

Importance of Heart-Healthy Diet

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ABSTRACT Prevalence of cardiac diseases is on the rise and is at alarming rate in the Indian subcontinent. Diet, life-style factors and stress are the cardinal factors in the aetio- pathogenesis of coronary diseases. Other important risk factors are history of smoking, high BP, increased cholesterol level, diabetes and atherosclerosis, abdominal obesity, high triglycerides, insulin resistance, increased homocysteine level in blood and increase in fibrinogen with defects in fibrinolysis. Inter-population differences exist in both the diet and in the socio-cultural factors within and outside the Indian subcontinent. The dietary pattern, eating and method of cooking vary in different parts of India. Currently, there is much controversy over the best balance in carbohydrates, fats, and protein. Although dietary approaches differ in important aspects, they have some recommendations in common: everyone puts much stress in the value of fiber-rich whole grains, legumes, and fresh fruits and vegetables, and when fats are recommended, they are mainly monounsaturated and polyunsaturated. Weight control and exercise are essential components of any diet program. Reduction of all kinds of stress through stress reduction programmes is beneficial. A combined approach will play a rich dividend in control of cardiac diseases.

INTRODUCTION

Diet has important role to play in Indians as they are prone to cardiac diseases particularly atherosclerosis related ischaemic episodes. Available data suggest that diet is one of the main culprits; other important ones are life-style and stress. The dietary pattern, eating and methods of cooking vary in different parts of India (Ramaiya et al. 1990). Bhatia (1995) have shown that the important risk factors of Coronary Vascular Disease (CVD) are smoking, high BP, cholesterol level and diabetes. Although there are now newer risk factors like abdominal obesity, high triglycerides, insulin resistance, homocysteine level in blood, increase in fibrinogen (Padmavathi 2002). Cholesterol phantom in mid-seventies (Raheja et al 1970) in Indian kitchen leads to increased consumption of omega-6 fatty acids in the form of sunflower oil, saffler oil or kardi oil etc. and it caused increase in omega-6 to omega-3 ratios from 4: 1 to even 16: 1 (Mitra and Bhattacharya 2006). As a result, alteration of viscosity and rheologic properties of blood was being eventuated (Chow 1992). Diet in rural India contains about 80% of carbohydrates and is diabetogenic in nature and increases insulin resistance (Mitra and Bhattacharya 2005). Contrary to the findings of Ghafoarunissa (1996), Mitra and Bhattacharya (2006) concluded that fat intakes in the diet did not depend on income in rural sectors. Diet has a profound role in the

control of insulin resistance syndrome and particularly in Coronary artery disease (Raheja et al. 1970; Sanders et al. 1985; Ghafoarunissa 1996; Luscombe et al. 2002; Mitra and Bhattacharya 2005 and 2006). Mitra and Bhattacharya (2007) found while rural diet is diabetogenic in nature, increase in protein content in the diet was easier to comply and more satiating. It caused reduction of abdominal fat in males. This corroborates with the observations of Luscombe et al. (2002). Ghafoarunissa (1996) observed that in Indian rural diet, fat intake, particularly intake of omega-3 fatty acid is low and intake of fat is directly proportional to income. Sanders et al. (1985) showed that with a low fat intake the difference in effects of omega-3 and omega-6 fatty acids are marginal. Hence, the view expressed by Sanders et al. was contrary to the view expressed by Raheja et al. (1970). Ornish (1996) had advocated that a low fat diet is beneficial for health but it has the disadvantage of low HDL level in blood. Hence, a diet with adequate fat and with omega-3 and omega-6 fatty acids is good for health. It was observed that vegetarian diet has a role in reducing the incidence of Coronary artery disease (Burslem et al. 1978; Burr and Sweetman 1982; Ernst et al. 1986; Fisher et al. 1986).

Prevalence of Coronary Artery Disease

The prevalence of coronary heart disease increased from 1.05% in 1960 to 9.67% in 1995 in urban populations. In rural areas, the prevalence

increased from 2.03% in 1974 to 3.7% in 1995 (Gupta et al. 2006). As described in Table 1 (Age distribution of prevalence rate of heart diseases in India, 1994 per 100,000 population), in urban areas there was a significant increase in the prevalence of coronary heart disease in men in the age groups 20-29 and 30-39 years and in women in the age groups 20-29, 30-39 and 40-49 years. In rural areas the increase in men was in the age groups 20-29 and 30-39 years (Gupta and Gupta 1996). Most of the studies on the coronary heart diseases (CHD) in India have been community-based studies. The largest study that has looked into the prevalence of CHD is by Chaddha et al. (1990) among 13,500 urban dwellers in Delhi. The estimated prevalence rate was around 9.7 per cent, and the estimates were based on clinical and ECG criteria. Reddy and Yusuf (1998), based on a cross-sectional survey of urban Delhi, found that a higher prevalence of CHD in the urban sample was associated with higher levels of body mass index, blood pressure, fasting blood lipids (total cholesterol, ratio of total cholesterol to High Density Lipoprotein cholesterol or HDL, serum triglycerides), and fasting blood sugar levels.

