

THE IMPACT OF EATING EGGS ON HEART DISEASE

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ABSTRACT

Eating eggs does not have an impact on the incidence of heart disease because many other causes and predisposing factors such as total fat content of the diet, heredity, social and business stress, drugs, excessive alcoholic consumption, smoking, overeating, obesity and lack of exercise are directly associated with heart disease incidence. As the cholesterol stigma becomes less of an issue for eggs, health professionals and nutritional scientists are now focusing on the many contributions of eggs to the quality and nutritional values of human diets. The impact of eating eggs on heart disease of humans are briefly reviewed.

Key words: Eggs, Blood Cholesterol, Heart Disease

INTRODUCTION

The health concerns about cholesterol content in eggs have been a mainstream consumer issue over many years (Damron, 2000). A few years ago the term 'egg' became a synonym for 'cholesterol' which, in turn, implied heart disease, to many laymen and medical professionals alike (Jiang and Sim, 1994). It is well known that the two factors most directly associated with heart disorders are high blood pressure and high cholesterol level. Heart disease is more common in those with a high blood level of cholesterol than in those with a low level, though no reason for this has been demonstrated to everyone's satisfaction (Anonymous, 1976). Without doubt, there has been considerable controversy about the extent to which plasma cholesterol levels in humans are influenced by dietary cholesterol (More, 1987). There are those whose blood cholesterol levels are much too high, who may be eating more eggs than they can cope with, and who may have to be told to cut their egg consumption drastically (Tunstall-Pedoe, 1987). Thus, there different answers for the question: "Can I eat eggs?" If your blood cholesterol is in the normal range, it's OK to eat eggs and other foods that are high in cholesterol (such as some offal and seafoods). However, if your blood cholesterol is high it might be a good idea to limit these foods to only a few times a week, because they can have some influence on your blood cholesterol level if it's already high (Anonymous, 2001a). Whether right or wrong, the cholesterol scare has hurt the egg-producing part of the poultry industry (Damron, 2000). In contrast, ".....according to cholesterol expert, McNamara, there is very little scientific evidence supporting cardiovascular disease risk reduction with dietary cholesterol restrictions, and such restrictions are not justified. This is especially true for foods such as eggs, (which) while containing cholesterol, are low in saturated fat" (Anonymous, 2001b). This paper provides a review of the impact of eating eggs on heart disease.

Consumers' attitudes towards egg consumption

Cholesterol is a waxy substance produced in the liver. It is a very important of the biological economy. It is a component of every shell and a precursor of essential

compounds such as corticosteroids, bile acids and sex hormones. The sex hormones estrogen, progesterone and testosterone are synthesized from cholesterol. Hormones from the cortex of the adrenal glands are likewise synthesized from cholesterol. The body can also convert a derivative of cholesterol to vitamin D with the help of ultraviolet light from the sun. (Anonymous, 1976; Kritchevsky, 1995). In general, cholesterol comprises about 0.2% of the body weight with most of the body's cholesterol being present in muscle and nervous tissue (Kritchevsky, 1995).

Cholesterol is also acquired from outside the body in certain foods, especially animal fats, milk products, and eggs (Anonymous, 1976). Cholesterol is an essential component of the animal cell membrane and also precursor substance for the synthesis of various hormones so that it has an essential role in cellular metabolism (Gallo, 1983). Thus, cholesterol itself is only found in animal products, and usually associated with total fat intake (Tunstall-Pedoe, 1987). Eggs are high in cholesterol because of its importance in sustaining the developing embryo, including its role as a structural component of cell membranes, and as a precursor for adrenal and sex hormones, vitamin D and the bile acids. Young chicks do not have the enzymes necessary for cholesterol synthesis, which emphasizes the importance of cholesterol being deposited in the egg (Leeson and Summers, 1997).

