Nut Consumption and Health Outcomes

The following article was written by me for an industrial journal. For 12 years I was a research assistant at Loma Linda University in the Department of Nutrition at the School of Public Health.

J. Sabate was my boss. He reviewed this manuscript, but did not write or edit it. The writing refects his research and he did supply the figure.

The publishers assumed that I have PhD. Without my knowledge they inserted the Dr. before my name.

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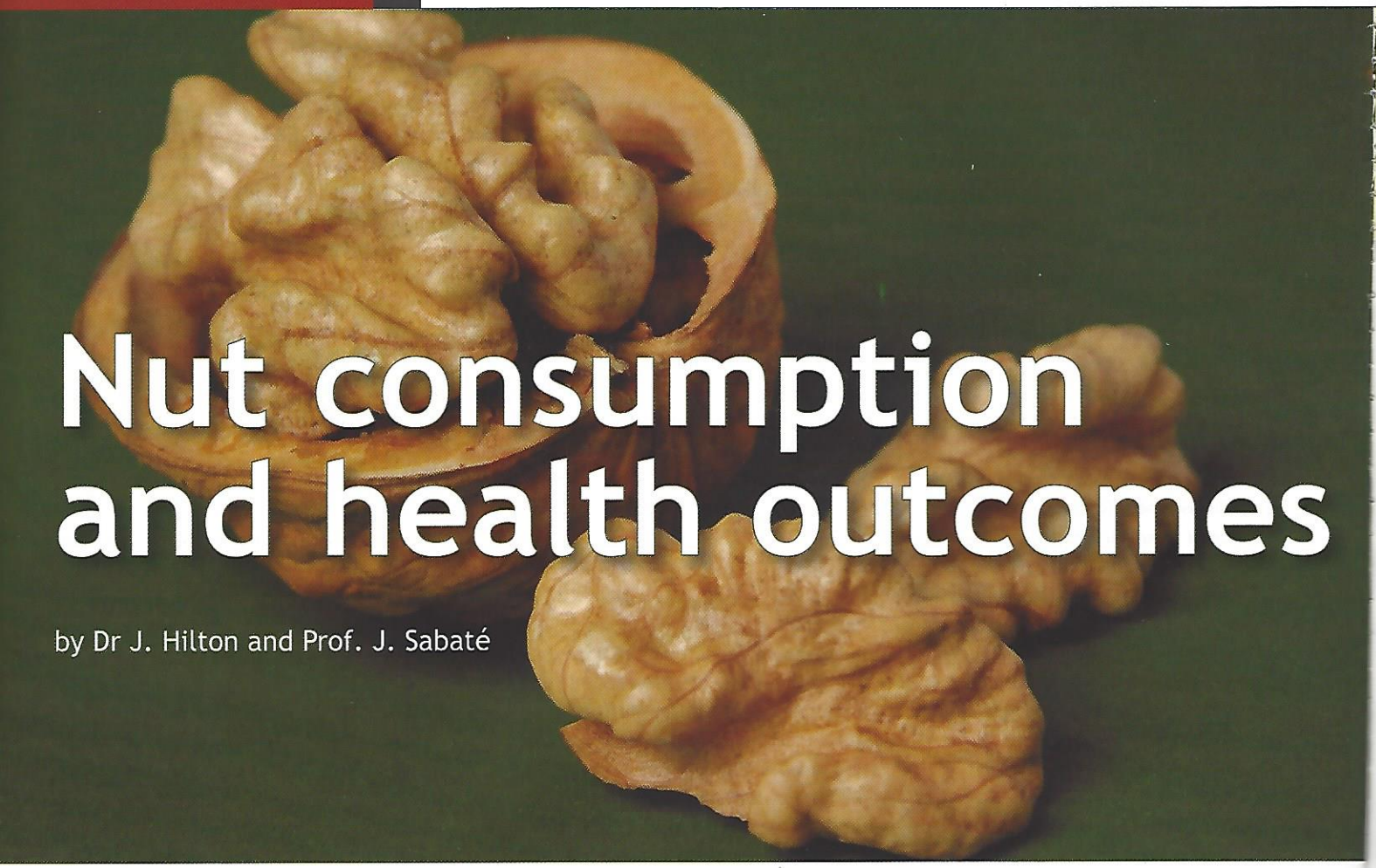


