IS FOOD NUTRIEMENT ESSENTIAL FOR CHRONIC DISEASE

Abstract

One of the leading causes of chronic disease in the world is overeating unhealthy foods. Differential responses to nutrition, commonly known as food-gene interaction, are linked to some genetic variations. Epidemiological evidence suggests that quitting smoking, increasing fruit and vegetable consumption, controlling infections, reducing alcohol consumption, and managing stress are all likely to have a significant impact on chronic disease rates. This dietary pattern could be concerning, and it warrants further examination. Long-term consumption of a typical junk-food diet sets off a number of processes that ultimately hasten the onset of heart failure, hypertension, diabetes, thyroid, etc. Although many drugs are available for the treatment of this condition, it continues to be life-threatening, and its long-term treatment is expensive.

Keywords: Probiotic, Dairy products, fish, vegetables and fruits, hypertension, diabetes

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I. INTRODUCTION

Diet usually refers to following a certain eating plan to improve one's health or lose weight. A well-balanced, healthful diet is the management for optimal nutrition and health. It protects against many chronic non-communicable diseases. Chronic diseases affect over half of all persons in the globe over the age of 35. According to data, dietary choices tend to have a significant impact on the unwell condition. Natural dietary supplements have recently been a hot topic among the general public. Knowing the prevalence of these ailments will reduce morbidity and mortality dramatically. The goal of this review is to see how beneficial natural dietary supplements are in treating chronic diseases. On the other hand, many natural compounds present in food have beneficial effects on a chronic conditions. We examine what we know about natural products and how they can be utilised to prevent and treat chronic diseases in this study. Unhealthy foods such as salty and highly saturated fatty foods and foods that have low carbohydrate complexlead to a high risk of cardiovascular. The majority of the literature has reported the benefits of foods and nutraceuticals as supportive therapy for treating HTN [Fitzpatrick, 2004; Shaterzadeh-Yazdi, Farkhondeh, & Samarghandian, 2017]. In 2010, the DGAC [Dietary Guidelines Advisory Committee] states the promotion of nutrition education to people and HTN management in a view . The AICR [American Institute of Cancer Research] promote a plant-based diet such as fruits, vegetables, whole grains etc. The natural bioactive compounds from foods sources are currently used strategies for HTN prevention. The bioactive peptides have been scientifically proven to have more health benefits as antihypertensive, antidiabetic, anticancer etc. The intake of probiotic consumption was associated with some healthy effect. Most probiotic studies are based on carbohydrate but recent studies shows have other substance such as phenolic compounds, omega 3 and 6 fatty acids and vitamins. Nutrients play an important role in the pathology of DM and HTN .In this view, bioactive peptides from engineered probiotic shows, a broad pattern of bio functions includes not limited to antiviral, antimicrobial, anti-diabetic, and antihypertensive activity.

II. SEARCH STRATEGY

The literature search was performed in pub med, Google scholar, and science direct search engines. The search keywords include probiotic, dairy products, fish, vegetables and fruits, hypertension, diabetes .In this study, there was no restriction to any calendar date or year

III. PRACTICAL APPLICATIONS

Some recent studies have put forward that eating a diet rich in fruits, meats, nuts, and vegetables can help control chronic diseases. This article investigates some of the mechanisms involved in the dietary control or prevention of disease caused by bioactive chemicals found in food. The use of nutrition in the treatment of disease is promoted in this review

IV. LIFESTYLE MODIFICATION

In recent days, the lifestyle of people is getting changed that is switching to alternative food habits, lack of exercise, the physical activity involves altering long term habits and getting adopted new lifestyle or new behaviour. These life changes play a major

role in altering the body's mechanisms and other things on long term use resulting in the diseased condition of the body various diseases like HTN, diabetes, thyroid etc. This is a big difference between being well-fed and well-nourished. Stress reduction is also an important part of managing a chronic condition. Finally, a healthy diet and a stress-free lifestyle are essential for maintaining a healthy diet. To lead a healthy diet steps should be followed are maintaining a balanced and healthy diet, regular exercise, plenty of sleep, quitting smoking, keeping a check on mental and physical health, consumption of more water, intake of more fruits, and veggies, nuts.