Table 1: Age distribution of prevalence rate of heart diseases in India, 1994 (per 100,000) population (Gupta and Gupta 1996)

States	0-4	5-14	15-44	45-59	60+
India	1	2	27	81	432
Andhra Pradesh	0	1	31	71	493
Bihar	0	0	0	0	0
Gujarat	0	0	43	98	650
Haryana	0	3	33	78	260
Karnataka	0	7	38	87	487
Kerala	20	5	35	163	1074
Maharashtra	0	0	23	75	305
Punjab	0	2	51	117	642
Rajasthan	9	5	18	66	183
Tamil Nadu	4	0	51	93	967

Gupta and Gupta (1996) and Ramachandran et al. (2001) found that individuals with lower levels of income or education are at higher risk of coronary heart disease, suggesting that in some population groups at South Asia, prevalence followed a pattern seen with advanced epidemics in developed countries and the observed shift is from the rich countries to the poor countries.

Epidemiological studies on Coronary Diseases in India begin as early as the 1960s, and continuing the date. However, with a few exceptions, these studies are small and region-specific

studies, and do not have a country level analysis. Also, many of these studies have looked into specific components of Coronary Diseases or at risk factors like hypertension, cholesterol or diabetes.

The American Heart Association estimated the economic costs of Coronary Vascular Diseases (CVD) in the United States in 2001 at \$298.2 billion. This includes health expenditures (the direct costs incurred by CVD – services provided by doctors and other health professionals, hospital and nursing home costs, medications, home health expenses, and other medical durables), estimated at \$182 billion, and lost productivity from CVD morbidity and mortality (the indirect costs of the disease), estimated at \$116 billion. The mean expenditures on diabetes, diseases of the heart and blood pressure in India were Rs. 5,484, Rs 9,180 and Rs. 2,736 respectively for 1985-86. The mean expenditure for all chronic illnesses was Rs. 5,414. For heart failure under acute illness, the mean expenditure was Rs. 502, which was much higher than the mean expenditure for all acute illnesses, Rs. 134 (Gupta et al. 2006). The goals of a heart-healthy diet are to provide foods that help to obtain or maintain healthy cholesterol and lipid levels to reduce overall levels and low-density lipoproteins (LDL) and to increase high-density lipoproteins (HDL). Reduction of lipids such as triglycerides and Lp(a) lipoproteins are important. Any such diet should also help to keep blood pressure under control.

GENERAL RECOMMENDATIONS FOR FAT INTAKE

The liver manufactures about two-thirds of cholesterol in the body. All fats found in foods are made up of a mixture of monounsaturated, polyunsaturated, and saturated fatty acids, one type usually predominates (Singh et al. 2002). In addition, there are three chemical subgroups of polyunsaturated fatty acids: omega-3, omega-6, and omega-9 fatty acids. Trans-fatty acids are products of food processing rather than naturally occurring fats. Omega-3 fatty acids are also known as alpha-linolenic acid (sources include flaxseed, canola oil, soybeans, olive oil, many nuts and seeds). Its active metabolites are docosahexaenoic and eicosapentaenoic acids. Studies have indicated that vegetable oils containing alpha-linolenic acids reduce triglycerides and are heart protective (Chow 1992), although fish oils,

which contain docosahexaenoic and eicosapentaenoic acids, do not have much triglyceride lowering effect. Mitra (2007) had found that flax oil is a better omega-3 health substitute than fish oil. Further, flax oil induces beneficial changes in dyslipidaemia by reducing LDL and VLDL levels (Nestel et al. 1997). Omega-6 fatty acids are also named as linoleic or linolic acid (sources are canola, flaxseed, corn, and soybean oil). Many hydrogenated fats are made from oils rich in omega-6 fatty acids. Source of Omega-9 fatty acids is olive oil but it can also be Synthesized *in vivo*.

Majority of workers advise limiting intake of saturated fats (found in animal products) and trans-fatty acids (found in commercial baked goods and fast foods). Other fatty acids, however, may offer benefits. Some recommends maintaining a relatively high intake of monounsaturated and polyunsaturated fats (about 32% of calorie intake), with saturated fats representing no more than 8% while others believe that a very trim diet 20% fat with as little as 4% saturated fat is ideal (Ornish 1996). Mitra et al. (2006) found that diet very rich in carbohydrate is diabetogenic and atherogenic in nature in sedentary people who do not perform regular exercises. However, the health dangers of a diet high in saturated or trans-fatty acids should not be underestimated (Mitra 2007). Saturated fats are found predominantly in animal products, including meat and dairy products. However, the countries with the highest palm-oil intake, Thailand, Malaysia, Costa Rica etc. also have much lower heart disease rates and cholesterol levels than Western nations (Ebong et al. 1999; Enig 2006).