Nut consumption and health outcomes

by Dr J. Hilton and Prof. J. Sabaté

This article reviews the scientific evidence for the association between nut intake in humans and health outcomes. Nuts have been shown to reduce blood lipid levels and many studies have demonstrated an association between nut consumption and a reduced risk of coronary heart disease. Recent studies show that frequent nut intake may also reduce the risk of diabetes mellitus and may be linked with reduction in body weight.

The healthy properties of nuts

With the active lifestyles of our contemporary cultures, there is a constant demand for foods that are convenient, easy to prepare and easy to eat. Nuts have been part of our diet since pre-agricultural times, and are still essential in the 21st century. Nuts are a handy, tasty and easy snack that contributes to a healthy lifestyle. Tree nuts and peanuts are cholesterol-free and rich in important nutrients, including vegetable protein, fibre and unsaturated fatty acids. They also contain important micronutrients, such as folic acid, niacin, vitamins E and B_6, and minerals such as magnesium, copper, zinc, selenium, phosphorus and potassium. These nutritional properties are responsible for the recent findings on the association between the consumption of nuts and protection against chronic diseases.

Nuts and heart disease

In 1992, when it was first reported that a higher frequency of nut consumption was associated with a lower risk of coronary heart disease [1], nuts were brought from obscurity to sudden prominence as an important health food. In the years since this first study, scientific evidence on the health effects of nuts has accumulated in the area of coronary heart disease (CHD) and its risk factors.

Effect on CHD

There has been remarkable consistency among four prospective epidemiological studies carried out in the United States, which demonstrated a cardio-protective effect associated with increased nut intake. The four major studies are the Adventist Health Study [1], the Iowa Women's Health Study [2], the Nurses' Health Study [3] and the Physicians' Health Study [4], which all showed a clear dose-response association between nut consumption and reduced CHD risk [Figure 1]. Taken together, these four epidemiological studies show an average 37% reduction in the risk of CHD death [5].

Effect on blood lipid levels

The first clinical study on the effect of nut consumption on blood lipid levels was the Loma Linda University walnut study, published in 1993 [6]. Since then over 40 clinical studies have been conducted to investigate the effect of nuts on blood lipids, with the findings consistently showing that nut consumption results in a decrease in total and LDL-cholesterol. The effect is dose-related with different types of nuts having similar effects on blood lipids. The effect of nut consumption is significantly modified by the LDL-cholesterol level, body mass index (BMI), and diet type: the lipid-lowering effect of nuts is greater in subjects with high serum LDL-cholesterol concentrations, low BMI levels and those consuming Western-type diets [7].

Nuts and diabetes

Epidemiological evidence for the association of nut consumption on diabetes is not as clear-cut as with CHD. There have been three epidemiological studies that have evaluated the association of nut consumption with the incidence of diabetes: the Nurses' Health study [8], the Iowa Women's Health Study [9] and the Shanghai Women's Health study [10], which were all studies conducted exclusively with women. It is not known whether nut consumption is associated with a reduced risk of diabetes in men.

The Nurses' Health study [8] was the first large scale cohort study to measure the effects of nut consumption on the risk of diabetes. Sixteen years of follow-up with this study has provided strong evidence that the consumption of nuts, including peanuts and peanut butter, was inversely associated with risk of diabetes. However, the association with a reduced risk of diabetes was less clear in the Iowa Women's Health Study [9]. After 11 years of follow up, the post-menopausal women who ate nuts often showed no reduced risk of diabetes compared to those who ate nuts only occasionally. In this study, adjustment was made for multiple factors including diet. When the data were adjusted for age, a significant reduction in risk was observed between the highest consumption of nuts (≥5 times/week) and lowest(< 1 time/week) frequency of consuming peanut butter.