V. MODIFIABLE FACTORS AND NON-MODIFIABLE FACTORS

The modifiable factors that play an important part in chronic conditions include obesity, unhealthy diets, lifestyle modifications, stress, socioeconomic conditions and lack of exercise. In most of developed and developing countries have changed their dietary pattern by increasing the consumption of diets rich in sugar, fats and calories which alter the flow of blood in vessels and functions of the heart [9].This accelerates the accumulation of cholesterol and fat that block the arterial wall which leads to hypertension. The non-modifiable factors that play a part in hypertension include genetics, family history, age, gender, racial differences, and diseased condition [10].

VI. NUTRACEUTICALS

The hypothesis of “nutraceuticals” is the combination of both nutrition and pharmaceutical which was formulated by Dr Stephen L. DeFelice, MD. The term nutraceuticals developed over the years and this differs across the countries. This is described as a food that gives medical and health benefits, including the prevention or treatment of diseases [11, 12].In the usual diet, the food consumed exhibits a physiological benefit beyond the risk of chronic diseases' nutritional functions [13]. The nutraceuticals include dietary supplements, vegan milk, antioxidants, minerals, vitamins, and herbals.

1. **Categories of Nutraceuticals:** Nutraceuticals are unfocused biological therapies used to assist wellness, inhibit malignant activity and control symptoms. They are classified into three groups:

    - Nutritional factor such as vitamins, minerals, amino acids, and fatty acids are abundant in the substance provided.
    - Herbs or botanical by-products result as concentrates and herbal extracts provide some nutrition.
    - Reagents obtained from other sources provide some specific functions in weight loss supplements, sports nutrition etc...[14].

2. **Safety aspects of Nutraceuticals:** Nutraceuticals are used for hundreds of millions of years and the products are not even accepted by all health care authorities [15]. The safety levels of some nutraceuticals can be affected by contamination, metals, mycotoxins, pesticides, fertilizers, and drug abuse. Understanding the pharmacokinetic, pharmacodynamic and toxicokinetic studies play an important role in the safety and toxicity evaluation of nutraceuticals [16]. At present, there are so many models available for the assessment of the safety, efficacy, and toxicity of nutraceuticals. Most

nutraceuticals have an action against disease because their ingredients exert antioxidant, anti-inflammatory, and immunomodulatory properties. To evaluate these properties in vivo studies, in silico, omics, and high-throughput screenings are available. For the safety and toxicity assessment of nutraceuticals, the vertebrate and non-vertebrate species are used [17]. Nutraceuticals are new but are of interest to both market and users. A risk can be denoted by the fact that nutraceuticals in most cases act as over the counter products (OTC) and do not always state that all products from the natural origin are always safe. All the countries have the pre and post-market surveillance phase so this phase gives information about the safety and potential risk of the nutraceuticals. Some possible side effects may come from some hidden intrinsic factors that are related to the plant compounds in the products. Possible unwanted effects may also come from some extrinsic factors such as no proper standardization, and lack of GMP procedure [18]. The knowledge of the mechanism of action and safety can make it feasible to obtain health claims for these innovation and science-based products.

3. **Nutraceuticals Products:** There is a great extent of ingredients and products enclosed by nutraceuticals. In some instances, all the ingredients are found in registered pharmaceuticals and nutrition supplements as well. Innovative nutraceuticals are developed as additional supplements for those who take part in sports, for small children, gymnastics persons, old aged people, and patients with chronic conditions [19].