Trans-fatty acids are also dangerous for the heart, and in addition, they may pose a risk for certain cancers. Hydrogenation process chemically converts polyunsaturated fats into trans-fatty acids. These partially hydrogenated fats are even worse than saturated fats because they both increase LDL and reduce HDL cholesterol levels (Oomen et al. 2001). A study with nurses reported that when total fat consumption was 46% of total caloric intake there was no greater risk in general for a heart attack than did those for whom fat represented 30% of calories consumed. However, those whose diets were high in trans-fatty acids had a 53% increased risk for heart attack compared to those who consumed the least of trans-fatty acids (Oh et al. 2005). Hydrogenated fats are used in stick margarine, *vanaspati*, and in many fast foods and baked products; including most commercially produced white breads.

Beneficial Fats and Oils: It should be noted that some fat is essential for health and fat is essential for healthy development in children. Public attention has mainly focused on the possible benefits or hazards of monounsaturated and polyunsaturated fats. Polyunsaturated fats are found in safflower, sunflower, corn, cottonseed oils, and fish, while monounsaturated fats are mostly present in olive, canola, and peanut oils and in most nuts.

Early studies indicated that monounsaturated fats helped to maintain healthy HDL levels while polyunsaturated fats reduced them. Subsequent studies, however, have found little difference between the effects of either fat on cholesterol levels. It is also not entirely clear that the positive effects of monounsaturated fats on HDL levels actually protect against coronary artery disease although they may protect against stroke. A high intake of monounsaturated fats increased the levels of very low-density lipoproteins (VLDL) (Curb et al. 2000; Sujata et al. 2001).

In a healthy balance, all of these fatty acids are essential to life. Omega-6 is associated with increased production of compounds called eicosanoids, which enhance tumor growth in animals (Black et al. 2008). Both omega-3 and omega-9 fatty acids contain chemicals that block these eicosanoids. Current Western diet contains an unhealthy ratio 16: 1 of omega-6 to omega-3 of fatty acids.

Fat Substitute: Fat substitutes added to commercial foods or used in baking, deliver some of the desirable qualities of fat, but do not add as many calories. Some common replacers are cellulose gel Avicel, Carrageenan (made from seaweed), Guar Gum, and Gum Arabic, and are generally recognized as safe. New, synthetic fat substitutes are now available, but little is known about their long-term effects. Olestra (Olean) passes through the body without leaving behind any calories from fat. But, even small amounts of olestra deplete the body of certain vitamins and nutrients that are important for protection against cancer (Cheskin et al. 1998). The FDA requires that the missing vitamins be added back to olestra products, but not other nutrients. Plant substances known as sterols reduce cholesterol. A sterol called sitostanol, also called stanol, has been added to canola to produce a margarine called Benecol. It reduced LDL by an average of 24%. Fat substitutes derived from beta-glucan,

the soluble fiber found in oats and barley has shown health benefits beyond reducing calories and replace hydrogenated or saturated fats (Borchers et al. 2004).

COMPLEX CARBOHYDRATES AND FIBER

Foods that are high in complex carbohydrates and fiber are as important as reducing harmful fats in maintaining a healthy diet.

Fresh Fruits and Vegetables: Regular consumption of fresh fruit and raw vegetables reduces deaths from stroke and coronary artery disease, lower blood pressure, and may be protective against certain cancers due to phytochemicals such as flavonoids, sterols, phenol, and sulfur-containing compounds in fruits and vegetables. In addition, fruits and vegetables also provide fiber. Flavonoids, found in red wine, onions, fruits like jamun, mango and apples, protect against damage done by cholesterol and prevent blood clots. Almost all berries are potent antioxidants. A chemical in garlic called S-allyl cysteine produces cholesterol-lowering effect. Another recent study reported that heating garlic blocks its health-protective effects. By allowing crushed fresh garlic to stand 10 minutes before heating, however, S-allyl cysteine and other beneficial chemicals are released and are not lost when the garlic is cooked (Harunobu et al. 2001; Banerjee and Maulik 2002).

Whole Grains, Nuts, and Fiber: Fiber is found only in plants, particularly vegetables, fruits, whole grains, nuts, and legumes (beans and peas), and offer other health benefits as well. Soluble fiber (found in nuts, oat bran, beans and other legumes, barley, prunes, and various fruits and vegetables) is particularly useful for lowering cholesterol levels, possibly because it removes bile acids from the intestine. Fat in the diet reduce LDL and total cholesterol. Mitra et al. (2007) reported reduction of fasting blood sugar and insulin resistance in diabetics with increase in soluble fibre content in diet. Fibre in diet reduces incidence of coronary vascular disease and atherosclerosis. Fiber also helps weight reduction and fights cancer (Macrae et al. 1993).

Soluble fiber also improves blood glucose levels and appears to reduce blood pressure. Oats may be a particularly beneficial source of soluble fiber. Researches found that, women who had six to 11 servings of whole grains a day reduced their risk of heart disease by a third. Insoluble fiber

(found in rye, wheat bran, whole grains, seeds, and fruit and vegetable peels) may also reduce fat absorption and even aid in weight reduction. Some studies have singled out nuts, which contain omega-3 fatty acids and fiber, as being particularly beneficial for the heart by lowering LDL and total cholesterol without increasing triglycerides (Das and Mitra 2007).

