Whole Grain Cereals as a Preventative Measures for Cardiovascular Disease

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ABSTRACT

Cardiovascular disease is one of the leading causes of death in the world. Whole grain food sources have been associated with lowered risk of cardiovascular disease (CVD) such as stroke, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, abnormal heart rhythms, congenital heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, and venous thrombosis. Studies in recent years have strengthened this observation and elucidated potential mechanisms for this association. This study sought to quantitate the available observational evidence on whole grain intake and clinical cardiovascular events. It's important to learn about your heart to help prevent it. Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain.

Keywords: Cardiovascular disease, whole grain cereals, strokes and atherosclerosis.

INTRODUCTION

Cardiovascular disease (CVD) is a class of diseases or conditions that effect the structures or function of the heart or blood vessels [1]. CVD includes coronary artery diseases (CAD) such as angina and myocardial infarction (commonly known as a heart attack). Other CVDs include stroke, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, abnormal heart rhythms, congenital heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, and venous thrombosis. Cardiovascular disease is one of the leading cause of death in the world [2]. One of the main mechanisms thought to cause CVD is atherosclerosis, where the arteries become clogged by atheromas or plaques. Cardiovascular disease occurs when the arteries are completely blocked or when blood flow is restricted by a narrowed artery, limiting the amount of blood and oxygen delivered to organs or tissue. The World Health Organization reports that by 2030, CVDs will account for almost 23.3 million deaths per year [3]. This burden is set to increase as a consequence of ageing populations and increasing levels of sedentary lifestyles and obesity. It's important to learn about your heart to help prevent it. Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fatty deposits on the inner walls of the blood vessels that supply the heart or brain. Strokes can also be caused by bleeding from a blood vessel in the brain or from blood clots [4]. The cause of heart attacks and strokes are usually the presence of a combination of risk factors, such as tobacco use, unhealthy diet and obesity, physical inactivity and harmful use of alcohol, hypertension, diabetes and hyperlipidaemia.

Whole grains are the complete grain with all its associated nutrients. As its whole, nothing has been removed, unlike refined grains. Whole grains are full of nutrients, including protein, fiber, B vitamins, antioxidants, and trace minerals (iron,

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zinc, copper, and magnesium) [5]. Wholegrain foods are particularly important in vegetarian diets as a source of iron and zinc. Whole meal foods are made from whole grains which have been crushed to a finer texture. International Whole Grain Day takes place every year on the 19 November, to highlight the importance of whole-grain consumption and nutrition, well-being and sustainability for healthier lives and planet [6].

Risk factors for cardiovascular disease

The most important behavioural risk factors of heart disease and stroke are unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. The effects of behavioural risk factors may show up in individuals as raised blood pressure, raised blood glucose, raised blood lipids, and overweight and obesity. These "intermediate risks factors" can be measured in primary care facilities and indicate an increased risk of developing a heart attack, stroke, heart failure and other complications [7]. Cessation of tobacco use, reduction of salt in the diet, consuming fruits and vegetables, regular physical activity and avoiding harmful use of alcohol have been shown to reduce the risk of cardiovascular disease. In addition, drug treatment of diabetes, hypertension and high blood lipids may be necessary to reduce cardiovascular risk and prevent heart attacks and strokes. Health policies that create conducive environments for making healthy choices affordable and available are essential for motivating people to adopt and sustain healthy behavior [8]. There are also a number of underlying determinants of CVDs or "the causes of the causes". These are a reflection of the major forces driving social, economic and cultural change – globalization, urbanization and population ageing. Other determinants of CVDs include poverty, stress and hereditary factors.

COMMON SYMPTOMS OF CARDIOVASCULAR DISEASES

Symptoms of heart attacks and strokes

Often, there are no symptoms of the underlying disease of the blood vessels. A heart attack or stroke may be the first warning of underlying disease. Symptoms of a heart attack include pain or discomfort in the centre of the chest, pain or discomfort in the arms, the left shoulder, elbows, jaw, or back. In addition the person may experience difficulty in breathing or shortness of breath; feeling sick or vomiting, feeling light-headed or faint, breaking into a cold sweat, and becoming pale. Women are more likely to have shortness of breath, nausea, vomiting, and back or jaw pain [9]. The most common symptom of a stroke is sudden weakness of the face, arm, or leg, most often on one side of the body. Other symptoms include sudden onset of numbness of the face, arm, or leg, especially on one side of the body, confusion, difficulty speaking or understanding speech, difficulty seeing with one or both eyes, difficulty walking, dizziness, loss of balance or coordination, severe headache with no known cause; and fainting or unconsciousness [10]. People experiencing these symptoms should seek medical care immediately.

Rheumatic heart disease

Rheumatic heart disease is caused by damage to the heart valves and heart muscle from the inflammation and scarring caused by rheumatic fever. Rheumatic fever is caused by an abnormal response of the body to infection with streptococcal bacteria, which usually begins as a sore throat or tonsillitis in children [11]. Rheumatic fever mostly affects children in developing countries, especially where poverty is widespread. Globally, about 2% of deaths from cardiovascular diseases is related to rheumatic heart disease.

