ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP1528

Review on Functional Foods and its Role in Both Health & Disease

[1]Sneha V and [2]Dhanushya P
[1]Student and [2]Guest lecture
M.Sc. Foods and Nutrition
Department of Home science,
Mother Teresa Women's University, Kodaikanal-624101

Abstract:- Functional foods are intended to offer health advantages in addition to needed nutrients. They efficiently prevent numerous diseases due to their mineral, vitamin, probiotic, bioactive, and fiber content, and they may increase quality of life. Probiotic strains are said to provide health benefits to humans when taken in sufficient quantities. As a result, there has been an increase in producing functional foods incorporating probiotic microorganisms in recent decades. Functional foods contain chemicals that may reduce the risk of specific diseases or otherwise improve health. The specific components are found naturally in functional foods or are added through fortification or enrichment.

Keywords:- *Functional Food, Bioactive Compounds, Health Benefits, Obesity, Probiotics.*

I. INRODUCTION

In 1984, Japan was the first to use the term "functional foods". The Japanese government developed a new product category, Food for Specific Health Uses (FOSHU), as food containing an ingredient with health functions and officially approved to claim their physiological effects on the human body" (Alongi *et al.,* 2021). Consuming meals fortified with functional elements (e.g., vitamins, probiotics, minerals, fiber, and antioxidants) may lower the risk of chronic diseases and promote physical and mental well-being (Baker *et al.,* 2022). Nowadays, consumers are turning to functional foods to prevent the formation of human microbiota dysbiosis and, as a result, diseases associated with it. There are numerous probiotic- containing items, on the market, including yogurt, cheese, liquids, jams, biscuits, mayonnaise, nutritional supplements, and more (Ballini *et al.,* 2023). Recent food sector advancements have focused mostly on functional food production (Gupta et al., 2023). The majority of foods contain a functional components that enhances health. Every food item, including dairy, meat, fish, vegetables, grains, and fruits, has useful components (Essa *et al.,* 2021).

II. BENEFITS OF FUNCTIONAL FOODS

Consumption of foods rich in antioxidants-active compounds, such as phenolic compounds including flavonoids, stilbenes, lignans, tannins, carotenoids, etc., which may reduce the risk of various diseases, including cancer, cataracts, age-related disorder, alzheimer's diseases, cardio-vascular diseases, diabetes (Banwo *et al.,* 2021). Low glycemic foods, fiber-rich products, plant-based meat composition, and functional foods are currently dominating in food advances (Bilal *et al.,* 2024). The gut microbiota regulates physiological functions in the human body. Consumption of probiotics containing natural bioactive components is a "green" alternative to pharmaceuticals for blood pressure control, immunity boost, mental wellness, sleep disorder elimination, and other purposes (Misra *et al.,* 2021). Antioxidants are the most significant chemicals for preventing the oxidation process. Natural antioxidants contained in food, especially vegetables, fruits and other plant-based diets, play a significant role in disease prevention (Rahaman *et al.,* 2023). Polyphenols have also been discovered to be useful for intestinal health by regulating gut flora and reducing inflammations (Li *et al.,* 2021). Cereals and pulses are essential sources of fiber (dietary), proteins, antioxidants, vitamins, minerals, calories, which have all been validated as functional food ingredients (Samtiya *et al.,* 2021).

III. IMMUNE BOOSTING FUNCTIONAL FOODS

Functional foods can modulate the immune system by enhancing or inhibiting immunological response, providing host defenses against infection and suppressing allergies and inflammation (Ashaolu *et al.,* 2020). Live bacteria in fermented foods are known as probiotics (lactobacilli and bifidobacteria) as well as their secondary metabolites have bioactive antiviral properties via a number of routes (Varsha *et al.,* 2023). Probiotics can be found in yogurt, sour cream, powdered milk, kefir, buttermilk, frozen sweets, fermented soy products like tempeh, and fermented vegetables like dill pickles, kimchi, and sauerkraut that have not been pasteurized (Al saqqa *et al.,* 2021).

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP1528

Food has long been known to give antiviral protection and, thus, can be utilized as a first-line method to strengthen the immune system in the form of functional meals to promote protection against both noval, developing viral illness and well-established viruses, like the influenza virus (Finnegan *et al.*, 2023). Functional foods and nutritional supplements contain immune booster such as polyphenols (Blackcurrant), polyunsaturated fatty acid (Fish oil), flavonoids (Quinoa), vitamin A, C, E (tangerines, lemons, grapefruits) , and minerals including zinc (Sorghum), iron (Finger millet), copper (Pumpkin seed), which can reduce virus risks and improve immune system effectiveness (Abokhwat *et al.*, 2024).

