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THERAPEUTIC BENEFITS OF *ANETHUM GRAVELOENS* LINN (DILL) TO CURE AILMENTS

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ABSTRACT

DILL (*Anethum graveloens* Linn.) it is a popular herb widely used as a spice. Dill also yields essential oil and has been used in ayurvedic medicines since ancient times. It is an annual aromatic branched herb of apiaceae family, native of south-east Europe and is cultivated commercially in most parts of Europe, particularly The Netherlands, Hungary, Germany, Romania, South Russia, Bulgaria. The Ayurvedic uses of dill seeds are carminative, stomachic and diuretic. The earliest reference to use of dill seeds in medicine goes back to "charak Samhita" (700 BC), an ancient renowned medical treatise on Indian medicinal plant. There are various components of dill seeds and herbs: carvone being the predominant odorant of dill seed and α-phellandrene, limonene, dill ether, myristicin are the most important odorants of dill herb. The main purpose of this review is to understand the significance of *Anethum graveleons* in ayurvedic medicines and emphasis can also be given to the uses of this medicinal plant.

KEYWORDS

DILL, (*Anethum graveloens* Linn.) and Medicinal plant.

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INTRODUCTON

The genus name Anethum is derived from Greek word aneeson or aneeton which means strong smelling. Dill foliage, fruits and their volatile oil are used extensively for culinary and medicinal purposes.

Some of the Balkan countries use dill in flavouring yogurt, wine and cream. In Sweden bread is flavoured with dill seeds. Dill seeds are used for seasonings several types of processed meat. The leaf oil has largely replaced the use of fresh herb especially in the food industry in Europe.

In Malaysia and Indonesia, the leaves are steamed

with rice whereas fruits are used in flavouring the confectionery's. The fresh and aromatic leaves are also used for soups, curries, gravies, salad, and pickle; the leafy stems are used in flavouring vinegar and fermented cabbages and the seeds are also used for flavouring meats.

The International Trade Centre (Anon.1991) has brought out a material survey of four west European countries (France, UK, The Netherlands and Germany) estimating an overall demand to be less than 300 tonnes per annum.

The Netherlands and Germany are larger producer, France produces a small quantity and imports it from Egypt, Israel. 70 to 100 kg of herb annually is said to import from USA, largely from Hungary. India exports 500 to 800 tonnes of seed annually to west Asian countries and a small quantity of dill seed oil to western Europe. Varshney (2000) has reported worlds production of dill weed oil as 80 tonnes and that of dill seed oil as 70 tonnes; the seed oil is produced mainly in India, Russia and Poland.

Dill is characterized by long leaves and compound radiating umbels. It grows to between 1 and 1.2 m in height under cultivation. Dill is a plant with; long fusiform (10-15cm) tap root with few secondary rootlets. The stem is erect, dull green, cylindrical, fistular with longitudinal light green streaks, up to 1.5 cm thick around the base.

Dill seed flowers in June- August and fruiting takes place in August -October in Europe, while in India it is February -March, March -April respectively. In the sowa plant, the fruits are longer, 3-5(-5.5)* 1.5-2.5(-3) mm in dimension, with three longitudinal ridges. It has a number of local races like Vizak Sowa, Variyali Sowa and Ghoda Sowa distinguished by the oil composition of their fruits (shah and Quadri, 1994; Randhawa and Kaur,1995).

In Ayurvedic medicine dill is commonly used in abdominal discomfort, colic and for promoting digestion. Ayurvedic properties of shatapushpa are katu tikta rasa, usna virya, katu vipaka, laghu, tiksna and snigdha gunas. It cures 'vate', "kapha", ulcers, abdominal pains, eye diseases and uterine pains. Kashyapa samhitaa attributed tonic rejuvenating and promoting properties to the herb (A. graveolens). It is used in digestive problem and also in gripe water.

Anethum Graveolens L. is used in the preparation of more than 56 ayurvedic preparations, which include Dasmoolarishtam, Dhanwantharishtam, Mrithasanjeevani, Saraswatharistham, Dhanwantharam quatham and so on. Charaka prescribed the paste of Linseed, Castor seeds and shatapushpa (A. graveolens) pounded with milk for external application in rheumatic and other swellings of joints. It was used by Egyptian doctors 5000 years ago and traces have been found in Roman ruins in Great Britain. In the Middle Ages it was thought to protect against witchcraft. Greeks covered their heads with dill leaves to induce sleep.

Review of literature

In October 2012, Zagami and Golmakani *et al.* conducted a research to analyse the effect of Dill seeds on uterus contractions in active phase of labor. The study concluded that Dill is an aromatic herb that used to shorter the labor and for the augmentation of uterus. It was believed by the women that the consumption of dry dill seeds soaked in boiling water decreases the pain and shortens the labor. The fall and the ratio of rise was measured from time to time for the contraction to return to the baseline.it was observed that the number of contraction in the case group was more than the control group. The study showed the shortening of the duration of the labor by the use of Dill seeds. Further, having not enough information or data about the time for consumption and about the correct amount to be consumed more detail and complete studies are to be needed.

