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EFFECT OF FENUGREEK (TRIGONELLA FOENUM GRACEUM) ON CARDIOVASCULAR ASSOCIATED RISK FACTORS AND BIO-MARKERS

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Abstract
Cardiovascular diseases are a frequent root of deadliness. CVD are widespread in human society and many of them are interconnected to foodstuff but most dangerous conditions are genetic lipid deformities which includes high blood cholesterol (hypercholesterolemia), hypertriglyceridemia, HDL metabolism disarray. Cardio metabolic determinant condition is a blend of vascular as well as metabolic agents that comprises of lipid profile, glycemic parameters, blood pressure and anthropometric indices that are likely to intensify the risk of diabetes and CVDs. Fenugreek or Trigonella foenum-graceum belongs to the Fabaceae family has medicinal properties. India and North African countries are major contributors of its cultivation. Fenugreek seeds contain, alkaloids, steroidal saponins, soluble and insoluble dietary fibers and flavonoids. Therapeutic effects of this plant includes inflammatory and anti-oxidant components. Anti-diabetic, digestive stimulant, cardio protective and gastro protective properties are diversified and advantageous consequence of fenugreek. Our review underlines numerous cardiovascular probability prediction biomarkers and risk factors.

Keywords: Fenugreek, Cardiovascular disease, Risk factors, Biomarkers.

1. Introduction

Cardiovascular disease (CVD) is the frequent root of deadliness around the globe. In early 2011, The United Nations formally accept cardiovascular disease as NCDs or chronic disease. [1]. One of the exploration of World Health Organization (WHO) represents that around 31% of all deaths each year occurred due to CVD internationally [2]. Extensive uptake of fats or due to genetic causes CVDs are expanding slowly but surely. To promote infection avoidance and toxicity refinement, major cardiovascular risk factors advance identification and medicament of dangerous aspects are required [3].

Cardio metabolic determinant condition is a blend of vascular as well as metabolic agents that comprises of lipid profile, glycemic parameters, blood pressure and anthropometric indices that are likely to intensify the risk of diabetes and CVDs. [4]. Premature cardiovascular morbidity and mortality and severe hypercholesterolemia are interlinked with Homozygous familial hypercholesterolemia (HoFH). Hypertriglyceridemia, kidney disease and obesity are the risk factors of CVDs. [5].

Hyperglycemia or types 1 diabetes is suspected as key factors in increased emergence of Cardiovascular disease and deadliness in mankind. Cardiovascular disease (CVD) promotes premature

death in patients suffering from type 1 diabetes, [6]. Increased intensity of Lp and low HDL cholesterol are the causes to promote the rate of cardiovascular disease [7].

To reduce the cardio metabolic determinant condition, lifestyle modifications is believed to be the first line treatment. [8,9]. For treatment of metabolic disorders and complication blockage pharmacotherapy together with primary approach is frequently acquired [10]. Over the last several decades, curative herbs and other types of complementary treatments are known to exhibit appreciable therapeutic benefits for the management of cardio metabolic hazards [11]. To define the potency and unfavorable circumstance of medicinal herbs WHO suggests that an increased research on medicinal herbs must be organized [12]. Cinnamomum verum [13], Nigella sativa [14], Urtica dioica [15] and Trigonella foenum [16, 17] are herbs that imparts positive consequences on cardio metabolic parameters.

For thousands of years, spices are used as natural food for the purpose to increase the sensory standards of foods. Spices exhibit to add characteristic features including flavor, fragrance and pigment to foods. Fenugreek is utilized as spice also improves the appearance of foodstuff. There are following names of fenugreek in different languages that includes Methi (Hindi), Bockshorklee (German), Fieno greco (Italian), Fenugreek (French), Pazhitnik (Russian), Alholva (Spanish), Koroha (Japanese), Hulba (Arabian) and K'u-Tou (China) [18].

Fenugreek plant seeds shows natural resistance to many infestations and infections. It is a leguminous plant and fixes atmospheric nitrogen [19]. Edible portion of fenugreek consists of raw or dehydrated leaves and soft stems. Fenugreek leaves rich in choline but also contain 77% leaf protein. [20]. Fenugreek seeds can be used to eat as raw or cooked form at the same time it shows features like fragrant, bitterness, carminative, antibacterial. Oil, steroidal saponins and alkaloids are the roots of acidity. The fiber portion contains both insoluble (30%) and soluble fraction (20%) Its 7.5% lipid portion consists of 6.3% triglycerides and 450 mg/100 g phospholipids [21]. Furthermore. If replacement of casein diets up to 10% by fenugreek seeds done, then seeds did not build any harmful outcome in protein quality of casein.