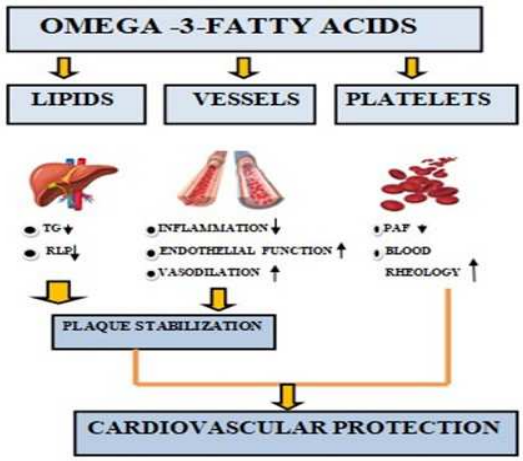

Figure 1:
Mechanism of Omega 3 Fatty Acid

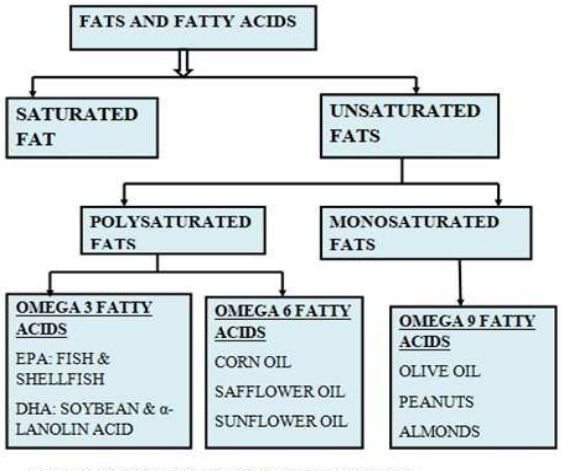

Figure 2:
Classification of Fatty Acid

- **Fish**: The essential fatty acids were discovered by biochemists Evans and Burr in 1929. They revealed that mammals can't produce enzymes of fatty acids. Therefore humans obtain the essential fatty acid linolenic acid which is α-linolenic acid from a dietary source. And α-linolenic acid broadens into EPA and DHA by elongation and desaturation of chains [20]. Foods or dietary supplements containing bioactive components derived from marine resources are known as marine nutraceuticals [21]. All fish product is a combination of omega 3 and 6 fatty acids it must be ingested regularly to reduce inflammation, decreases blood triglycerides and even reduce dementia. The body does not make its own omega 3 fatty acids and it is essential fat required for the body. Omega-3 fatty acids are found in plants and fish. The best sources of omega 3 fatty acids from fish appear to be EPA (eicosapentaenoic acid)

and DHA (docosahexaenoic acid). Whereas from plants ALA (α-linolenic acid) seems to be the best source of omega 3 fatty acids [22]. Polyunsaturated fats elevate HDL cholesterol levels that help to maintain hypertension. People who consume fish have more beneficial effects on cardiovascular than those who haven't [23]. Omega3 fatty acids directly bind to nuclear receptors that operate transcriptional factors. The antihypertensive effect of Ω 3 fatty acids is connected with vascular and cardiac function. The Ω fatty acids change vascular function by increasing the release of NO and also altering the release of ADP adenosine diphosphate and endothelium-derived hyperpolarisation factors [24].In overweight, hypercholesterolemia patients DHA supplements reduced BP and also show some improvement in endothelial and smooth muscle function [25]. The EPA and DHA will not be produced by the fish but these oils are synthesized from marine organisms the fish eats. Fish that have high levels of EPA and DHA include salmon, mackerel, tuna, oilier etc...ALA synthesized from the plant is found in some leaves and seed oils such as vegetable oils, soybean oil, and flaxseed oil [26]. Kromhout et al in Japan compared the level of fish intake among farmers and fishermen to reduce the risk of CAD. The average food intake of these men was 20gram per day. The 2/3 of fish was cod plaice that is (lean fish) and 1/3 of fish was fatty fish (mackerel) this shows CAD death rate was lowered by 50% among those who consumed 30g of fish per day in his studies [27].Lukas Schwingshackl, Carolina Schwedhelm, Georg Hoffmann, Sven Knüppel, Khalid Iqbal,Violetta Andriolo, Angela Bechthold, Sabrina Schlesinger, and Heiner Boeing they compared highest and lowest intake of fish and observed no risk of hypertension [28]**.**Antidiabetic drugs have an effect on lipid profile but the action may be selective orinsufficientrequired additional therapy. To control the blood sugar level more drugs are needed also there is a possibility of drug interaction and adverse reactions. But omega 3 fatty acids intake reduces the risk of diabetesand adverse effects [29]. It improves insulin sensitivity through hepatic fatty acid oxidation and decreases lipogenesis, enhances the production of adipocytokines associated with insulin sensitivity improvement and incretin hormones modulation is involved in the glucose-stimulated insulin secretion [30]. Many investigators reported on the use of dietary supplements with fish oil in the treatment of diabetes in the 1980s [31] Omega 3 fatty acids in Fish oils are essential in the reduction of TC, TG, glucose, LDL, creatinine, urea in diabetic rats [32].A recent study has evidence of the use of omega 3 fatty acids in conjunction with pharmacological agents for the management of hypertension and diabetes.