Pharmacogn Rev. in 2010 in his study depicted that *Anethum graveolens* L. (dill) has been in use in ayurvedic medicines and is a popular herb used widely as a spice, in medicine use and also yields essential oil. Herb from apiaceae family used in Ayurvedic medicine are diuretic, stomachic and carminative in nature. The dill seeds contain various volatile components, and are the predominant odorant of dill seeds are carvone. a-phellandrene, limonene, dill ether, myristicin are other important odorants of the herb. The study shows the significance of *Anethum graveolens* in ayurvedic

medicines and non-medicinal purposes and also the enhancement of secondary metabolites of this medicinal plant. Lis-balchin *et al* (1997) reported that the dill seeds and other herbs in laboratory have contractile effect on myometer. However, dill seeds plays an important role in releasing oxytocin an effective hormone in uterus contractions. In October 2012, Zagami and Golmakani *et al.* conducted a study to determine that the Dill seed enhances frequency of. Fall time in relation to rise time, in the women who consumed the Dill seeds was shorter than the control group. Further, it was determined that it shortens duration of the first stage of labor. It can be used for augmentation of uterine contractions in labor and also prevention of post term pregnancy. Researchers have investigated the effect of dill seed on the pattern of uterus contraction and there was no complication found.

Cultivation

Dill prefers rich well drained, loose soil and full sun. It tolerates a Ph in the range 5.3 to 7.8. It requires warm to Hot summers with huge sunshine, even partial shade will reduce the growth substantially. The plant quickly runs into seeds in dry weather. Seeds are viable for 3 to 10 years. The seed is harvested by cutting the flower heads of the stalks when the seed is beginning to ripe. It is grown as an annual crop both in temperate and tropical regions up to 100m. A large number of varieties are known in cultivation.

Germination commences after a week in tropical regions and may take two weeks in warm temperate conditions. Seed rate is 5 to10 kg per hectare depending on the method of sowing. Drilling in rows or broadcast; usually it is sown in rows. The crop responds favorably to use of inorganic fertilizers depending on the nutrient status of the soil. Atanosov *et al.* (1976) observed that the application of 70kg per hectare each of N, P_2O_5 and K_2O produce maximum yield.

The herb oil is the colorless to brownish-yellow mobile liquid. The fresh herb at vegetative stage contains 0.60% of oil, which increases with growth. For herb oil, the crop is harvested when it is between maximum flowering to beginning of fruit formation stage as oil content in the leaves are high and the oil has lower amount of oxygenated compounds.

In seed crop the terminal umbels are handpicked when the fruit begins to turn yellowish brown in color; these comes to maturity 40 days early. The rest of the crop is cut from the base later when the umbels begins to turn brownish; delay may cause sed shattering which will ultimately lead to loss of crop.

The essential oil of the herb as well as the seed crop is obtained through hydro distillation or steam distillation and complete exhaustion of the produce takes 4.0 and 2.5 hours for herb crop and 8 to 10 hours for seed crop respectively. The seed are crushed into powder to facilitate easy extraction of the oil. During the initial stage the distilled oil has high d- carvone content, carvone is actively soluble in water, it is distilled easily. The wilted herb should be distilled within 72 hours.

Applications

The herb is a good companion for corn, cabbage. Lettuce and onions but inhibits growth of carrots. Dill reduces a carrot crop if it is grown to maturity near them. Insects, bees and wasps are attracted to the yellow flower of Anethum for plant resources like nectar and pollens.

Coriander and dill when planted together has a very remarkable pest control benefits. Dill is potentially suitable host for parasitoids.

Medicinal uses

Anethum is used as an ingredient in gripe water, given for relieve to colic pain in babies and in young children. The essential oil in the seed relieves intestinal spasms helping to settle colic. The seed is aromatic, carminative, mildly diuretic, stimulant. The carminative volatile oil improves appetite, relieves gas and aids digestion. Another benefit is that chewing the seeds improves bad breathe. Anethum also stimulates mil flow in lactating mothers and is also given to cattle's for the very reason. It cures urinary complaints, piles and mental disorders.

Importance and other applications

As already discussed Anethum seeds are used as a spice, and its dried leaves called dill weed are used as condiment and tea. The fresh and dried leaves are

used for sandwiches and fish sauces.

The aromatic herb is used for flavoring and seasoning various foods such as pickles, salads, sauces and soups. The herb oil has a powerful sweet spicy, peppery and aromatic odor. The taste is warm and slightly burning, but pleasant and not pungent. It is also an essential ingredient for sour vinegar. Dill oil which is extracted from seeds, leaves and stems contains an essential oil used as flavoring in food industry. It is also used in perfumery to aromatize detergents and soaps.

Anethum is used in other applications as well like preservatives as it inhibits the growth of several bacteria like Staphylococcus, Streptococcus, Escherichia coli and Pseudomonas.

Toxicity and functional properties

They contain almost all the amino acids as well as flavonoids. The leaves are rich in minerals, mainly calcium, phosphorus and iron. However these oils have anti-bacterial property and are known to protect prepared food from contamination during storage.

