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EFFECT OF TRACHYSPERMUM AMMI, ELETTARIA CARDAMOMUM AND CARTHAMUSTINCTORIUS ON CARDIOVASCULAR DISEASES

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Abstract:

For a period of time, the synthetic chemicals are used as drugs for the treatment of most diseases. Moreover, from ancient history to modern history, many plant based medicines are used in health care. Phytochemicals are the natural bioactive compounds that are found in fruits, vegetables, aromatic plants, medicinal plants, flowers , leaves and roots which act as a defence system to fight against diseases. The phytochemicals found from natural products cover a large range of chemical entities such as polyphenols, steroidal saponins, flavonoids, organosulphur compounds and vitamins. A number of bioactive compounds are obtained from terrestrial plants such as isoflavones, resveratrol, quercetin, diosgenin, catechin, tocotrienols, diosgenin and carotenoids are proven to decrease the risk of cardiovascular diseases and helps in cardioprotection which is the primary cause of death in the world. The cardioprotective effects of these phytochemicals are due to their antioxidative, antiangiogenic, anti-ischemic,antihypercholesteroemic, inhibition of platelet aggregation and anti-inflammatory activities that decrease the risk of cardiovascular diseases. This review summarizes the role of Ajwain (*Trachyspermumammi*), Cardamom (*Elettariacardamomum*) and Safflower (*Carthamustinctorius*) in the prevention and treatment of cardiovascular diseases.

Key Words: Ajwain, Cardamom, Cardiovascular, heart,herbs, Medicinal, Safflower.

Introduction :

Plants, especially those with ethno-pharmacological uses, are the main source of medicines for early drug discovery. In fact, a recent survey has shown that the uses of 80% of 122 plant derived drugs were related to their original ethno pharmacological purposes [1]. Due to rise in risk of chronic illness in the world, World Health Organization (WHO) is encouraging the developing countries to use traditional herbal medicines for the treatment of various chronic diseases. Present epizootic predictions show that the world is addressed for a vascular typhoon of cardiovascular disease burden [2]. Coronary artery disease (CAD) is one of the leading causes of death among the various cardiovascular diseases in developing countriesand it is the largest cause of death in developed countries [3]. CAD is a multifactorial disease which occurs due to narrowing of arteries and build up of plaque in the arteries. Coronary artery disease (CAD) is caused due to various risk factors which include age,

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diabetes, high fat diet, smoking, obesity, hypertension, chronic inflammation, dyslipidemia, sedentary life style and premature family history of Coronary artery disease (CAD)[4, 5]. Hence, it is peremptory to look into nature for cardiovascular drugs that are derived from plants.

In this review, we will discuss three plants (*Trachyspermumammi, Elettariacardamum, Carthamustinctorius)*that are used for prevention and treatment of cardiovascular diseases.

Equivalent methanol extract of Ajwain is effective in lipid lowering action by reducing total cholesterol, LDL (low-density lipoprotein) -cholesterol, total lipids, triglycerides[6]

Like Ajwain, small cardamom is also very useful for the prevention and treatment of cardiac disorders [7]

There are numerous evidence in support of the uses of safflower medicines for treatment of menstrual problems and cardiovascular complications[8, 9].

Trachyspermumammi

Common name: Holy basil

Classification

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Apiales

Family: Apiaceae

Genus*: Trichyspermum*

species: *ammi*

Part used: Fruit

Botanical description :

Ajwain (*Trachyspermumammi)* is an annual herb (Fig. 1), erect, glabrous or minute pubescent. It is branched herb. The height of the plant is upto 90 cm. [10, 11]. Leaves of T*rachyspermum*ammi rather distant, 2 to 3 pinnately divided. It forms the feather like tender leaves. It is petiolate. The petiolate is of 1 to 5 cm. The leaf segments are linear and ultimate that is 1.0 to 2.5 cm long [10, 11]. The flowers are terminate or lateral pedunculate, white in colour small, inflorescence is compound umbels.

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Fig. 1Ajwain

Chemical composition of *Trachyspermumammi:*

Gas chromatography (GC) and Gas Chromatography - Mass Spectrometery(GS-MS) analysis of essential oil of Ajwain has confirmed that it has various organic and inorganic compounds, of which, 26 different types of compounds have been identified. These compounds account for 93% of the total amount[10]. Due to the presence of 2-4% essential oil it has characteristic odour and taste [10, 12, 13]. The following components are seen in the phytochemical analysis of essential oil: Moisture content (7.4%), fats (21.1%), protein residues (17.1%), carbohydrates (24.6%). Ajwain fruits contain minerals (7.9%) such as sodium, aluminium, potassium, calcium, copper, cadmium,iron and lithium (Table 1). No nitrates and nitrites are detected in the fruit. The fruits of *Trachyspermumammi* are also rich in vitamins, phosphorus and some other essential components. The other trace elements detected in essential oil are iodine, zinc, manganese, cobalt, nicotinic acid and chromium[10, 14].Thymol contributes approx. 39.1% of total amount of essential oil of ajwain[14]. Other alkaloids like carvacrol, camphene, *p*-cymene,myrcene, dipentene, a-pinesnes, b- pinesnes, a-plellandrenes, b- plellandrenes, phenol, g-terpinene, Thymol, thymine, linoleic, palmitic petroselinic acid, oleic and resin acid have also been isolated from the fruit's essential oil of *Trachyspermumammi*[10, 14]. The main component of the plant is Thymol[10, 13].In another report, it was discovered that Thymol contributes approx. 50% of the total essential oil[10, 12]. Another study reported that Thymol contributes 55% of total volume of essential oil [10, 15]. The Thymol present in *Trachyspermumammi* effects as antiseptic and antioxidant [10, 16], antitussive[10, 17] hypotensive activities[7, 10], and many more activities.