Fenugreek oil is a mixture of pungent smell and sour taste. Fenugreek oil represents following characteristic features that includes iodine value 115, saponification value 178–183, specific gravity of 0.91 with acid value 1–2, unsaponifiable matter 3.9%, and fatty acid composition of palmitic 9.6%, stearic 4.9%, arachidic 2%, oleic 35.1%, linoleic 33.7%, and α-linolenic 13.8%. [23]. The fenugreek oil shows similarity in aroma like grilled coffee or maple syrup. The unsaponifiable portion contains the lactation-stimulating factor. The fenugreek seeds believe to enhance suckling in females and cattle and also shows insect and pest resistant features [24].

Necessary elements in a healthy food includes dietary fibers which are indigestible complex carbohydrates present in plants. Soluble fiber forms a gel and insoluble form unresolvable fiber. Dietary fiber from fenugreek has a long shelf life [20]. Dietary fiber induces satiety and delays gastric emptying.

Around 4 to 8% saponins or triterpene glycosides and about 1% alkaloids are present in ***Trigonella foenum-graecum***. Bitterness, abdominal stimulation, enhanced acidity and increased appetite are characteristic attributes of saponins and alkaloids. Liberation of testosterone in males and enhance endometrium shrinking in females is known to be induced by the extract rich in saponins content. So,

during early pregnancy fenugreek plays an important role to avoid possibility of abortion. Moreover, alkaloid reduce glycosuria in diabetes. So, seeds of fenugreek are source of saponins and alkaloids [23]. It is reported that fenugreek is safe for consumption. [25].

2. Brain Function and Lipids

In mammals, Cholesterol is a vital constituent of CNS. It either synthesized from astrocytes and oligodendrocytes or obtained from 27-hydroxycholesterol. CNS only involved in the formation of Apo lipoprotein E and not in Apo lipoprotein A-1. Only in Tangier disease, HDL genetic abnormality leads to brain dysfunction. Genetic variations in lipid related genes causes different diseases in human. In many brain related diseases omega-3 polyunsaturated fatty acids (ω-3 PUFAs) have curative potential [26]. N-acylethanolamines (NAEs) involved in important process of lipid signaling and used as biomarker in lipid related abnormalities [27].

3. Association between lipid abnormalities and CVR

CVD also related to diet because genetic variation in lipids leads to different diseases like hyperlipidemia, hypercholesterinemia, dyslipidemia and hypertriglyceridemia. Dysfunction of kidney related to irregularity in triglycerides. Patients of kidney dysfunction show increases con. of glucose in their dialysis fluid. In diabetic patient, hypoglycemic condition link to CVR. So, increase level of lipids leads to CVD [28]. Abnormalities in lipids link to different heart related diseases. LDs (lipid droplets) that are heterogeneous, regulated by different proteins also involved in CVP (cardio vascular problems) [29]. In hypothyroidism, level of TG and LDLc (LDL cholesterol) increases. In hyperthyroidism, level of TG and LDLc decreases.

Obesity related to high level of lipids that link to CVD. Weight loss associated with calorie burning by regular exercise. Many diseases associated with overweight and obesity like hypertension, coronary heart disease, and type 2 diabetes. Obesity treatments includes modification in lifestyle and diet that lower LDLc, weight and CVR. There are many associating factors that emerging risks for cardiovascular diseases [30]. In pregnancy condition, chances of cardiovascular diseases are higher [31]. No abnormalities in coronary arteries find in myocardial infarction linked cannabis people. [32]. In populated countries, frequency of atherosclerosis (ATH) increased in population [33]. Low degree swelling in aorta of abdominal part also related to atherosclerotic RS (risk factor) [34].

In nonalcoholic fatty liver, seriousness of subclinical cardiovascular disease also increased [35]. For detection of acute heart attack some new cardiac biomarkers require [36]. The present need is to explore novel biomarkers for CVR (cardiovascular risks) detection purpose in young age [37]. Some biomarkers used to identify different heart related diseases and risks like coronary problems, post infarction heart failure and vasculogenic erectile abnormalities [38,39,40]. Risk of acute heart attack also find by level of ST2 and interleukin-33 [41]. Some ions, proteins and deactivators moves in body act as biomarkers also used for prediction of cardiac failure [42]. Some biomarkers that predict pro CVR includes increased body weight, swelling and thrombosis with sedentary behavior for cardio metabolic diseases in youngster [43,44,45].