People who increase their levels of soluble fiber should also increase water and fluid intake. It is best to obtain dietary fiber, soluble or insoluble, in foods. Gas and bloating often accompany a high-fiber diet (Mitra et al. 2007).

PROTEIN

Fish: A number of studies have reported that eating fish or shellfish at least once a week reduces the risk of sudden death from dangerous heart-rhythm abnormalities by more than one half. Oily fish, such as salmon, halibut, swordfish, and tuna, appear to be particularly beneficial. (Studies of people who take fish oil supplements, which contain omega-3 fatty acids, have found no similar benefits, indicating that fish contain other protective substances). It is being found that eating fish reduces triglycerides and Lipoprotein (a). Eating fish also appears to protect the nervous system and may reduce risks for other disorders, including rheumatoid arthritis, asthma, ulcerative colitis, and some types of cancers. At this time, most studies indicate that eating moderate amounts (one or two servings weekly) of fish offers the most benefits (Lands 1989; Daviglus et al. 1997).

Soy: Soy is an excellent food. It is rich in both soluble and insoluble fiber, omega-3 fatty acids, and provides all essential proteins. Soybeans also contain natural estrogens called phytoestrogens, which may have effects on lipid levels and also serve as antioxidants. Mitra and Bhattacharya (2006) found that with taking of soy (20g/day) LDL was reduced by 18%, triglycerides by 22%, and HDL increased by 2%. It was reported by a group of Japanese workers that the lowest cholesterol levels are found in those with the highest soy intake. For people with heart disease, at least 25 grams of soy products each day is recommended (Friedman and Brandon 2001; Mitra and Bhattacharya 2006).

Meat: The fat content of meat varies depending on the type and cut. It is best to eat skinless chicken or turkey and the leanest cuts of pork and is comparable to chicken in calories, fat, and

cholesterol levels. It is best to avoid beef. In case of red meat, the select grade has the least fat, and prime grade the most (Kinnucan et al. 1997).

Sodium

Diets high in salt accelerate the increases in blood pressure that occur as people age. Most (about 75%) of the salt in people's diets comes from processed or commercial foods; the benefits of table-salt substitutes are likely to be very modest. Potassium in the diet is beneficial in controlling blood pressure while zinc in the diet helps in reduction of LDL and VLDL in dyslipidaemia (Mitra et al. 2006).

Sugar

Sugar adds calories and increases blood glucose levels quickly. Sugar was a risk factor for heart disease, possibly because sugar fuels obesity, which boosts very low-density lipoproteins and triglycerides that are dangerous for the heart (Macrae et al. 1993).

Dietary Cholesterol

Cholesterol is found only in animal tissues, with high amounts occurring in meat, dairy products, egg yolks, and shellfish. American Heart Association recommends 300 mg of cholesterol per day. Reducing dietary cholesterol intake by 100 mg/day would only produce a 1% decrease in cholesterol levels. Avoiding foods high in cholesterol will also not make much of a dent in high LDL levels. Certain people with high cholesterol, who ate eggs regularly, experienced lower LDL levels and even a modest increase in HDL; people with high triglycerides appeared to fare badly. When cholesterol contained in food is heated, it becomes oxidized and accelerates atherosclerosis (Ornish 1996).

VITAMINS AND SUPPLEMENTS

Antioxidant Properties: Currently, many researchers are studying vitamins C, E, A, and other nutrients for their role as antioxidants, which are scavengers of particles known as oxygen-free radicals. These unstable particles are by-products of many of the body's normal chemical processes and are increased by smoking, environmental toxins, and stress. They can damage cell mem-

branes and interact with genetic material, contributing to the development of a number of disorders including cancer and heart disease.

Vitamin E: It may help prevent blood clots and coronary artery disease — two major factors in heart attacks. However, actual evidence of its beneficial effects on the heart is uncertain. Positive results in patients who consumed high amounts of vitamin E may have been due to a generally healthy diet that contained a team of healthy nutrients, including vitamin E. Recommended dose is 65 to 260 mg (100 to 400 IU) a day. High doses of vitamin E may increase the risk for hemorrhagic stroke, although the risk is very small. Women whose diets were rich in vitamin E had lower LDL levels, but those who took supplements did not (Suzukawa et al. 1998).

Vitamin C: Evidence for the heart-protective value of vitamin C, has been even more inconclusive. Some studies have found some benefits against stroke, but not heart disease. It has properties that might improve the elasticity in blood vessels. Vitamin-C deficiencies are associated with a higher incidence of angina, heart attack, and death from heart-related disorders (Padayatty and Levine 2000). However, such findings do not prove that taking extra vitamin C protects patients against these conditions. Vitamin C may act as pro-oxidant in high doses.

