterol levels, but simultaneous administration of Vitamin C restricts this.

The conclusion is that a vegetarian diet, particularly containing vitamin C rich citrus and other fruits and vegetables can prevent heart disease in a specific manner by

keeping the blood cholesterol low. Of course, vitamin C can help in other way too. It has recently come to light that vitamins C as well as other factors in vegetarian food, help to maintain the blood in fluid state, i.e. prevent it clotting within the body itself. What often precipitates a heart attack is the total blockage of a narrowed coronary artery by sudden clotting in the blood within it (thrombosis). Daily consumption of vitamin C rich fruits and vegetable as a part of a simple vegetarian diet, while avoiding excessive amount of fats from animal sources, can go a long way in protecting us from such coronary thrombosis, heart attack and premature death.

Incidentally, our previous work on vitamin C and heart disease was prompted by reports from England and Norway that the attacks of paralysis or stroke (cerebral thrombosis) are more common in those months in which fresh fruits and vegetable are not available.

How exactly does vitamin C work? We do not understand it fully yet, but several possible mechanisms have been found:

- i) Vitamin C lowers blood cholesterol, particularly the ‘bad’ LDL cholesterol and promotes excretion of all extra cholesterol through the bile.
- ii) It is a powerful anti-oxidant and, therefore, prevents harmful oxidation of fats like cholesterol and poly-unsaturated fatty acids. It is actually the oxidised form of these which gets readily deposited in the arteries.
- iii) It shares other antioxidant like vitamin E and protects them from inactivation.
- iv) Vitamin C increases fibrinolytic activity of blood and thereby prevents thrombosis in diseased.
- v) Deficiency of vitamin C decreases collagen synthesis in blood vessels which then become more susceptible to damage.
- vi) Vitamin C deficiency reduces activity of lipoprotein lipase so that triglycerides accumulate in the blood.
- vii) Vitamin C concentration in blood correlates with HDL which mobilize cholesterol out of the arteries into the liver for the breakdown and so on.

Obviously we are still groping in the dark as far as the precise mechanism behind the vitamin C –blood lipids/atherosclerosis relationship is concerned.

The benefit from vitamin C can be astonishing. A 1 % fall in blood cholesterol through a vitamin C rich vegetarian diet can lower the risk of suffering a heart attack by at least 2 %.