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Review Article

Potential Health Effects of Beta Glucan

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Abstract

Beta glucan is natural product, which present in cell wall of various bacteria, and fungi. It is playing an important role in different metabolic process. B-Glucans can act as an immune system modulator, also, it has the ability to reduce the blood glucose, and it may be used in the treatment of diabetes mellitus. Although β-Glucans can protect the body from heart attack through lowering cholesterol levels, it can represent as anti-tumor agents. Due to the vital importance of β - Glucan, we will discuss in this review, its structure, sources, and mechanism action.

Keywords: Beta Glycan; Glucans; Immune Modulator; Anti-Cancer; Diabetes Mellitus; Heart Attack

Beta glucan (β-Glucans)

B-Glucans consist of assembly of β-D-glucose polysaccharides naturally occurring in the cell walls of bacteria, and fungi, with considerably differing in properties according to its source. Chemical structure of is six-sided D-glucose rings attached together with different bonds according to isolated sources. B-glucans form a linear backbone with 1-3 β-glycosidic bonds but vary with respect to molecular solubility, mass, viscosity, branching structure, and gelation properties, these cause miscellaneous effects in animals, figure 1 [1].

Figure1: Structure of β-Glucans.

Sources of β-Glucans

Cell walls of bacteria, fungi, yeast, and several cereals like oat and barley contain naturally B-glucans on its composition. Each type of beta-glucan has its own molecular backbone according to extraction sources. The main sources of β (1, 3) D-glucan is baker's cell wall yeast. On the other hand, β (1, 3) (1, 4)-glucans are also extracted from the bran of some grains, like oats and barley, and low concentration in rye and wheat [2].

Benefits of β-Glucans

Beta glucans are used in medical field to treat many diseases as hyper cholesterolemia, diabetes, cancer, and HIV/AIDS. Beta glucans act as modulator for immune system [3]. The immunomodulation effects of beta glucans are well established during the development of immune reactions as in some conditions such as chronic fatigue syndrome, or physical and emotional stress. This effect result from glucans is proven macrophage stimulants, and macrophages are key to immunity [4].

Radiotherapy is the chief method for treatment of vigorous tumors, during treatment process beta glucan represent as a guard from damage, also, help in improvement the blood cells formation [5].

Beta glucan is used in treatment of various cancers, as pulmonary malignancy, prostate cancer [6] and, breast cancer [7].

Beta glucans are also used for treatment of various types of diseases which correlated with immune system infections. Not only, but also, beta glucans are used in industries as a food additive in several products [8].

Improvements heart health

The U.S. Food and Drug Administration (FDA) have approved that high amount of beta glucan enhancement the heart healthy and decrease the risk of heart attack through its effect on concentration of cholesterol. B-glucans are characterized by increase the viscosity of aqueous solutions, especially in the upper gastrointestinal tract, leading to an increased binding of bile acids and their subsequent excretion which in turn decrease plasma cholesterol levels [9]. There is inversely correlation between bile acid synthesis and cholesterol level [10].

Adjustment blood sugar levels

B-glucans aid in reducing the risk of type 2 diabetes. Oat and barley β-glucans are high molecular-weight polysaccharides that exhibit high viscosities even at low concentrations. Ingesting of viscous polysaccharides increases the viscosity of the meal in the stomach, which in turn reduces mixing of the food with digestive enzymes and delays gastric emptying. In addition, increased viscosity also slows down the absorption of glucose. Recently, the European Food Safety Authority, the Panel on Dietetic Products, Nutrition and Allergies give out an opinion that 'ingestion of oat and barley β-glucans reduced post-prandial glycemic responses [11,12].

Stimulates immune system

Several studies indicated that beta glucan could have some positive effects on the improvement immune system. It binds to a specific receptor site on the surface of all immune cells with CR3 receptors. This binding improves the effectiveness of these immune cells to attack any foreign substances such as, viruses, bacteria, fungi, parasites [13].

Beta glucan as chemoprevention

Beta glucan act as anti-cancer agent, primary reason mediated by the reduction of reactive oxygen species and this protect DNA from damage, whereas secondary reason it inhibits the growth and further transformation of cancer cells [14].

Conclusion

β-glucan is an essential food component in the modulation of metabolic syndrome, immune diseases, heart attack, hypertension, and diabetes. The physiological effects of β-glucan are mainly depending on its physicochemical and structural characteristics.

Conversely, challenges in incorporating β-glucan into some food items without cooperating their sensory properties and their acceptance by consumers do still exist, and requisite to be committed.

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Conflict of Interest

The authors declare that they have no conflict of interests.

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