B Vitamins: Niacin is currently used for lowering both LDL-cholesterol and triglyceride levels and for raising HDL levels. Vitamins B6, B12, and folic acid are important in elevated blood levels of homocysteine, a possible factor in coronary artery disease (Iqbal et al. 2005). However, it is not documented that B vitamin supplements will actually reduce the risk of cardiovascular disease.

Other Supplements: Magnesium reduces the bad cholesterols (Rosanoff and Seelig 2004) and the arterial pressure, and suitable amounts of this mineral are important to prevent the excess of calcium in the arteries, that can cause a hardening of endothelium. Calcium obtained from foods that did not contain fat reduces infarct occurrence. Chromium, present in the peanuts, cereals and peas, increases the levels of HDL (Carlson 2006). The supplements of L-Arginine can prevent the atherosclerosis in the people with elevated cholesterol, but more clinical tests are required to assure it (Macrae et al. 1993).

ALCOHOL, CAFFEINE AND CHOCOLATE

Alcohol: Wine increases HDL levels and

protect against heart disease and possibly stroke (Cordova et al. 2005). However, in patients who had experienced heart attacks, wine consumption was associated not only with higher HDL levels, but also with higher LDL and triglyceride levels. Pregnant women or those at risk for alcohol abuse should not drink alcohol. Even moderate drinking increases the risk of breast cancer in women.

Caffeine: Tea, although it contains caffeine, also has folic acid, which reduces homocysteine levels, a possible factor in coronary artery disease (Olthof et al. 2001). Black tea also contains flavonoids and other substances that offer protection against damaging forms of LDL and a lower incidence in heart attacks in tea drinkers compared with non-tea drinkers. Coffee did not appear to have any affect one way or the other, although drinking coffee increases excretion of calcium, which is important for bones and possibly for heart health. Studies are finding that unfiltered coffee contains an alcohol called cafestol, which can raise cholesterol levels. However, a high level of homocysteine is found in people who drink many cups of coffee per day. On the other hand, coffee, like red wine, contains phenol, which helps prevent oxidation of LDL cholesterol. There is no evidence that drinking coffee increases the risk for heart disease, although tea is the better caffeine choice.

Chocolate: Chocolate contains stearic acid, which may lower LDL. Food containing chocolate, however, also contains sugar and fat, so it is not recommended for prevention.

OTHER LIFESTYLE CHANGES WITH A HEART-HEALTHY DIET

Obesity and Weight Gain: Spectrum of insulin resistance includes obesity, dyslipidaemia, atherosclerosis and coronary or cerebro-vascular diseases, type 2 diabetes and hypertension. Obesity is associated with rise in total cholesterol and triglyceride levels and lower HDL levels.

Exercise: Dietary changes improve cholesterol levels only when an aerobic exercise program is also included. In addition to having a beneficial effect on cholesterol, exercise is critical to maintaining a healthy heart; it helps keep weight off and lowers the heart rate and blood pressure. People who maintain an active lifestyle have a 45% lower risk of developing coronary heart disease than do sedentary people. Regular aerobic exercises like brisk walking, jogging, swimming, biking, aerobic dance etc are the best

forms of exercise for lowering LDL and raising HDL levels. It may take up to a year of sustained exercise for HDL levels to show significant improvement. Mitra and Bhattacharya (2007) found that routine of brisk walks for an hour at a speed of 6 km/hour is better for reduction of blood sugar and bad cholesterols (LDL and VLDL) and improve in good cholesterol (HDL). Resistance (weight) training offers a complementary benefit by reducing LDL levels. After a high-fat meal, triglycerides can be lowered either with a single, prolonged (about 90 minutes) aerobic session or by several shorter sessions during the day (Stefanick et al. 1998). Active yoga or breathing exercises as a part of exercise programme reduces stress of all kinds and different stress relieving procedures are in practice and recorded even in ancient Indian literatures.

DIFFERENT TYPE OF DIETS RECOMMENDED

Currently, there is much controversy over the best balance of carbohydrates, fats, and protein. The three major cholesterol reduction diets are the following: the Step 1 and Step 2 diets recommended by the American Heart Association; the Mediterranean Diet; and very low-fat diets, such as the *Ornish* Program (Nutrition: An ocean of options 1997; How much can diet lower cholesterol, 1997). Some experts believe that either the Step 1 or the Mediterranean diet is probably adequate for people with no coronary artery disease and normal LDL levels (<160 mg/dl) and for those with low LDL levels (<130 mg/dl) with only one or two risk factors for heart disease, such as low HDL levels and smoking. For those with higher cholesterol levels, the Step 2, *Ornish*, or Mediterranean diets may be effective depending on individual conditions. In general, most patients find it difficult to comply even with fat restrictions recommended under the Step 2 diet, which calls for fat intake being 20% of daily calories. The *Ornish* program is far stricter. It was reported that restricting fat intake to only 26% of calories reduced LDL levels as effectively as restricting fat intake to 18%. Consuming more fats (46% of their calories) had no greater risk, in general, for heart disease than those who ate less (29%). However, consuming trans-fatty acids had more than double the risk of a heart attack compared to those whose diets were low in this dangerous fat. The type of fat is more important

