

Preventive and therapeutic role of functional foods: a review

Moumita Barik¹, Sampa Chowdhury² and Souvik Tewari^{3*}

^{1,2}Assistant Professor, Department of Nutrition, Haldia Institute of Health Sciences, West Bengal, India

^{*3}Assistant Professor, Department of Food and Nutrition, Swami Vivekananda University, Barrackpore, West Bengal, India

#Email: souvikt@svu.ac.in

ABSTRACT

Functional foods are those that are whole, enhanced, fortified, or improved and are consumed at beneficial levels as part of a nutrient-dense diet on a regular basis to provide therapeutic advantages beyond the provision of basic nutrients (e.g., minerals and vitamins). However, not all foods marketed as "functional foods" today are supported by enough data to back up such claims. Functional foods include things like fruits and vegetables, as well as foods that have been augmented or fortified. Functional foods have biologically active ingredients that provide positive physiological effects or health benefits. Functional foods should be a part of a balanced diet to meet nutritional needs and safeguard the body from many illnesses and disorders as diabetes, cancer, obesity, cardio vascular disease, etc. It is utilized in food supplements and generally in nutraceuticals (including probiotics, prebiotics, synbiotics etc). Probiotics, prebiotics, and functional foods rich in a variety of nutrients also play an important part in daily living in addition to these nutraceuticals. The functional qualities of many traditional meals are being investigated, and new food products containing healthy ingredients are being created. One of the areas of the food and nutrition sciences that is currently receiving the greatest research and promotion is functional foods. The goal of the current review study is to incorporate the therapeutic and preventative functions of functional food.

Keywords: *Biologically active components, functional properties, fortified food, health benefits, Medicinal value, traditional food, therapeutic value.*

1.1.INTRODUCTION

Functional foods are known as conventional food (Henry, 2010). When consumed regularly and in sufficient quantity, it has health advantages beyond the dietary contribution. Positive effects of functional foods on a person's health, physical ability, or mental state, in

addition they can reduce a number of health disorders (Krystallis & Maglaras, 2008). In order to prevent the various diseases functional food, nutraceuticals play an important role and also improves our health by enrichment and modifying the functional food with bioactive substances (Henry, 2010). Diet and health are the crucial occurrence of junction of functional foods in our lives (Dahiya & Nigam, (2022)). Functional food has functional effect by increasing bioavailability for reduction of the disease risk potential of the food (Henry, 2010). To meet the all-nutritional requirements, functional foods provide adequate amounts of proteins, fats, vitamins, carbohydrates etc. for healthy survival. Food production and consumption and eating habits may impact social and environmental, there are several indications or effects of diet on gut microbiota (Conlon & Bird, 2014). Imbalance of intestinal microbial normal flora or opportunistic pathogenic bacteria may cause several complications in gut area, such as irritable bowel syndrome, ulcerative colitis, gluten therapy resistant celiac disease and crohn's disease. The gut is in charge of getting our bodies in functioning order. As it breaks down food, the stomach absorbs nutrients that support body processes, including toxin and waste removal, hormone balance, energy production, and skin and mental health (Avrelija & Walter, 2010). In relation between gut-microbiota, probiotics are live microorganisms that are marketed as having health advantages by generally enhancing the gut flora. They are also referred to as beneficial bacteria (Butel, 2014).

Mohanty *et al.* (2018) reported that probiotics, prebiotics are non-digestible food ingredients which is also beneficial for gut's healthy bacteria. Natural probiotic food is yoghurt, kefir rich in adequate amount of calories, protein, calcium can help keep the intestines healthy.

In order to live as healthy life nutraceuticals also plays a vital role to improve all overall health, boost energy, relieve anxiety and prevent chronic diseases as a functional food. Herbal rich nutraceuticals also help to reduce drug cravings and act as therapeutic diet. Therapeutic diet designed as modified diet (Cencic & Chingwaru, 2010).

These diets are special diets detected for the people with certain medical conditions. So, by the help of therapeutic diet functional foods, nutraceuticals and antioxidants have the potential power to prevent Cardio Vascular Disease (CVD), obesity and cancer etc.

