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A REVIEW ON THE ROLE OF NUTRACEUTICALS IN THE TREATMENT OF CARDIOVASCULAR SYSTEM DISEASES

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ABSTRACT

Cardiovascular disease (CVD) ranks among the most common health-related and profitable issues worldwide. Salutary factors are important contributors to cardiovascular threat, either directly, or through their goods on other cardiovascular threat factors including hypertension, dyslipidemia and diabetes mellitus. Nutraceuticals are natural nutritive composites, which have been shown to be efficient in precautionary drug or in the treatment of complaint. There has been a great deal of interest in studies associating the salutary goods of food with prevention and treatment of numerous conditions. Prevention and treatment of conditions can be handed by nutraceuticals, which are defined as foods or part of food that provides health benefits, as well as by insulated nutrients and salutary supplements. In this review, we bandy if there are benefits in the use of nutraceuticals for the prevention and treatment of cardiovascular conditions.

KEYWORDS: Cardiovascular disease (CVD), hypertension, dyslipidemia, diabetes mellitus, nutraceuticals.

INTRODUCTION

Cardiovascular diseases (CVD) are common, indeed the maturity of grown-ups above sixty times of age will witness some incarnation of CVD. Grounded on data from 2012 and 2013, it has been estimated that CVD is responsible for million deaths annually worldwide.[1] Threat factors for CVD can be distributed as adjustable and non-modifiable. adjustable threat factors

include rotundity, hypertension, hyper-lipidemia, diabetes mellitus, metabolic pattern and life threat factors similar as unhealthy diet, smoking and physical inactivity. Salutary factors are also important contributors to cardiovascular threat, either directly, or through their goods on other threat factors including hypertension, dyslipidemia and diabetes mellitus.[2]

Reduction of threat factors in the population, especially blood pressure reduction and lipid-lowering can have important impacts upon mortality from CVD.[3] Defensive goods against CVD have been demonstrated for several foods and salutary supplements[4] therefore presenting new possibilities for population- position reduction of CVD threat.

The end of this review is to present an update on the most recent substantiation relating to the use of nutraceuticals in the environment of the prevention and treatment of CVD. Large randomized controlled trials are particularly rare, and therefore there's a deficit of substantiation in this area. therefore, our discussion will be largely concentrated on the goods of nutraceuticals on well- characterized threat factors for CVD.

NUTRACEUTICALS

The term “nutraceuticals” was introduced by Stephen DeFelice, author and president of the Foundation for Innovation in Medicine, in 1989. A nutraceutical is defined as a “food, or corridor of a food, that give medical or health benefits, including the prevention and treatment of complaint”.[5] The description encompasses medicinal products made from natural constituents. Several classes of nutraceuticals have been proposed to have implicit benefits in the treatment of CVD and the bones with the strongest substantiation are compactly epitomizedbelow.

- **STEROLS/STANOLS**

Plants sterols stanols are phytosterols, and have been linked in a range of plants products including colourful fruits and vegetables, cereals, seeds and nuts. Their natural exertion results from their molecular structural similarity to cholesterol.[6]

- **POLYPHENOLS**

Polyphenols are phytochemicals with wide distribution in foods of plants origin. They're set up in fruits, vegetables, cereal and legumes. also, they are set up in potables produced from plants products similar as tea, coffee, wine and cocoa. Polyphenols are structurally different, and over 8000 have been linked. These include flavonoids, phenolic acids, stilbenes and lignans.[7]

Polyphenols set up in grapes and grape derivations, cocoa and tea are of interest in the prevention of CVD. Phenolic composites are set up in grapes and these include anthocyanins, flavanols, flavonols, stilbenes and phenolic acids.[8] A variety of polyphenols have been linked in cocoa and its outgrowth. These include catechins, flavonol glycosides, anthocyanins and procyanidins.[9] The veritably wide and frequent consumption of tea makes disquisition of its nutraceutical propertied rudiments. Polyphenols set up in tea include catechins, theaflavins, tannins, and flavonoids. Green tea, which is minimally fermented, contains further catechins similar as epigallocatechin gallate, epicatechin-3-gallate, epigallocatechin and epicatechin[10] whereas the further considerably fermented black tea is rich in flavins and thearubigins.[11]

- **SPIRULINA**

Spirulina is a blue-green microalgae (Cyanobacterium). Spirulina is a rich source of protein, vitamins, minerals, carotenoids, and phycocyanins and has a veritably long history of use as a mortal foodstuff with no apparent enterprises over safety.[12]

➢ **DYSLIPIDEMIA**

Dyslipidemia is an marquee term for a variety of lipid abnormalities, which increase the threat of CVD. Reduction of total cholesterol (TC) and low- viscosity lipoprotein- cholesterol (LDL-C) is effective in the primary and secondary prevention of CVD events.[13] In particular, low LDL- C situations are associated with lower rates of major coronary events.[14] Therefore nutraceuticals with the implicit to modify the tube lipid profile have the eventuality to reduce the burden of CVD.[15] Substantiation related to the lipid- modifying goods of nutraceuticalsis epitomized below.

