Kalijeeri: A Novel Therapeutic Anti Diabetic & Antioxidant Agent

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Abstract-Traditional medicines derived from medicinal plants are used by about 60% of the world's population. This review focuses on a plant Kalijeeri commonly known as 'Bitter cumin', 'Black Cumin' & also named as Centratherum anthelminticum , a traditional Ayurvedic herb which has been used since centuries for curing many diseases. C. anthelminticum has wide range of secondary metabolites such as: aliphatic fatty acids, flavones, saponins, steroids and glycosides. The extract of this herb possess a wide range of pharmacological activities such as: antidiabetic and antioxidant etc. This review is an effort to elaborate the therapeutic effects of kalijeeri with responsible bioactive constitutes in detail.

keywords: Kalijeeri, Herbal drug, Anti-Diabetic, Antioxidant, Free radical scavenger.

I. INTRODUCTION

Kalijeeri commonly known as, somraj, black cumin or bitter cumin, is a robust leafy plant belongs to the family Asteraceae (Compositae). It is an erect, branched, leafy annual herb which can grow up to 50 to 90 cm in height. The seeds are brown-black in color, with a hot sharp taste and astringent properties. Commonly grown in India and south east Asia.

The experimental investigations on the extract or pure components isolated from the plant shows a extensive range of pharmacological effects, including anti-diabetic, antioxidant, anti-diuretic, anti-obesity, analgesic-antipyretic, applied in inflammatory swelling & good wound healing, anthelmintic activity etc [1, 2].

Chemical constitutes of black Cumin:

More than 120 bioactive components were identified in black cumin. It contains 18% fixed oil and 0.02% volatile oil. Apart from this different classes of chemical constituents are further reported in seeds like flavonoids (Butein, flavone, dihydroflavone), polyphenolic derivatives, sterols (methylvernosterol, vernosterol and avernosterol), steroidal saponins, sesquiterpene lactones, tannins, proteins, carbohydrate etc[1,2]. these identified chemical constitutes were isolated using chromatographic techniques and spectroscopic techniques used for structural elucidation.

This current review focuses mainly on kalijeeri's use in the treatment of diabetes mellitus, a major crippling disease in the world leading to huge economic losses.

Diabetes Mellitus:

Diabetes mellitus is a major global health concern with a projected rise in prevalence from171 million in 2000 to 366 million in 2030[3]. It is estimated that there are approximately 33 million adults with diabetes in india and this number is likely to increase to 57.2 million by the year of 2015[4]. Etiologic factors for diabetes are changes in life style, stress, obesity and aging in general population worldwide.

Diabetes mellitus is a complex metabolic disorder resulting from either insulin insufficiency or insulin dysfunction. it also characterized by chronic hyperglycaemia and postprandial hyperglycaemia. Type I diabetes (insulin dependent) caused due to insulin insufficiency because of lack of functional beta cells. Patient suffering from this are therefore totally dependent on exogenous source of insulin while patient suffering from type II diabetes (insulin independent) are unable to respond to insulin and can be treated with dietary change, exercise and medication, both leading to enhanced micro- and macrovascular morbidity and overall mortality[5,6].

Though pathophysiology of diabetes remain to be fully understood, experimental evidence suggest the involvement of free radicals in pathogenesis of diabetes[7] and more importantly in the development of diabetes complications[8,10]. Free radicals are capable of damaging cellular molecules, DNA, protein and lipids leading to altered cellular functions. many recent studies reveals that antioxidants capable of neutralizing free radicals are effective in preventing experimentally induced diabetes in animals models[11,12] as well as reducing the severity of diabetic complications.

Biochemical and animal model experiments have produced abundant data and hypotheses accounting for the anti-diabetic and antioxidant effects of the kalijeeri.

The mechanism of action to produce anti-diabetic and antioxidant activities by the kalijeeri and chemical constitute has been discussed below.

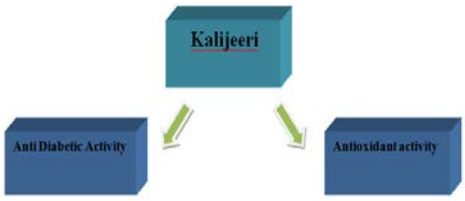

Figure no.1: Effects of kalijeeri

II. ANTI DIABETIC ACTIVITY:

Glucosidase and amylase are the important enzymes involved in the digestion of carbohydrates. They serve as the major digestive enzymes which help in intestinal absorption of the carbohydrates.

Many studies reported, the polyphenolic extract of kalijeeri seeds containing a mixture of phenolic-flavanoid compounds like gallic acid, proto-catechuic acid, caffeic acid, ellagic acid, ferulic acid, quercetin and kaempferol showed significant inhibition of intestinal glucosidase (maltase and sucrase) activity, human salivary amylase and also reduced postprandial hyperglycemia thus indicating a possible mechanism in antihyperglycemic effect of kalijeeri seeds.However modulating the carbohydrate hydrolyzing enzymes amylase and glucosidase it is useful for management of type-2 diabetes[13].

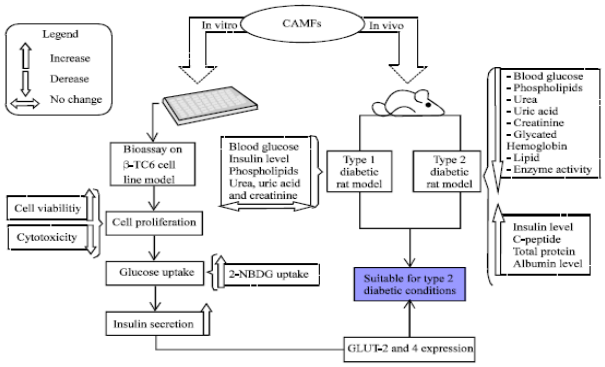

Fig. 2 Anti diabetic activity of kalijeeri

III. ANTIOXIDANT POTENTIAL:

Oxidative stress is the result of an increased ROS (Reactive oxygen species) production and a decrease in their elimination. Based on the fact that ROS are dangerous for cells, tissues and organs it has been inferred that oxidative stress is the cause for number of disorders, including atherosclerosis, neural degenerative disease, inflammation, cancer and ageing[14-16].

The main physiological role of antioxidants is to prevent damage to cellular constituents arising as a consequence of chemical reactions involving free radicals [17, 18].

The phenol extract of kalijeeri contain phenolic compounds. Hydroxyl groups of phenolic compounds function as hydrogen donor that reduces ROS by donating hydrogen atom so it may be responsible for its antioxidant & free radical scavenging activity [19, 20].

IV. CONCLUSION:

Several scientific investigations have indicated high medicinal potential of kalijeeri & its wide therapeutic activity against numerous illnesses and as anti diabetic agent it shows both anti hyperglycaemic and antioxidant activity.

These evidential properties indicate the importance of this plant for further studies directed towards Plant based drug development leads to production of safer and economical alternative medicine from black cumin in the future.

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