Recently about 64,000 women were followed for an average of 4.6 years in a population-based study in Shanghai, China [10]. There were favourable indications that peanut consumption reduced the risk of diabetes in both pre- and post-menopausal women. A strong and significant risk reduction of 20% was observed between those who ate very few peanuts and those who ate many.

Nuts and body weight

Many health agencies around the world, including such authoritative bodies as the US Surgeon General and the United Nations Food and Agriculture Organisation, have declared obesity to be a major public health problem of epidemic proportions. Obesity is linked to a number of chronic diseases. Since nuts are high-fat, high calorie foods, it is a reasonable concern that frequently eating nuts may lead to weight gain, and may consequently increase the risk of many chronic degenerative diseases. However, the results of epidemiological studies do not support the concern that frequent nut consumption leads to weight gain [1, 3, 4].

The prospective SUN study, with extended follow-up of a Mediterranean cohort continues to support the observation that frequent nut intake is not associated with weight gain [11]. The SUN study is the only epidemiological study that has examined in a prospective fashion the direct impact of nut consumption on body weight. The study found that the frequent nut consumers (≥2 times/week) gained 350 g less weight than those who never ate nuts during a follow-up period of 28 months. A review of nut intervention trials in both controlled and free-living conditions showed no negative effect of nut consumption on body weight [12].

Nuts and cancer

Nuts contain an abundance of tocopherols, folic acids, selenium, magnesium and several phytochemicals [13]. All these compounds have anti-oxidant, anti-inflammatory or anti-carcinogenic properties, making them a likely source of protection in cancer. In this context, it is notable that until recently epidemiological evidence on any association of nut consumption with cancer prevention was insufficient and inconclusive [14, 15]. In the past six years however, three prospective studies from different population groups [16, 17, 18] have produced findings which do suggest a protective effect of nuts on colorectal and endometrial cancer.

According to the European Prospective Investigation Cohort (EPIC) there may

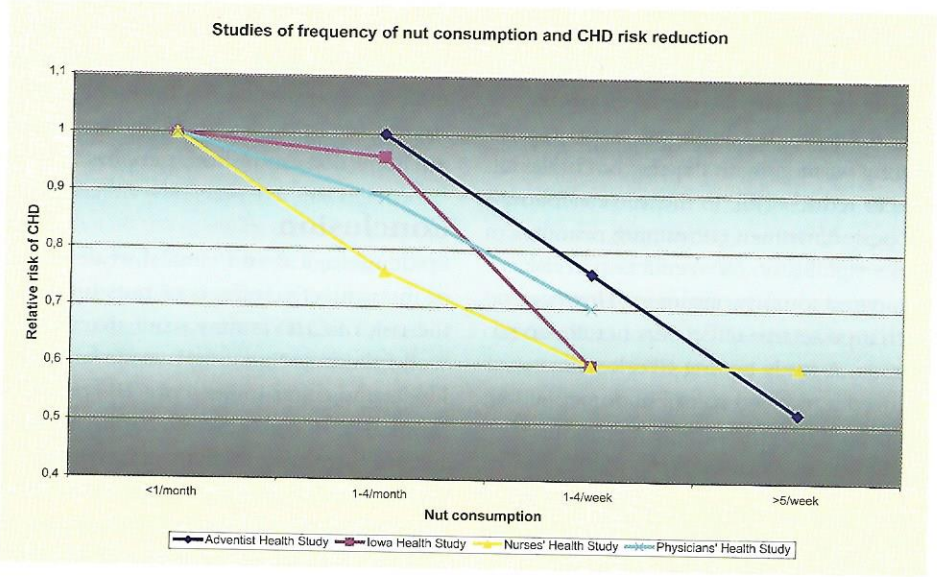
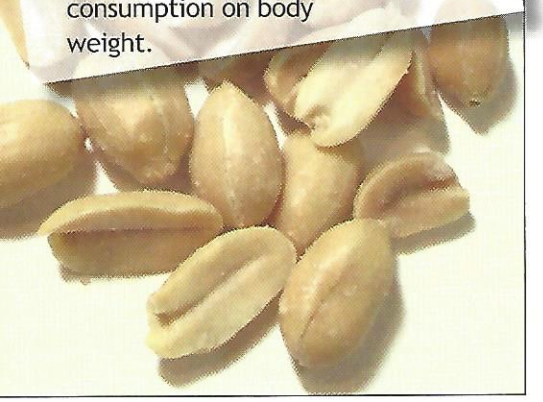