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Table 1. Phytohemical constituents of essential oil[10]

s.no.	Component	Percentage
1.	Moisture content	7.4
2.	Fats	21.1
3.	Protein residue	17.1
4.	Carbohydrates	24.6
5.	Minerals	7.9

Role of *Trachyspermumammi* for the preparation of cardiovascular diseases

The phenolic compounds such as tannins and flavonoids are putative antioxidants and also carry anti carcinogenic, anti inflammatory and radial scavenger capabilities. The presence of these phenolic compounds within the dietary antioxidants plays an important role to prevent cancer as well as cardiovascular diseases[3, 6].

Elettariacardamum:

Commom name: Cardamom

Classification

Kingdom: Plantae

Division: Magnoliophyta

Class: Liliopsida

Order: Zingiberales

Family: Zingiberaceae

Genus*: Elettaria*

Species: *cardamum*

Part used: Fruit and seeds

Botanical description: *Elettariacardamum* belongs to the family Zingiberaceae. Small cardamom is aperennial, herbaceous plants. The height of the plant is 2 to 5 m. the underground rhizomes are present. Cardamom is propagated by the vegetative divisions of rhizomes[18]. The stem (aerial stem) is formed by the circulation of leaf sheaths. The length of leaf is 30-35 cm and the width is 7-10cm. Leaves are lanceolate with acuminate tip. Their colour is dark green. From the axils of underground stems, the tillers are emerged. Mostly, the vegetative buds are produced in the period of monsoon [18, 19]. In most of the varieties and types of the cardamom, the flowers are white in colour with central lip streakedwith pink colour[18, 20].

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Chemical Composition of *Elettariacardamum:*

In cured Cardamom capsule, the composition of proximate include carbohydrate (68.2%) , fats (2.4%) , protein (10.6%) and ash (5.3%0) [18, 21]. 100g of cured capsules contais magnesium (182mg) , calcium (93mg) , potassium (124mg) , sulphur (100mg) , phosphorus (183mg) and iron (13mg) [18, 21-23]. All these are the essential mineral elements present in *Elettariacordamum* for day to day physiological activities of people. The leaves and capsules of cardamom contain significant level of zinc, manganese and copper. Some of the flavonoids

and carotenoids are also present.

Fig. 2 Cardamom

Role of *Elettariacardamum* in prevention of Cardiovascular diseases:

From centuries, the capsules of Cardamom have been used for culinary and traditional medicinal applications which also include prevention of cardiovascular diseases [18]. Recently, reports claimed that the terpenoids, flavonoids, alkaloids, anthocyanins and other phenolic constituents in cardamom were used to control the cardiovascular, lung, pulmonary and kidney disorders [18, 24]. The treatment with the extract of cardamom results in the noticeable decrease in arterial pressure indices, diastolic arterial pressure (DAP), systolic arterial pressure (SAP), mean arterial pressure (MAP) and the myocardial enzyme than controls it[18]. On the basis of currently available information, there are more than 100 secondary metabolites that have been isolated from *Elettariacardamum* and 1,8-cineole present in it is a very important active compound, that shows cardiovascular, antitumor and anti-inflammatory activities [18].

Carthamustinctorius:

Common name: Safflower

Classification

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Asterales

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Family: Asteraceae

Genus: *Carthamus*

Species: *tinctorium*

Part used : Fruit(seed)

Botanical description of Safflower:

The family of Safflower is Asteraceae. In India, its common name is kusum and in China, it is known as honghua[2, 16]. Safflower is a herbaceous, bushy plant. It posses several branches. There are two main varieties of safflower- spineless and spiny. In spiny variety, spines are present on the the leaves. The modified leaves are associated with the flower heads. The height of the plant is about 3feet (1meter) even in dry and poor soils in full sun. Taproot system is present in Safflower that grow to 2 to 3meter in the soil with proper depth. The colour of flowers of *Carthamustinctorius*is pale yellow to orange.

Fig. 3 Safflower

Chemical composition of Safflower

In *Carthamustinctorius*, there are more than 200 compounds that have been isolated. The most commonly known compounds are flavonoids, fatty acids,phenylethanoid glycosides, coumarins, steroids and polysaccharides [16, 25]. The Safflower oil contains 63% to 72% linoleic acid, 16% to 25% oleic acid and 1% to 6% linolenic acid [16, 26]. Luteolin and its glucopyranosides are also found in the leaves of Safflower[16, 27]. A natural flavonoid named Nictiflorin is extracted from the coronal of the Safflower [16, 28]. 5 flavonoids, 6-hydroxykaempferol 3-glucoside, 6-hydroxykaempferol 3,6-diglucoside, 6-hydroxykaempferol 3,6,7-triglucoside and 6-hydroxykaempferol 3-rutinoside-6-glucoside have been isolated with 13 known compounds from the dried petals of *Carthamustinctorius*

Role of safflower in prevention of cardiovascular diseases:

Safflower is a herb that is very helpful for the prevention and the cure of cardiovascular diseases. It properly opens the arteries by lowering the blood cholesterol hypertension and increase the flow of blood. It also increases the oxygenation of the tissues. Safflower also helps to inhibit the thrombus formation in 90% of the patients. In the 83% of the coronary

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disease patients, after the treatment of 6 weeks the level of blood cholesterol lowered down [16, 29], due to which Safflower is used by the patients that are suffering from the cardiovascular diseases. Safflower yellow is a common traditional medicine used in China to promote the circulation of blood for removing blood stasis . It is also used for the treatment of disorders related to circulation of blood such as coronary heart diseases[29]. It helps to prevent the heart attack.

Conclusion:

In future, more research is needed in this field. To develop new medications for the treatment of cardiovascular disorders that have no or few side effects, more scientific study of these plantsis required.

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