1.2 Functional food and human health:

Functional food provides some essential nutrients that gives potential health benefits that can helps to prevent diseases in the body (Gupta & Mishra, 2021). Functional food enhances a certain physiological response by reducing the risk of various disease. The body uses vitamins, minerals, fibre, omega 3 fatty acids, antioxidants, and phenolic compounds found in plant-based foods including fruits, vegetables, nuts, herbs, and beans to fight chronic diseases like diabetes, cancer, cardiovascular disease (CVD) and obesity (López-Varela *et al.*, 2002).

1.2.1 Functional food and cardiovascular disease (CVD):

In order to prevent CVD disease and reducing the rate of mortality and morbidity it's mandatory to reduce the intake of dietary fat and sodium (Dror & Stern, 2004). Vitamin E or alpha tocopherol is an antioxidant rich functional food. Vitamin E has the power to reducing the risk of CVD disease because vitamin E have been studied in several epidemiological studies during the past decade (Rimm *et al.*,1993); (Stephens *et al.*,1996); (Hodis *et al.*,1995); (Yochum *et al.*,1999); (Losonczy *et al.*,1996); (Riemersma *et al.*,1990); (Riemersma *et al.*,1991); (Gey, 1993); (Stampfer *et al.*,1993); (Knekt *et al.*,1994).

Stephens *et al.* (1996) reported that to reduce the risk of non-fatal heart attacks vitamin E supplementation has the 77 percent reduction. Also found that subjects who had preexisting heart disease with 400 or 800 IU vitamin E supplementation are mostly affected the severity of atherosclerosis. Thereby reducing the oxidation vitamin E might be the responsible for changes the in the lipid composition of atherosclerotic plaque.

Bouchenak, (2013); Bazzano, (2008); Wang, (2007); Malaguti *et al.* (2014); Gomes *et al.*, (2020) reported that with the help of vitamin E supplementation legumes are also important for prevention of CVD disease. The legumes which are rich in proteins, such plants are pea, lupin, cowpea, jackbean, mungbean, chickpea, lentils and soyabean have their numerous associated health benefits.

Rizkalla *et al.* (2002) noted that serum total cholesterol [TC], LDL-C and TAG levels are reduced because of intaking frequent legume ingestion and increased high density lipoprotein [HDL-C] levels.

Moreno-Valdespino *et al.* (2019) noted that common bean hydrolysates protein showed hypocholesterolemia activity to prevent inflammation and oxidative stress through the regulation of an adipocytokines and by inhibiting the GLUT2 and SGLT1 glucose transporters black bean protein hydrolysates showed hypoglycemic activity

Moghaddam *et al.*, 2014; Garg *et al.* (2016) reported that polyphenols are also other legume bioactive components which are beneficial to reduce the risk of CVD. Flavones, flavonol, flavonols and flavonones are different polyphenols and flavonoids are made up of this. The metabolism of lipids and glucose is regulated by adenosine monophosphate protein kinase, which is made more active by soy isoflavones.

By preventing lipid buildup in 3T3-L1 and adipocyte cells, the other phenolic components in common beans reduced lipid levels. Chickpea pancreatic lipase is blocked by soapins (Moreno-Valdespino *et al.*, 2019).

1.2.2 Functional foods for cancer prevention:

Cancer is a long term and dynamic process with the involvement of many complex factors with step wise formation leading to a uncontrolled spreading and growth of inactive cells which is known as cancerous cells and the process is called metastasis. The primary source of human food and animal feed are cereal grains as well as cancer prevention (Xue *et al.*, 2008). Whereas cereal products like rice, wheat and barley are the main macro nutrients for the energy requirement of human diet and also helps to prevents the cancer. Whole grains reduce the risk of cancer prevention (Liu, 2007).

Nakurte *et al.* (2013) found that lunasin isolated from barley, rice, wheat, triticale is a novel anti-inflammatory, cholesterol reducing peptide and cancer preventive. The highest and most stable lunasin level contained the oat namely Ivory.

Rizzello *et al.* (2012) noted that the concentration of lunasin is increased with anti-cancer by the fermentation by lactic acid bacteria of whole meal wheat and barley and also rye flours and it has the new possibilities of functional foods.