than the amount (Mitra et al. 2007). Low-fat diets, in fact, have recently been associated with a higher risk for stroke. The Mediterranean diet has great appeal, then, because of the foods allowed, including olive oil and wine. It significantly reduced the risk for a second heart attack after an average of four years compared to a conservative Western diet. Of great concern with the Mediterranean diet, however, is the risk for weight gain, and it is recommended only for people who are reasonably lean. A fourth heart-healthy diet is called the Dietary Approaches to Stop Hypertension (DASH) diet, which has been designed specifically to help people reduce blood pressure (Ornish 1996).

Fat-restrictive diets may even be harmful. Some have reported that high-carbohydrate and low-fat diets can reduce HDL levels and increase blood sugar and triglyceride levels. Very low-fat diets may also increase the risk for stroke. Many people who reduce their fat intake may also not consume enough of the basic nutrients, including vitamins A and E, folic acid, calcium, iron, and zinc (Daviglius et al. 1997). People on low fat diets should consume a wide variety of foods and take a multivitamin if appropriate. Still, low-fat diets that is high in fiber, whole grains, legumes, and fresh produce offer health advantages in addition to their effects on cholesterol. They are effective in keeping weight off and they protect against high blood pressure and possibly against certain cancers.

CONCLUSION

The rich cultural reservoir of traditional Indian medicine is supported by diverse cultural sources, which have to be evaluated fully. It represents the people. The popular therapeutic habits and successes have to be retrieved and validated in order to use this information to develop new cost-effective, safe and efficacious system of medicines. A national congress on traditional sciences and technologies of India during 1993 was organized specifically to comprehend and evaluate our traditions in diverse domains of knowledge and practice. This was considered an important issue in our developmental efforts at the grass-root levels, as many of these living traditions still have the potential to contribute to the physical well being of our people. Inter-population differences exist in both diet and the socio-cultural factors both within and outside the Indian subcontinent.

Although dietary approaches differ in important aspects, they have some recommendations in common: all stress in the value of fiber-rich whole grains, legumes, and fresh fruits and vegetables, and when fats are recommended, they are monounsaturated and polyunsaturated. Weight control and exercise are essential companions of any diet program. Reduction of all kinds of stress through stress reduction programmes is beneficial. A combined approach will play a rich dividend in control of cardiac diseases.

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REFERENCES

- Banerjee SK, Maulik SK 2002. Effect of garlic on cardiovascular disorders: a review. *Nutrition Journal*, 1: 4doi: 10.1186/1475-2891-1-4.
- Bhatia ML 1995. Prevalence of coronary heart disease in India: A contemporary view. *Indian Heart Journal*, 47(4): 339-42.
- Black HS, Thornby JI, Gerguis J, Lenger W 2008. Influence of dietary Omega-6,-3 fatty acid sources on the initiation and promotion stages of photo-carcinogenesis. *Photochemistry and Photobiology*, 56(2): 195-199.
- Borchers TA, Keen LC, Gershwin ME 2004. Mini review Mushrooms, Tumors, and Immunity: An Update. *Experimental Biology and Medicine*, 229: 393-406.
- Burr ML, Sweetman PM 1982. Vegetarianism, dietary fibre and mortality. *American Journal Clinical Nutrition*, 36: 873-877.
- Burslem J, Schonfeld G, Howald MA, Weidman SW, Miller JP 1978. Plasma apoprotein and lipoprotein lipid levels in vegetarians. *Metabolism*, 27: 711-719.
- Chadha SL, Radhakirshnan S, Ramachandran K, Kaul U 1990. Epidemiological study of Coronary heart disease in urban population of Delhi. *Indian Journal Medical Research*, 92: 424-30.
- Carlson LA 2006. Nicotinic acid and other therapies for raising high-density lipoprotein. *Curr Opin Cardiol*, 21: 336-344.
- Cheskin L J, Midday R, Zorich N, Filloon T 1998. Gastrointestinal symptoms following consumption of olestra or regular triglyceride potato chips: A controlled comparison. *Journal of American Medical Association*, 279: 150-152.
- Chow CK 1992. Fatty acids in Foods and their Health Implications. New York: Marel Dekker Inc.
- Cordova A, Jackson L, Berke-Schlessel D, Sumpio B 2005. The cardiovascular protective effect of red wine. *Journal of the American College of Surgeons*, 200(3): 428 - 439.