Symptoms of rheumatic heart disease

Symptoms of rheumatic heart disease include: shortness of breath, fatigue, irregular heartbeats, chest pain and fainting [12].

Prevalence of cardiovascular diseases in low and middle-income countries

At least three quarters of the world's deaths from CVDs occur in low- and middle-income countries. People in low- and middle-income countries often do not have the benefit of integrated primary health care programmes for early detection and treatment of people with risk factors compared to people in high-income countries. People in low- and middle-income countries who suffer from CVDs and other non communicable diseases have less access to effective and equitable health care services which respond to their needs [13]. As a result, many people in low- and middle-income countries are detected late in the course of the disease and die younger from CVDs and other non communicable diseases, often in their most productive years. The poorest people in low- and middle-income countries are affected most. At the household level, sufficient evidence is emerging to prove that CVDs and other non communicable diseases contribute to poverty due to catastrophic health spending and high out-of-pocket expenditure [14]. At macro-economic level, CVDs place a heavy burden on the economies of low- and middle-income countries.

Intervention

A whole grain contains the entire edible parts of a natural grain kernel. The structure of all whole grains is similar and includes the endosperm, germ, and bran. Whole grains are rich in dietary fibre, antioxidants, resistant starch, phyto-oestrogens, and other important micronutrients such as vitamins and folic acid [15]. In the grain-refining process, most of the bran and some of the germ is removed, resulting in the loss of dietary fibre, vitamins, minerals, lignans, phyto-oestrogens, phenolic compounds, and phytic acid. The remaining starchy endosperm is ground to produce refined white flours. Important grains in the Western diet include wheat, rice, maize, oats, barley, and rye [6]. Wholemeal foods are made from whole grains that have been milled to a finer texture rather than leaving them whole in the final product. Both whole grain and wholemeal cereal foods are grain foods that include the outer layers of the grain, including the bran and germ. The EU HEALTHGRAIN consortium definition of whole grain is "whole grains shall consist of the intact, ground, cracked or flaked kernel after the removal of inedible parts such as the hull and husk [10]. The principal anatomical components - the starchy endosperm, germ and bran - are present in the same relative proportions as they exist in the intact kernel" [3]. This definition also allows for small losses of components during processing. The HEALTHGRAIN definition also lists specific grains included as whole grain. Research has shown that such processing of whole grains does not remove biologically important compounds [12]. Nutritionally, whole grain and whole meal foods are similar. For foods made from whole grain such as breads, breakfast cereals, pasta, biscuits, and grain-based snack foods, a standard definition for what constitutes a whole grain food has been recommended as a minimum of 8 g whole grains/30 g serving (27 g/100 g) [9]. This was in response to a lack of consistency in previous definitions of whole grain foods across "countries, governments, regulatory agencies, private and commercial organisations" [1]. A recent comprehensive systematic review and meta-analysis of prospective studies of the relationship between whole grain intake and cardiovascular disease found significant reductions in risk for cardiovascular disease, stroke, and coronary heart disease per 90 g/day (3 servings) increase of whole grain intake [7]. Evidence from two different meta-analyses of observational cohort studies suggests that those consuming 48 to 80 g/day (3 to 5 servings/day) compared to lower consumers of whole grains [4], or 2.5 servings/day compared to 0.2 servings/day have a 21% lower risk of CVD [9]. The 10-year Nurses' Health Study, a large prospective study of 75,521

women aged 38 to 63, found that increased whole grain intake was associated with decreased risk of coronary heart disease [10]. The lower risk associated with higher whole grain intake was not fully explained by the contribution of the diet to intakes of dietary fibre, folate, vitamin B6, and vitamin E. The Atherosclerosis Risk in Communities (ARIC) study found a beneficial relationship between whole grain consumption and the risk of total mortality and incidence of coronary artery disease but not the risk of ischaemic stroke [15]. The study followed 15,792 people aged 45 to 64 for 11 years. A review ofthe relationship between whole grains and CVD risk concluded thatthere is an increasing body of evidence [8], including from observational studies, suggesting a strong inverse relationship between increased consumption of whole grain foods and

CVD risk. Associations between whole grain consumption and risk factors for coronary heart disease have also been reported. In the Framingham Offspring study, diets rich in whole grains were inversely associated with total cholesterol, low-density lipoprotein (LDL) cholesterol and body mass index [11]. While cereal fibre has been associated with reduced risk of CVD [4], the relative effects of fibre or other components of whole grains such as phytochemicals and micronutrients, [2];[3], on CVD and risk factors is unclear [10]. A recent systematic review of RCTs found no effect of whole grains on body weight outcomes, although there was some evidence of small changes in body fat [8]. A systematic review of the effect of whole grains on type 2 diabetes and risk factors, [6], found only one relevant randomised trial relating to a small improvement in insulin sensitivity [13].

CONCLUSION

There is a consistent, inverse association between dietary whole grains and incident cardiovascular disease in epidemiological cohort studies. In light of this evidence, policy-makers, scientists, and clinicians should redouble efforts to incorporate clear messages on the beneficial effects of whole grains into public health and clinical practice endeavors.

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