4. Association between hypertension and CVR

The most spreading cardiovascular risk factors are Hypertension and dyslipidemia. Hypercholesterolemia may be associated to Alzheimer's disease (AD) and hypo-perfusion through the progression of atherosclerosis [46]. Use of alcohol and infectious diseases causes metabolic

abnormalities in hepatic functions. These conditions lead towards dyslipidemias in people whose age lies between 40 to 45 years [47]. Hypertension also caused Vascular dementia. Lipid related disorders with dyslipidemia and hypertension evaluated by BMI (body mass index). BMI does not show positive effects on LDL cholesterol targets. That's why need of some sensitive biomarkers for these variations. [48]. For hypertension associated hyperhomocysteinemia, some important biomarkers are conc. of TC (total cholesterol), LDL and HDL cholesterol, TG (triglycerides), Apo lipoprotein A-I and B [49].

5. Association between diabetes and CVR

Type I and 2 diabetes also associated with CVD. Diabetes may link to dyslipidemia (low level of LDLc and high of TG). This condition increases the chance of CVD. It also has been seen that dyslipidemia occurs in patients of type 2 diabetes [50]. In AVDs (atherosclerotic vascular disease) lipid profile has a crucial part. Abnormalities in endothelial functions find by stiffness of arteries [51]. Diseases related to metabolism causes atherosclerosis that can be indicated by activity of serum enzyme GGT (γ-glutamyl transferase) and act as a biomarker for arteriosclerosis [52,53].

Additionally, for CVR (cardiovascular risk) β-trace protein and for CVD lipid deposition, accumulation of fats in liver and obesity related problems in kidney tubules acts as biomarkers [54,55]. Different techniques working to find out lipid abnormalities or lipid profile like mass spectrometry and MALDI [56,57]. To find disordering in process of metabolism, presences of different types of protein in serum act as some important biomarkers now a day [58]. It is reported that main cause of CVD is atherosclerosis. It is linked to different conditions like abnormalities and apoptosis in endothelial, accumulation in monocytes and kidney diseases (related to HDL) [59]. Genetic variation also leads towards CVD and these variations in gene like apo proteins and some enzymes related to decreased amount of high density lipoprotein [60].

6. Reaction of (*Trigonella foenum-graecum L*) on different parameters

Medicament with a decoction of fenugreek seeds gives better results in diabetic patients. In fenugreek fibers content is 51.7 percent which included neutral fiber 32.5% and mucilaginous fiber 19.2%. Trigonelline (an alkaloid) play important role in treatment of glycosuria also present in fenugreek [61]. So, fenugreek seeds in diet have potential to decrease cholesterol level in blood and decreases the risk of CVD.

7. Discussion

Cardiovascular diseases are a frequent root of deadliness. CVD are widespread in human society and many of them are interconnected to foodstuff but most dangerous conditions are genetic lipid deformities which includes high blood cholesterol (hypercholesterolemia), hypertriglyceridemia, HDL metabolism disarray. Cardio metabolic determinant condition is a blend of vascular as well as metabolic agents that comprises of lipid profile, glycemic parameters, blood pressure and anthropometric indices that are likely to intensify the risk of diabetes and CVDs. Mutations in some wide variety genes for lipid can result in human diseases.