IV. PREVENTION OF DIABETES MELLITUS:

Diabetes mellitus is a metabolic illness that can cause a variety of issues to the heart, kidney, eyes (Okoduwa et al., 2024). Diabetic-related metabolic problem mostly impact adipose tissue, skeletal muscles, and the liver as a result of insulin resistance (Antar et al., 2023). Functional foods have bioactive chemicals, which may improve metabolic health and lower the risk of chronic diseases like diabetes (Wiyono et al., 2024). Citrus fruits, grapes, onions, berries, cherries, broccoli, honey, apples and green tea are all rich in bioactive chemicals. The most often identified bioactive chemicals were quercetin, kaempferol, rosmarinic acid, cyanidin, rutin, catechins, luteolin, and ellagic acid, all of which are polyphenolic compound (Egbuna et al., 2021). Functional foods are used to prevent and manage diabetes mellitus because they have antioxidants, anti-inflammatory, and insulin-sensitivity properties (Kayode et al., 2023).

V. PREVENTION OF OBESITY

Obesity is defined as an abnormal or excessive build up of fat that poses a health concern, as evidenced by Body Mass Index (BMI of 30kg/m2 or more (Hidalgo et al., 2024). Recently, functional foods and their bioactive components have been viewed as a novel strategy to illness prevention and management. Polyphenols are abundant in fruits, vegetables, whole grains, as well as other foods and beverages including, chocolate, and wine (Boccellino et al., 2020). Coffee (phenolic acids, caffeoylquinic acids), tea (terpenoids, polyphenols), and cocoa (dietary fibers and phytosterols), three commonly consumed beverages, have the potential to help prevent obesity (Wang et al., 2024). Benefits flavonoids in meals act as functional components, combating obesity and maintain energy balance through a variety of ways (Liu et al., 2023).

Table 1 Various Functional Substances, Foods and Their Postive Effect

Functional Substance	Foods	Positive Effect
Curcuminoids include diferuloyl methane, phydroxycinnamoly methane, bisphydroxycinnamoyl methane.	Curcuma longa (also known as turmeric).	Reduces lipid oxidation, prevent ischemia hypoxia.
Flavonoids include flovonols.	Berries.	Antioxidation.
Tocopherols, tocotrienols, omega-3 fatty acid.	Nuts, margarine, wheat, almonds.	Reduces blood cholesterol, prevent lipid peroxidation.
Ascorbic acid, resveratrol, ginsenosides, and other grape polyphenol.	Panax ginseng, grapes, citrus fruits, red wines.	Reduces blood pressure, and avoids advanced malignancy.
Calcium, anthocyanins, quercetin, catechins.	Milk, grape peels, egg plant, wine (red grapes).	Superoxide scavengers, inhibits LDL, antioxidant activity, decreases proliferation and decreases colon cancer
Thiols and sulfides, Gallic acid.	Onion , garlic.	Lowers blood pressure.

(Afar s. Pathan et al., 2024).

VI. CONCLUSION

In conclusion, functional foods have become a crucial aspect of modern nutrition, offering numerous health benefits beyond traditional nutrients. These foods contain bioactive compounds that can improve metabolic health, boost immunity, and reduce risk of chronic disease like diabetes and obesity. By incorporating functional foods into our diets, we can potentially prevent and manage various health conditions, improving overall health outcomes. Further research and development of functional foods can lead to innovative solutions for promotion health and well-being.

REFERENCES

[1]. Abokhwat, B. M., Mahmoud, R. M., Ashoush, 1. S., &Attia, M. Y. Antioxidant Status, Physicochemical and Immune-boosting Characteristics of New Formulated Functional Beverages.
[2]. Al Saqqa, G. S. (2021). Some functional foods and benefits of their bioactive components. Journal of the Saudi Society for Food and Nutrition, 14(1), 1-11.
[3]. Alongi, M., &Anese, M. (2021). Re-thinking functional food development through a holistic approach. Journal of functional foods, 81, 104466.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP1528

[4]. Antar, S. A., Ashour, N. A., Sharaky, M., Khattab, M., Ashour, N. A., Zaid, R. T., … & Al- Karmalawy. A. A. (2023). Diabetes mellitus: Classification, mediators, and complications; A gate to identify potential targets for the development of new effective treatments. Biomedicine & Pharmacotherapy, 168, 115734.

[5]. Ashaolu, T. J. (2020). Immune boosting functional foods and their mechanisms: A critical evaluation of probiotics and prebiotics. Biomedicine & Pharmacotherapy, 130, 110625.

[6]. Baker, M. T., Lu, P., Parrella, J. A., &Leggette, H. R. (2022). Consumer acceptance toward functional foods: A scoping review. International Journal of Environmental Research and Public Health, 19(3), 1217.

[7]. Ballini, A., Charitos, I. A., Cantore, S., Topi, S., Bottalico, L., &Santacroce, L. (2023). About functional foods: The probiotics and prebiotics state of art. Antibiotics, 12(4), 635.

[8]. Banwo, K., Olojede, A. O., Adesulu-Dahunsi, A. T., Verma, D. K., Thakur, M., Tripathy, S., … &Utama, G. L. (2021). Functional importance of bioactive compounds of foods with Potential Health Benefits: A review on recent trends. Food Bioscience, 43, 101320.