- Curb JD, Wergowske G, Dobbs JC, Abbott RD, Huang B 2000. Serum Lipid Effects of a High-Monounsaturated Fat Diet Based on Macadamia Nuts. *Archives Internal Medicine*, 160: 1154-1158.
- Das M, Mitra A 2007. Benefits of Nuts. *Processed food Industry*, 10(8): 36-40.
- Daviglus L M, Stamler J, Orenca JA, Dyer RA, Liu K, Greenland P, Walsh MK, Morris D, Shekelle RB April 4, 1997. Fish consumption and the 30-year risk of fatal myocardial infarction. *The New England Journal of Medicine*, 336(15): 1046-1053.
- Ebong PE, Owu DU, Isong, EU 1999. Influence of palm oil (*Elaeis guineensis*) on health. *Plant Foods for Human Nutrition (Formerly Qualitas Plantarum)*, 53(3): 209-222.
- Enig MG 2006. Palm Oil and Coronary Heart Disease. Retrieved from <http://www.mpopc.org.my/abtenbopo2.htm> on 16.01.2006.
- Ernst E, Pietsch L, Matrai A, Eisenberg J 1986. Blood Rheology in Vegetarians. *British Journal of Nutrition*, 56(3): 555-560.
- Fisher M, Levine PH, Weiner B 1986. The effect of vegetarian diets on plasma lipid and platelet levels. *Archives Internal Medicine*, 146: 1193-1197.
- Friedman M, Brandon LD 2001. Nutritional and Health Benefits of Soy Proteins. *Journal of Agriculture and Food Chemistry*, 49(3): 1069 -1086, 10.1021/jf0009246 S0021-8561 (00)00924-9.
- Gupta I, Kandamuthan S, Upadhyaya D 2006. *Economic Impact of Cardiovascular Diseases in India*. Delhi: Institute of Economic Growth, pp. 1-51.
- Gupta R, Gupta VP 1996. Meta-analysis of coronary heart disease prevalence in India. *Indian Heart Journal*, 48(3): 241-5.
- Ghafoarunissa 1996. Fats in Indian diets and their Nutritional and health Implications. *Lipids*, 31 Supplement: 287-291.
- Harunobu A, Brenda LP, Matsuura H, Shigeo K, Itakura Y 2001. Supplement: Recent Advances on the Nutritional Effects Associated with the Use of Garlic as a Supplement: - Intake of Garlic and Its Bioactive Components. *Journal of Nutrition*, 131: 955S-962S.
- Iqbal MP, Ishaq M, Kazmi KA, Yousuf FA, Mehboobali N, Ali SA, Khan AH, Waqar MA 2005. Role of vitamins B6, B12 and folic acid on hyperhomocysteinemia in a Pakistani population of patients with acute myocardial infarction. *Nutrition, Metabolism and Cardiovascular Diseases*, 15 (2): 100-108.
- Kinnucan HW, Xiao H, Hsia CJ, Jackson JD 1997. Effects of Health Information and Generic Advertising on U.S. Meat Demand. *American Journal of Agricultural Economics*, 79(2): 13-23.
- Lands WEM 1989. n-3 fatty acids as precursors for active metabolic substances: dissonance between expected and observed events. *Journal of Internal Medicine*, 225 Supplementary 1: 11.
- Luscombe ND, Clifton PM, Noakes M, Parker B, Wittert G 2002. Effects of energy-restricted diets containing increased protein on weight loss, resting energy expenditure, and the thermic effect of feeding in type 2 diabetes. *Diabetes Care*, 25: 652-657.
- Macrae R, Robinson RK, Sadler MJ (Eds.) 1993. *Encyclopedia of Food Science, Food Technology and Nutrition*, 2nd volume. London: Academic Press.
- Mitra A, Bhattacharya D 2005. Effects of overall consumption, dietary patterns, cooking, on patients suffering from Non insulin dependent diabetes mellitus. *Journal of Interacademia*, 9(4): 635-642.
- Mitra A, Bhattacharya D 2006. Effects of Walking on Patients of Insulin Resistance. *Journal of Interacademia*, 10 (3): 373-380.
- Mitra A, Bhattacharya D 2006. Preparation of Cheap break-first composite with Soybean and Sorghum for the management of Type 2 Diabetes (Non-Insulin-Dependent Diabetes Mellitus). *All India Seminar on Advances In Agro-Processing And Rural Empowerment, Kolkata*, Feb 17-18, 2006. Agriculture Engineering Division, The Institution of Engineers (India), West Bengal State Center, 8 Gokhale Road, Kolkata 700 020.
- Mitra A, Bhattacharya D 2006. Effect of Fatty Substances on Health particularly to Patients Suffering from NIDDM and Dyslipidaemia. *Journal of Interacademia*, 10(1): 74-85.
- Mitra A, Bhattacharaya D, Goswami TK 2006. A Study of the Zinc Deficiency in a Section of Rural People in Bengal by Soil Fortification. *African Journal of Health Sciences*, 13(3-4): 53-58, Bioline Code: jh06028.
- Mitra A 2008. Effects of a Cheap Salad oil in the management of Type 2 Rural Indian Diabetics with Dyslipidaemia. *Journal of Human Ecology*, 23(1): 27-38.
- Mitra A, Bhattacharya D, Roy S 2007a. Dietary influence on TYPE 2 Diabetes (NIDDM). *International Journal of Human Ecology*, 21(2): 139-147.
- Mitra A, Bhattacharya D 2007. Oil cakes for human consumption in NIDDM patients. *Indian Journal of Practicing Doctors*, IV (1): 33-44.
- Mitra A, Bhattacharya D, Roy S 2007b. Role of Resistant Starches Particularly Rice Containing Resistant Starches in Type 2 Diabetes. *Journal of Human Ecology*, 21(1): 47-51.
- Nestel PJ, Pomeroy SE, Sasahara T, Yamashita T, Liang YL, Dart AM, Jennings GL, Abbey M, Cameron JD 1997. Arterial Compliance in Obese Subjects Is Improved With Dietary Plant n-3 Fatty Acid From Flaxseed Oil Despite Increased LDL Oxidizability. *Arteriosclerosis, Thrombosis, and Vascular Biology*, 17: 1163-1170.
- Oh K, Hu FB, Manson JAE, Stampfer MJ, Willett WC 2005. Dietary Fat Intake and Risk of Coronary Heart Disease in Women: 20 Years of Follow-up of the Nurses' Health Study. *American Journal of Epidemiology*, 161(7): 672-679.
- Oomen CM, Ocké MC, Feskens EJM, Erp-Baart MAJV, Kok FJ, Kromhout D 2001. Association between trans fatty acid intake and 10-year risk of coronary heart disease in the Zutphen Elderly Study: a prospective population-based study. *Lancet*, 357: 746-751.
- Ornish D 1996. *Program for Reversing Heart Disease*. New York: Ivy Books.
- Olthof MR, Hollman PC, Zock PL, Katan MB 2001. Consumption of high doses of chlorogenic acid, present in coffee, or of black tea increases plasma total homocysteine concentrations in humans. *American Journal of Clinical Nutrition*, 73(3): 532-528.
- Padayatty SJ, Levine M 2000. Vitamin C and myocardial