Consequently, consumers' attitudes towards lipids in general changed their attitudes towards egg consumption because of fears that yolk cholesterol would raise their blood cholesterol levels. The average egg of 50 g contains approximately 5 g lipid, about 4.2 % (213 mg) of which is cholesterol, and the polyunsaturated : saturated fatty acids of yolk lipid is about 0.59 (USDA, 1989). Without question, individuals who are aware of the conceptual association between cholesterol and health risks are less likely to consume eggs and those individuals who do consume eggs consume fewer eggs (Wang *et al.*, 1996). By contrast, there is essentially no research to support a limitation on egg consumption (Willet, cited by Anonymous, 1999).

Factors affecting heart disease

The cholesterol issue has concentrated attention on yolk composition and nutritional status of the egg compared with other foodstuffs. Yolk is a lipoprotein complex of primarily hepatic origin, with a high cholesterol content (480 mg/100 g). However, the significance of this value only becomes meaningful when the genetic background of birds and composition of the total diet of the individual, and the environmental and other risks factors are also taken into consideration (Solomon, 1997). Although the egg has been targeted as a rich source of cholesterol, the egg provides an essential source of linoleic acid and the proportion of saturated : monounsaturated : polyunsaturated are balanced according to the recommendations of the American Heart Association. These are that fat be limited to 30 % of total calories, and that an equal portion of those calories come from saturated, monounsaturated and polyunsaturated fat sources. The egg also contains high concentrations of stearic and oleic acids which have neutral effects on plasma cholesterol levels. The data on cholesterol intakes and risk of coronary heart disease may be related more to an individual's cholesterol levels and other factors (Watkins, 1995).

Willet examined the eating habits of 120,000 nurses over a 22-year period in the Nurses Health Study, Harvard University and found that consuming eggs does not increase heart disease risk (Anonymous, 1999). Broadly speaking, blood cholesterol level in the body varies with the individual's eating habits, age, sex, race, hormone

production, climate and occupation (Anonymous, 1976; Tunstall-Pedoe, 1987). Without doubt, many other causes and predisposing factors are associated with heart disease. Among those factors are total fat content of the diet, heredity, social and business stress, drugs, excessive alcoholic consumption, smoking, overeating, obesity and lack of exercise (Mann, 1998).

Egg consumption does not affect the blood cholesterol level in humans

Reducing or increasing egg consumption does not significantly affect the blood cholesterol concentration in most people. The type of fat intake is more important in lowering the cholesterol level in the blood (Anonymous, 1976; Moore, 1987). McNamara (2000) reported that reducing or increasing egg consumption does not significantly affect the blood cholesterol in 80 % of the population, nor does the rise in blood cholesterol of the other 20 % of the population mean that they have an increased risk of heart disease, because the incidence of heart disease is a combination of dietary, environmental and other risk factors, and hence egg consumption does not alter heart disease risk. A statistical review of dietary effects on blood cholesterol from researchers at the University of Arizona has also demonstrated conclusively that saturated fat – which is relatively low in eggs – not dietary cholesterol, was the major contributor to raised blood cholesterol for the population at large (Anonymous, 2001b). Applebaum-Bowden *et al.* (1984) found that supplementary eggs in the diet did not significantly increase total plasma cholesterol levels but significantly increased plasma low density lipoproteins (LDL). Clearly other factors are more important than eating eggs. This is good news for both egg producers and egg eaters.

McNamara (2000) analysed dietary cholesterol feeding studies (166 studies in 3,498 individuals), and found that dietary cholesterol increases both atherogenic LDL (“bad”) and anti-atherogenic high density lipoprotein (HDL: “good”) plasma levels and would, in theory, have no effect on overall cardiovascular disease risk because LDL:HDL ratio is unaffected. Kritchevsky (1995) also explained that in the popular press LDL is said to carry the “bad” cholesterol and HDL to carry the “good” cholesterol. In other words, desirable total cholesterol levels for healthy adults remain at 200 mg or below, and the target for LDL remains at 130 mg or lower, whereas the advisable level of the protective “good” form of HDL has been increased from 35 to 40 mg or higher (Hart, 2001).