- **Probiotics:** In recent years the probiotic's benefits in health have been increased the attention among the people. A Probiotic is a live microorganism that has some benefits on host health [33]. Probiotics may be bacteria, moulds and yeast. The most common one is lactic acid bacteria.The lactic acid bacteria includes L.bulgaricus ,L.plantarum, Streptococcus thermophilus,Enterococcus faecium, Enterococcus faecalis,Bifidobacterium ,E.coli [34] .In the early days, probiotics have been used for irritable bowel syndrome, gastric ulcers, diarrhoea, and travellers syndrome. But recent studies have identified they reduce the risk of hypertension [35,36,37]. It is illustrated in some literature that probiotics and their products will improve BP by improving total cholesterol levels and LDL and decreasing insulin resistance and regulating the renin-angiotensin system [38]. The probiotics have ACE inhibitory activity by forming antihypertensive bioactive peptides which are transmitted during protein hydrolysis. During proteolysis of milk protein and microbial fermentation

cytokinins and lactokinins and other peptides are released which are similar to ACE inhibitory peptides. The bioactive peptides rich in fermented milk products are the natural dietary source to control hypertension [39] .In some patients, HTN and diabetes occur together commonly known as co-morbidity diseases. Recent researchers indicated that hypertension is twice in diabetes patients. So new drug therapy development is needed to overcome the occurrence of diabetes and hypertension without any side effects. Probiotics are a newer natural therapeutic for reducing the incidence of HTN and diabetes [40]. The most commonly used strain in dietary supplements and functional foods are bifidobacteria and lactobacilli. The data evidence from clinical trials and experimental studies have suggested that alteration of intestinal microbiota by probiotics might be effective in the prevention of diabetes and HTN [41].

- **Vegetables and Fruits:** The vegetables and fruits carry good sources of flavanoids, tannins, vitamins, and polyphenol. Supplementation of antioxidants will reduce oxidative stress and reduce HTN and diabetes [42]. High intake of these selected fruits and vegetables greatly enhance calcium, antioxidants, dietary fibres and potassium levels in the body which are significantly involved in the reduction of HTN and diabetes including banana (rich in potassium, fibres, vitamin A,vitaminB6, vitamin C, iron, folate, riboflavin, magnesium, antioxidant), grapes (copper, vitamin k, vitamin B), pineapples (vitaminB6, copper, iron, niacin, potassium, thiamine, manganese, vitamin c), papaya (vitamin c, iron, manganese, potassium, magnesium), okra (niacin, pyridoxine, thiamine, pantothenic acid, vitamin A, C, K), pumpkin (vitamin A, C, E, iron, copper, potassium), spinach (vitamin C, K, iron, potassium), garlic(allicin, vitamin c, zinc, iron, vitamin E, potassium).Resveratrol is highly present in grapes and possesses chemo preventive properties in CVD [43]. Garlic when taken converted into allicin by the enzyme allinase causes smooth muscle relaxation and vasodilation [44]. Vitamin c functions as an antioxidant by preventing NO breakdown [45].Martin Lajous, Emilie Rossignol, Guy Fagherazzi, Florence Perquier, Augustin Scalbert, Françoise Clavel-Chapelon, Marie-Christine Boutron-Ruault 2016 conducted a study, on middle-aged women with greater flavonol, anthocyanins and flavanoids intake less likely to develop hypertension over 14 years follow up [46]. Arantxa Rodriguez-Casado 2014 stated that phytochemicals in foods and vegetables play an important role in diseases prevention among those antioxidants' activity is well documented [47].

VII. CONCLUSION

Nutraceuticals can boost the body's immune system and also prevent and reduce diseases. Intake of food plays vital role in developing proper immune system so our body can fight against toxic disease. Leading a healthy lifestyle following proper balanced diet, physical and mental activity can prevent our body from all sorts of disease. Potential therapy must combine with nutraceuticals and drugs to improve life. Finally, we conclude that natural foods will reduce the incidence of chronic diseases.

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