- **STEROLS/STANOLS**

Consumption of plants sterols stanols has been shown to be associated with lower circulating attention of TC in humans.[16] Their effect is generally LDL- C reduction with little or no effect on high- viscosity lipoprotein cholesterol (HDL- C) or triglycerides.[17] The medium by which sterols stanols reduce LDL- C is associated with a reduction in the intestinal immersion of cholesterol, the upregulation of hepatic LDL receptors (and consequent increased hepatic cholesterol uptake) and reduced product of endogenous cholesterol.[18] As sterols stanols reduce the intestinal immersion of cholesterol, their effect may be cumulative to that of statins which act by the reduction of hepatic cholesterol product. It was set up that a combination of statins and stanols sterols lowered the situations of TC and LDL- C to a lesser extent than with

statins alone. HDL- C and triglyceride attention weren't altered by the addition of sterols stanols to statin remedy.[19] Another meta- analysis demonstrated that the lipid- lowering efficacity of plants sterols stanols was analogous when the sterols were consumed as part of the diet and when they administered as a nutraceutical supplement[20], therefore allowing for inflexibilityin the system of medicine delivery. One explanation for the LDL- C reduction failing to restate into a reduction in CVD is that sterols stanols may reduce the immersion of carotenoids and fat-answerable vitamins.[21] Such an effect would be anticipated to be associated with a advanced prevalence of CVD[22], still further examinations are demanded to determine whether this effect occurs in vivo.

- **POLYPHENOLS**

Several studies have indicated that grape polyphenols may influence tube lipid attention. Consumption of grape juice has been associated with elevated HDL- C.[23] A study of the effect of polyphenol-rich grape excerpt supplement (700 mg) on cardiovascular threat in healthy subjects and set up that treatment was associated with a reduction in tube TC and LDL-C attention.[24] The results of studies probing the goods of cocoa products on lipid biographies have been epitomized in a meta- analysis of six randomized controlled trials. The results indicated that short- term cocoa consumption significantly lowered LDL- C by 5.87 mg/ dL, hardly lowered TC by 5.82 mg/ dL without any substantiation of an effect upon HDL- C attention. Tea polyphenols may also exert lipid- lowering goods. A meta- analysis of 14 randomized controlled trials including subjects in total set up that the administration of green tea potables or excerpts redounded in significant reductions in serum TC and LDL- C attention, without altering HDL- C.[25] Black tea consumption was shown to be more effective in lowering LDL- C in subjects with hypercholesterolemia and other labels of elevated cardiovascular threat. Armolipid Plus is a food supplement combining natural constituents containing red incentive rice, policosanol, berberine, folic acid, astaxanthin and coenzyme Q10. It has been demonstrated that supplementation with this nutraceutical exert reduction of TC (−19.2), LDL- C (−17.4) and triglycerides (−16.3). A veritably recent meta- analysis of several randomized controlled trials revealed that this nutraceutical is safe, well permitted and verified the salutary goods upon lipid profile with reductions in Tube TC of 11–21 and reductions in LDL- C of 15–31.[26]

- **SPIRULINA**

Spirulina supplementation has been associated with salutary differences to blood lipid

biographies. Spirulina maxes, given orally (4.5 g/ day, for 6 weeks), was associated with significant changes in TC and LDL- C attention. likewise, in a population of individualities with dyslipidemia, consumption of 1 g Spirulina per day for 12 weeks dropped mean situations of triglycerides, LDL- C, and TC without any apparent effect on tube attention of HDL- C.[27]

➢ HYPERTENSION

Hypertension is an important adjustable threat factor for CVD. It has been shown that lowering blood pressure reduces CV threat by 20 – 25 for myocardial infarction, – 40 for stroke and about 50 for heart failure. The substantiation relating to antihypertensive goods of named nutraceuticals is outlined below.

• STEROLS/STANOLS

Studies have failed to demonstrate antihypertensive goods of sterols stanols despite continuing treatment for a time or further. One recent study, which aimed to assay the effect of plants stanol esters on arterial stiffness and endothelial function in grown-ups also set up no effect on measured blood pressure.[28] Although the data are limited there appears to be no antihypertensive goods of these composites in humans, neither is there any suggestion of adverse goods on blood pressure.

• POLYPHENOLS

It has been suggested that consumption of flavonoid-rich fruits and vegetables may lower blood pressure. Studies on the influence of polyphenols on blood pressure are veritably different and have included a great variety of polyphenol- containing foods, including grapes, berries, cocoa product, tea and other. A lately published randomized controlled trial indicated that grape seed excerpt significantly reduced systolic blood pressure by 5.6 and diastolic blood pressure by 4.7 after 6 weeks of supplementation in subject with mildly elevated blood pressure. also, the blood pressure lowering goods appeared to be dependent on birth blood pressure, with the topmost reduction observed in subjects with advanced birth blood pressure. veritably recent clinical studies also confirm that cocoa flavanols exert a salutary impact on blood pressure in cases with type 2 diabetes and hypertension and in senior subjects. Studies on tea polyphenols have also reported blood pressure lowering parcels. Several clinical studies have demonstrated an antihypertensive effect of pomegranate juice. A recent meta- analysis, which included the results of eight randomized controlled trials Probing the goods of pomegranate juice on blood pressure indicated that consumption of this polyphenol-rich juice significantly