McNamara (2000) also analysed the relationship between per capita egg consumption and cardiovascular disease (CVD) mortality rates in 24 countries, including three of the highest egg consuming countries in the world, i.e., Japan, Spain and France, which indicates a significant, and negative relationship ($r = - 0.54$, $P = .0053$; Figure 1).

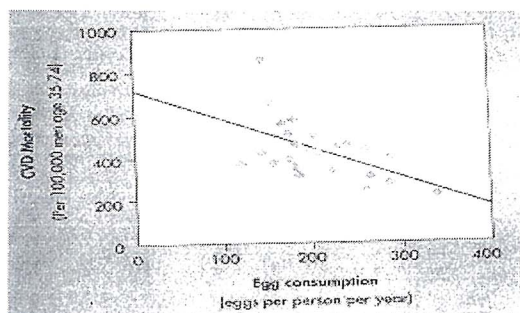


Figure 1. The relationship between per capita egg consumption and CVD mortality rates (after McNamara, 2000).

Such simple correlation analyses do not consider the many dietary differences between these countries, but it clearly shows that eggs are not a contributor to dietary factors increasing heart disease risk. McNamara concluded that as the cholesterol stigma becomes less of an issue for eggs, health professionals and nutritional scientists are now focusing on the many contributions of eggs to the quality and nutritional value of the diet.

Generally speaking, eggs are considered to be less atherogenic than other animal products, despite the high level of cholesterol in the eggs. Current health recommendations have thus encouraged individuals to reduce the consumption of total lipid, saturated fatty acids, and cholesterol and to increase the proportion of monounsaturated and polyunsaturated fatty acids in their diets (Walsh *et al.*, 1975). It has been suggested that a diet rich in polyunsaturated fatty acids (i.e. those of most vegetable oils) can lower the blood cholesterol level if saturated fat consumption is reduced (Anonymous, 1976). However, the diet of western societies, for example, is normally rich in lipid (40 % energy), about 40-50 % of which is saturated and the ratio of polyunsaturated : saturated fatty acids is about 0.40 (English, 1987).

Shrimpton (1987) also reported that eating a slice of bread weighing 50 g and 5 g of polyunsaturated margarine, the ratio of polyunsaturated fatty acids to monounsaturated and saturated fatty acids changes from 0.16 for the egg alone to 0.48 for the egg consumed with the wholemeal bread and polyunsaturated spread. Rose (1997) estimated that an adult man living in a developed country and eating a mixed diet would eat about 450 mg of cholesterol daily. This leads to obesity which is directly associated with a number of diseases including cardiovascular disease, type 2 diabetes mellitus, stroke and certain types of cancer (Collier *et al.*, 2000). Consequently, people in developed countries have more heart disorders than those in developing countries (Anonymous, 1976; Mann, 1998). In Australia, for example, there are more than 10 million Australians at risk of heart attacks and strokes which are the nation's No. 1 killer (Hart, 2001).

Most coronary heart disease deaths occur suddenly and out of reach of medical or resuscitation services. There is therefore an overwhelming case for complementing expensive and often unsuccessful treatments with strategies for preventing the onset and progression of the disease, provided that these can be shown to be sensible, acceptable and safe and with a reasonable prospect of success (Tunstall-Pedoe, 1982). Therefore, people in western societies require user friendly information to improve their knowledge about types of fats and oils to consume for a healthy diet (van Gerven *et al.*, 2000). In fact, it would be very difficult to eat less saturated fat, which is largely of animal origin, without a substantial reduction in cholesterol intake. There are, however, some foodstuffs in which cholesterol is less associated with saturated fat (shellfish, offal such as liver and eggs) so what the dietary guidelines say or do not say becomes more important (Tunstall-Pedoe, 1987).

CONCLUSION

There is no causal relationship between egg cholesterol in the diet and heart disease because many other causes and predisposing factors are associated with heart disease incidence.

As the cholesterol stigma becomes less of an issue for eggs, health professionals and nutritional scientists are now focusing on the many contributions of eggs to the quality and nutritional values of human diets.

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