- infarction: the heart of the matter. *American Journal of Clinical Nutrition*, 71(5): 1027-1028.
- Padmavati S 2002. Prevention of Heart Disease in India in the 21st Century: Need for a Concerted Effort. *Indian Heart Journal*, 54: 99-102.
- Raheja BS, Talwalkar NG, Suttarwalla SK 1970 February. Ischaemic heart disease in diabetes. *J Assoc Physicians India*, 18 (2): 261-267.
- Rajaram S, Burke K, Connell B, Myint T, Sabaté J 2001. A Monounsaturated Fatty Acid-Rich Pecan-Enriched Diet Favorably Alters the Serum Lipid Profile of Healthy Men and Women. *Journal of Nutrition*, 131: 2275-2279.
- Ramachandran A, Snehalatha C, Kapur A, Vijay V, Mohan V, Das AK, Rao PV, Yajnik CS, Prasanna Kumar KM, Nair JD 2001. Diabetes Epidemiology Study Group in India (DESI). High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey. *Diabetologia*, 44(9): 1094-1101.
- Ramaiya KL, Kodali VR, Alberti G 1990. Epidemiology of diabetes in Asians of the Indian subcontinent. *Diabetes Metabolism Review*, 6: 125-46.
- Reddy KS, Yusuf S 1998. Emerging Epidemic of Cardiovascular Disease in Developing Countries. *Circulation*, 97: 597-601.
- Rosanoff A, Seelig MS 2004. Comparison of Mechanism and Functional Effects of Magnesium and Statin Pharmaceuticals. *Journal of the American College of Nutrition*, 23(5): 501S-505S
- Sanders TAB, Oakley FR, Miller GJ, Mitropoulos KA 1985. Influence of n-6 versus n-3 polyunsaturated fatty acids in diet low in saturated fatty acid decreases during long term compliance with a lipid lowering diet. *Journal of Internal Medicine*, 59: 249-258.
- Seshadri CV 1993. Indigenous sciences and technologies - the PPST endeavor. Congress on Traditional Sc and Technologies of India 28th Nov. - 3rd. Dec, 1993 IIT, Mumbai.
- Singh R, Dubnov G, Niaz M., Ghosh S, Singh R, Rastogi S, Manor O, Pella D, Berry E 2002. Effect of an Indo-Mediterranean diet on progression of coronary artery disease in high risk patients (Indo-Mediterranean Diet Heart Study): a randomised single-blind trial. *The Lancet*, 360(9344): 1455 - 1461.
- Stefanick ML, Mackey S, Sheehan M, Ellsworth N, Haskell WL, Wood PD 1998. Effects of diet and exercise in men and postmenopausal women with low levels of HDL cholesterol and high levels of LDL cholesterol. *The New England Journal of Medicine*, 339(1): 12-20.
- Suzukawa M, Ayaori M, Shige H, Hisada T, Ishikawa T, Nakamura H 1998. Effect of supplementation with vitamin E on LDL oxidizability and prevention of atherosclerosis. *Biofactors*, 7: 51-54.