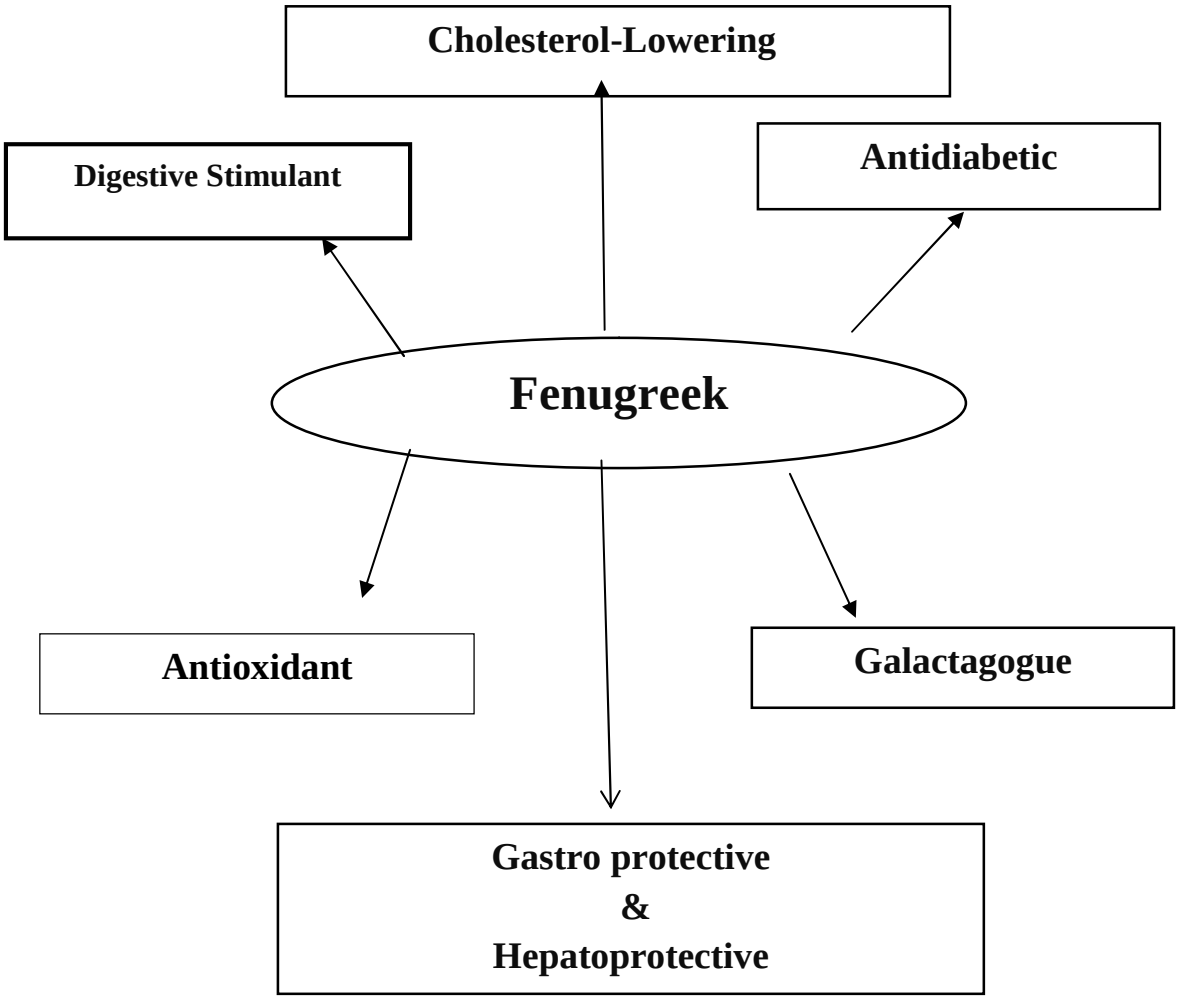
Patients with long term renal failure also suffer Hypertriglyceridemia and shows less activity of lipoprotein and hepatic lipase and enhancement of Apo lipoprotein C-II. Procardiovascular risk factors and emerging biomarkers for cardio metabolic diseases includes inflammation, obesity, thrombosis, and autoantibodies among teens and youngsters. The most spreading cardiovascular risk factors are

hypertension and dyslipidemia. Type 1 and type 2 diabetes also show signs of CVD. Dyslipidemia is known to be a risk factor of diabetes.

LDL is known to be an important biomarker in atherosclerosis whereas atherosclerotic kidney disease shows high-density lipoproteins concentration. Fenugreek seeds contain, alkaloids, steroidal saponins, soluble and insoluble dietary fibers and flavonoids. Dominant features for curative outcomes of fenugreek includes analgesic and anti-oxidant components., Due to the presence of fiber component, "galactomannan" dietary fenugreek seeds have been found to lower high cholesterol level.

8. Conclusion

In recent decades' fitness favorable features of the spice, ***Trigonella foenum-graecum*** that shows the probability of possible remedial approach have been analytically confirmed. Considering these advantageous physiological consequences ***Trigonella foenum-graecum*** is understood to be a natural and necessary element of our routine edibles. Utilization of fenugreek is proved to be secure and it can simply apply to obtain curative favorable outcomes.



Advantageous consequences of Methi
(*Trigonella foenum-graecum L*)

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