Pasha *et al.* (2013) reported that the numerous bioactive substances found in wheat straw, including policosanols, phytosterols, phenolics, and triterpenoids, have a wide range of beneficial health properties, including anti-cancer, anti-inflammatory, anti-allergic,

antioxidant, anti-thermogenic, anti-microbial, anti-thrombotic, antiviral, cardioprotective, and vasodilatory effects.

Deng *et al.* (2013) found that germinated brown rice is a popular functional food, rich in basic nutritional and bioactive components, have many physiological effects including anticancer, antitumor, antihypertension, antidiabetic etc. There are several bioactivities in the pigmented rice's diverse components, including anticancer, antioxidant, anti-atherosclerosis, hypoglycemic, etc, the components are flavones, tannin, phenolics, sterols, tocopherols, GABA, amino acids, essential oils and γ – oryzanols.

Rice bran is also acting as functional food, have anticancer effects, it has bioactive component phytochemicals such as tocopherols, tricin, ferulic acid, phytic acid γ - oryzanols, β – sitosterol and phytic acid (Henderson *et al.*, 2012), another component of rice bran is cycloartenylferulate have the anticancer activities by inhibiting human colorectal adenocarcinoma and showed most prominent in vitro growth (Kong *et al.*, 2009).

1.2.3 Functional foods for diabetes prevention:

Diabetes is metabolic and lifestyle disorder. Diabetes occurs in the body because of genetic factors, poor diet, physical inactivity, stress, infection, excess body weight, high blood pressure and family history of diseases (WHO, 2017). Functional food has their potential health benefits and have been scientifically proven, it has protective effectiveness combined with physical activity in T2DM prevention. Mediterranean diet (MD) enriched with functional foods is a healthy meal plans to protect and manage T2DM, this diet is highly rated in American Diabetes Association recommendation for T2DM prevention and management. MD diet is rich with polyphenols content such as fruits, vegetables, olive oil, tree nuts and these components have health protective benefits (Perona *et al.*, 2006); (Urpisarda *et al.*, 2012). MD diet components are highly rich in fruits, vegetables, legumes, moderate intake of dairy products and fish and low intake of red meat and red wine (Martinez-Gonzalez *et al.*, 2012). Instead of salt herbs and spices are included in this diet (Esposito *et al.*, 2017).

Along with polyphenols, flavonoids, alkaloids, terpenoids, sterols, pigments, and unsaturated fatty acids plays a crucial part in maintaining wellbeing and helping to avoid

diseases like cancer, depression, T2DM, asthma, obesity, and cognitive decline (Vasto *et al.*, 2014).

Perona *et al.* (2006); Urpi-sarda *et al.* (2012) noted that nutraceuticals with mediterranean diet (MD) components including MUFA such as oleic acid in olive oil, omega 3 PUFA in tree nuts well known as wall nuts and EPA and DHA found in oily fish and high amounts of fiber found in whole grains with a low glycemic index, this kind of acids and antioxidants prevents the inflammation, oxidation and also helps to improvement the endothelial micro macro vascular function.

1.2.4 Functional food for obesity prevention:

Obesity is a common problem throughout the worldwide. Due to the energy imbalances obesity arises whereby energy intake exceeds energy expenditure (Hall *et al.*, 2022).

Rumpler *et al.* (2001) found that another food supplement is olong tea that can contribute in some way to rising energy costs. To reduce the total energy intake, olestra is effective in producing weight loss (Bray *et al.*, 2004).

CONCLUSION

Overall, this review paper explores the topic of functional foods, which may offer health advantages and enhance our well-being by reducing the risk of developing certain conditions or diseases. Functional food should be included in daily diet as balanced way to fulfill the nutritional requirements and to protect the body against different diseases and disorders such as diabetes, cancer, obesity, Cardio Vascular Disease etc. It is used as food supplements, and nutraceuticals in general (including probiotics, prebiotics, synbiotics etc). Along with these nutraceuticals, probiotics, prebiotics, functional food rich in various nutrients and has effective role in daily life.

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