reduced both systolic and diastolic blood pressure. In addition, lipid- lowering, antioxidant and anti-atherosclerotic conduct of pomegranate juice have been reported, making it a veritably seductive seeker as a nutraceutical with the eventuality to ameliorate cardiovascular health.[29] The nutraceutical product, Armolipid Plus (containing red incentive rice, policosanol, berberine, folic acid, astaxanthin and coenzyme Q10) was set up to be safe, well permitted and effective in reducing mean 24- h systolic and 24- h palpitation pressure in hypertensive and hypercholesterolemic subjects at low cardiovascular threat.

- **SPIRULINA**

Some studies indicated that Spirulina maxes might exert an antihypertensive effect. Oral Spirulina supplementation redounded in systolic and diastolic blood pressure reduction in a small clinical trial. Again, no effect of Spirulina upon blood pressure was observed after consumption of 1 g Spirulina per day for 12 weeks in a Greek population. Administration of 2g Hawaiian Spirulina for 3 months was associated with advanced blood pressure and endothelial function in cases with hypertension. still, substantiation relating to cardiovascular issues is lacking and farther well- designed trials are needed to clarify the clinical value of Spirulina supplementation in lowering blood pressure.[30]

➢ **DIABETES MELLITUS**

Diabetes mellitus is a well- established threat factor for CVD. Diabetes mellitus type 2 is associated with high threat for developing cardiovascular complications. Also, cases with diabetes and hypertension have about twice the threat of cardiovascular events as nondiabetic cases with hypertension. It has been estimated that the global frequency of diabetes mellitus will rise to 552 million by 2030. experimental studies indicated that diet is one of the factors, which might help diabetes and its complications. The TOSCA- IT (the influence of salutary fat and carbohydrates proportions on tube lipids, glucose control and low- grade inflammation in cases with type 2 diabetes) study demonstrated that a diet characterized by an advanced input of total polyphenols was associated with a better cardiovascular threat factors profile and a lower grade of subclinical inflammation in population with diabetes mellitus type 2.

- **POLYPHENOLS**

Fairly many studies have estimated the goods of grape polyphenol on hyperglycemia. Guilford et al.[31] indicated that regular red wine consumption is associated with a 30 times threat reduction for type 2 diabetes. Consumption of grape seed polyphenols and red wine grape

pomace flour have been associated with significant reductions in blood glucose. A randomized controlled trial revealed that supplementation of resveratrol for 3 months significantly bettered the mean haemoglobin A1c, in cases with type 2 diabetes mellitus.

A recent meta- analysis of 11 randomized controlled trials set up that resveratrol reduced fasting glucose, insulin, glycated haemoglobin, and insulin resistance in subjects with type 2 diabetes, but not in those without diabetes. The medium of action of resveratrol in the treatment of diabetes mellitus seems to be multifactorial; resveratrol may have antioxidant parcels, increase AMPK activation, and increase internalization of glucose through modulating glucose transporter expression. A meta- analysis of 17 trials comprising a aggregate of, 133 subjects revealed that green tea consumption was associated with significantly reduced fasting glucose and haemoglobin A1c. Polyphenols might impact glucose homeostasis by several mechanisms, by inhibiting carbohydrate digestion and glucose immersion in the intestine, guarding pancreatic β- cells, reducing glucose release from liver and cranking insulin receptors and glucose uptake in insulin-sensitive apkins.

- **SPIRULINA**

Spirulina might be salutary in controlling blood glucose position in subject with diabetes mellitus type 2. Supplementation of 2 g/ day for 2 months redounded in reduced fasting blood glucose, postprandial blood glucose situations and HbA1c. Again oral supplementation of Spirulina in a separate trial (4.5 g/ day, for 6 weeks) didn't result in changes in the labels of glucose metabolism. Farther trials are needed to clarify the clinical value of Spirulina supplementation in treatment of diabetes.

CONCLUSION

Dyslipidemia, hypertension and diabetes are major adjustable threat factors for CVD. The nutritive supplementation represents a possible strategy for operation and prevention of hypertension and other cardiovascular conditions. The nutraceuticals act not only direct by antioxidant or anti-inflammatory parcels but also laterally, via modulation on colourful physiological pathways. A lot of the nutraceuticals that was described, similar as oil painting excerpts, shops, fruits and vegetables as well as botanical excerpts, have shown salutary goods on the cardiovascular system through substances similar as phenolic composites or polyphenols, lycopene and flavonoids. numerous of the nutraceuticals delved for the prevention and treatment of CVD are well permitted in cases. still, there's frequently inadequate data available with respect to long- term safety and effectiveness against clinical issues similar as

myocardial infarction and mortality. farther clinical exploration should be conducted to identify nutraceuticals with the stylish clinical and cost- effectiveness in the prevention and treatment of CVD.

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