Figure 1. Frequency of nut consumption and CHD risk reduction. Results from four epidemiological studies, showing a decrease in CHD risk with increasing nut consumption

Nut consumption has been shown to provide beneficial health, e.g in CHD. Since nuts are high in fat-content, it is legitimate to question whether nut consumption could lead to weight gain or obesity. The data however show that there is no apparent effect of nut consumption on body weight.



be a gender difference in the protective effects of nuts on colon cancer [16]. No significant association was observed in a combined analysis of data from both men and women between higher intake of nuts and seeds and the risk of rectal, colorectal and colon cancers. However, when the subgroup of women was analysed separately, a significant inverse association with the risk of these cancers was detected between subjects with a high intake of nuts (>6.2 grams/day) and those with no intake.

Peanuts are relatively common in Asian culture and diet. In a population-based cohort study of approximately 24,000 people in Taiwan, an anti-carcinogenic effect of peanuts consumption was found among women, with the risk of colorectal cancer reduced[17]. In the 10-year follow-up period, women consuming peanuts had a significant, 58% reduction in risk compared to non-consumers. However, such a protective effect was not observed in men. A study among Greek women showed a reduced risk of endometrial cancer, though the sample size in this study was small (n=84) [18].

The relationship between nuts and cancer therefore warrants further study, especially with regard to issues of gender difference. Current research in this area is insufficient to be able to predict the reasons for these differences. To date only three cancers (colorectal, prostate and endometrial) have been studied in epidemiological studies in relation to the effects of nut intake. The bioactive ingredients responsible for the supposed anti-carcinogenic effects of nuts need to be further characterised, as some of the health-conferring phytonutrients found in nuts are also present in fruits, vegetables and legumes. More epidemiological and clinical trial studies are required to clarify the possible effects of nuts on different types of cancer.

Nuts and other chronic diseases

Gallstones are the only other chronic condition that has been tested to date where a positive protective effect has been shown with nut consumption. A group of researchers from Harvard University reported similar outcomes in studies of two different populations. After 20 years follow up of 80,718 women from the Nurses' Health Study [19], it was shown that frequent nut consumers (≥5 portions/week) had a 25% reduction in the risk of developing cholecystectomy. Similar findings were also observed among some 43,000 men in the Health Professionals follow-up study [20]. Men who consumed five or more servings of nuts per week showed 30% lower risk of developing gallstones compared to those who did not eat nuts at all. It appears that the frequency of nut consumption is equally protective of gallstone disease in both genders.

Conclusion

Epidemiological and clinical evidence of the protective effects of nuts on the risk of CHD is now extensive and well-founded. Nuts improve serum lipid levels and other indices of CHD risk. Women who consume nuts appear to have a lower risk of diabetes, but the effect remains unknown in men. Nuts are high in fat, but they do not appear to lead to weight gain, and epidemiological and clinical evidence indicate that frequent nut consumption is not related to obesity. To date, the association between nut consumption and cancer risk is less conclusive. More longitudinal population-based studies are needed to clarify the possible effects of nut consumption on diseases other than CHD.

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