[9]. Bilal Sadiq, M. (2024). Underutilized Ingredients in Innovative Food Formulations. Journal of Culinary Science & Technology, 1-5.

[10]. Boccellino, M., & D'Angelo, S. (2020). Anti- obesity effects of polyphenol intake: Current status and future possibilities. International journal of molecular sciences, 21(16). 5642.

[11]. Egbuna, C., Awuchi, C. G., Kushwaha, G., Rudrapal, M., Patrick-Iwuanyanwu, K. C., Singh, O….. &Chikwendu, C. J. (2021). Bioactive compounds effective against type 2 diabetes mellitus: a systematic review. Current Topics in Medicinal Chemistry, 21(12), 1067-1095.

[12]. Essa, M. M., Bishir, M., Bhat, A., Chidambaram, S. B., Al-Balushi, B., Hamdan, H., &Qoronflch, M. W. (2021). Functional foods and their impact on health. Journal of Food Science and Technology, 1-15.

[13]. Finnegan, D., Tocmo, R., &Loscher, C. (2023). Targeted application of functional foods as immune fitness boosters in the defense against viral infection. Nutrients, 15(15), 3371..

[14]. Gupta, A., Sanwal, N., Bareen, M. A., Barua, S., Sharma, N., Olatunji, O. J., … &Sahu, J. K. (2023). Trends in functional beverages: Functional ingredients, processing technologies, stability, health benefits, and consumer perspective. Food Research International, 170, 113046.

[15]. Hidalgo-Lozada, G. M., Villarruel-López, A., Nuño, K., García-García, A., Sánchez-Nuño, Y. A., & Ramos-García, C. O. (2024). Clinically Effective Molecules of Natural Origin for Obesity Prevention or Treatment. International Journal of Molecular Sciences, 25(5), 2671.

[16]. Kayode, A. A., Adebodun, G. O., Fabunmi, D. I., &Kayode, O. T. (2023). Role of functional foods in the management of diabetes mellitus: a concise review. Bioactive Molecules and Pharmaceuticals, 2(7), 29-42.

[17]. Li, Y., He, D., Li, B., Lund, M. N., Xing, Y., Wang, Y., … & Li, L. (2021). Engineering polyphenols with biological functions via polyphenol-protein interactions as additives for functional foods. Trends in Food Science & Technology, 110, 470-482

[18]. Liu, J., Cao, J., Li, Y., &Guo, F. (2023). Beneficial flavonoid in foods and anti- obesity effect. Food Reviews International, 39(1),560-600.

[19]. Misra, S., Pandey, P., & Mishra, H. N. (2021). Novel approaches for co-encapsulation of probiotic bacteria with bioactive compounds, their health benefits and functional food product development: A review. Trends in Food Science & Technology, 109, 340-351.

[20]. Okoduwa, S. 1., Mhya, D. H., Abdulwaliyu, L.,Igiri, B. E., Okoduwa, U. J., Arthur, D. E., … &Nathyns-Pepple, E. (2024). Phytomedicine approach for management of diabetes mellitus: an overview of scientifically confirmed medicinal plants with hypoglycaemic properties and their probable mechanism of action. Phytochemistry Reviews, 1-61.

[21]. Pathan, A. S., Wagh, P. P., Jain, P. G., Sonawane, G. B., &Ahire, E. D. (2024). Functional Foods in Health and Diseases. In Applications of Functional Foods in Disease Prevention (pp. 103-117). Apple Academic Press.

[22]. Rahaman, M. M., Hossain, R., Herrera-Bravo, J., Islam, M. T., Atolani, O., Adeyemi, O. S., … &Sharift-Rad, J. (2023). Natural antioxidants from some fruits, seeds, foods, natural products, and associated health benefits: An update. Food science & nutrition, 11(4), 1657-1670.

[23]. Samtiya, M., Aluko, R. E., Dhewa, T., & Moreno- Rojas, J. M. (2021). Potential health benefits of plant food-derived bioactive components: An overview. Foods, 10(4), 839.

[24]. Varsha, K. K., Narisetty, V., Brar, K. K., Madhavan, A., Alphy, M. P., Sindhu, R., … &Binod, P. (2023). Bioactive metabolites in functional and fermented foods and their role as Immunity booster and anti-viral innate mechanisms. Journal of Food Science and Technology, 60(9), 2309-2318.

[25]. Wang. Q., Hu, G. L., Qiu, M. H., Cao, J., &Xiong, W. Y. (2024). Coffee, tea, and cocoa in obesity prevention: Mechanisms of action and future prospects. Current Research in Food Science, 100741.

[26]. Wiyono, N., Yudhani, R. D., Wasita, B., Suyatmi, S., Wardhani, L. O., Pesik, R. N…..&Rahayu, R. F. (2024). Exploring the therapeutic potential of functional foods for diabetes: A biliometric analysis and scientific mapping. Narra J, 4(1).