The dill fruit contains petroselinic acid triglyceride, glucoside and flavonoids as well as large quantities of fats and proteins. It is also used in veterinary medicine.

The oil of east Indian dill (sowa) has an additional component called dillapiole in high proportion. The dillapiole is toxic when taken in large doses. But it is easily separated through fractional distillation because it is heavier than water with high boiling point.(285*C).

Anethum graveolens have been reported in some pharmacological effects such as antimicrobial and anti-hypercholesterolemic activities. Seeds extract from *Anethum Graveolens* L. have significant mucosal protective, antisecretory and anti-ulcer activities against HCL and ethanol induced stomach lesions in mice. Dill fruit hydrochloric extract is a potent relaxant of contractions induced by a variety of spasmogens in rat ileum, so it supports the use of dill fruit in traditional medicine for gastrointestinal disorders. Besides having strong anti - hyperlipidemic effect can also improve the biological antioxidant status by reducing lipid peroxidation in liver and modulating the activities of antioxidant enzymes in rats fed with high fat diet. It has been reported that they also have antibacterial activity against salmonella typhii etc. The higher activity can be explained on the basis of the chemical structure of their major constituents such as dillapiole and anethole, which have aromatic nucleus containing polar functional group that is knoen to form hydrogen bonds with active sites of the target enzymes.

Metabolic Importance

Various different compounds have been isolated from the seeds, leaves and inflorescence of this plant. Total 17 volatile compounds have been identified. The main constituents of dill oil which is pale yellow in color, darkens on keeping, acidic in taste are a mixture of paraffin hydrocarbon and about 40 to 60 % of d- carvone with d-limonene. The fruit yields about 3.5% of the oil; its specific gravity varies between 0.895 and 0.915.

Carvone and limonene are monoterpenes, which are present as main constituent of dill oil from fruits. a-phellandrene, dill ether and myristicin are the compounds which form the important odor of dill herb. Monoterpenes are 10-carbon members of the isoprenoid family of natural products. They are widespread in the plant kingdom and are often responsible for the characteristics odors of plants. These substances are believed to function principally in ecological roles, serving as herbivore-feeding deterrents, antifungal defenses, attractants for pollinators. Seventeen compounds have been identified in Indian dill leaf.

The several applications of carvone are as fragrance and flavor, antimicrobial agent and biochemical environment. D-limonene is one of the most common terpenes in nature. It is a major constituent in several citrus oil (orange, lemon) being an excellent solvent of cholesterol. D-limonene has been used clinically to dissolve cholesterol containing gallstones. It has chemo preventive and chemotherapeutic activities and also reported to have low toxicity in pre-clinical studies. Myristicin is a naturally occurring insecticide and an important compound od essential oil. Anethole is a terpenoid that is present in minor quantity in Anethum. But is also found in essential oil of anise and fennel.

Metabolic pathway for Carvone synthesis

The essential oils are primarily composed of mono and sesquiterpenes and aromatic polypropanoids synthesized via the mevalonic acid pathway for terpenes and the shikimic acid pathway for aromatic polypropanoids. The biosynthesis of the monoterpenes limonene and carvone proceeds from geranyl diphosphate via three step pathway. First, geranyl diphosphate is cyclized to d-limonene by limonene synthase. Secondly, this intermediate is stored in essential oil ducts without further metabolism or is converted by limonene 6-hydroxylase to transcarveol. Finally trans-carveol is oxidized by a dehydrogenase to d carvone.

Conservation status

To prevent extinction and derive maximum benefits from the indigenous plants of a nation, it is necessary to preserve the germplasm.

Due to lack of cultivation practices destruction of plant habitats and illegal and indiscriminate collection of plants from these habitats, many medicinal plant are severely threatened.

Anethum seeds are being used tremendously in flavoring and pharmaceutical industries as they are exported to European countries. Most of the perfumery industries are highly dependent on the supply of its herb oil and seeds. The plant is propagated through seeds. An increasing interest in the use of efficient protocols for the tissue culture and micropropagation for *in vitro* production of secondary metabolites and for clonal multiplication of elite genotypes has developed. Sharma *et al.* have reported a complete protocol on micropropagation of *Anetheum graveolens* L. through axillary shoot proliferation.

Anethum graveolens culture, which eventually formed normal plantlets, however very less in vitro research has been performed on this potential plant species. It is cultivated commercially throughout the country and most parts of Europe.

Effect of Dill (*Anethum graveolens* Linn.) seed on uterus contractions pattern in labor

In each women's life delivery is one of the most natural experience. It is followed by severe physical activity, stress, and pain. Dystocia is a disorder in uterus contractions, birth canal, and fetus. Its common cause is the ineffective uterus contractions. Non-effective uterus contraction are related to some physical, psychological factors such as, fatigue, lack of energy supply, dehydration.

Nowadays, oxytocin is used as 10unit infusion for uterus contractions. Also, prostaglandins directly affect on myometrium and induction of uterus contractions. Misoprostol and oxytocin are effective drugs and has side effects of its own. For example, side effect of oxytocin is the hypertension, water intoxication, headache, nausea, vomiting, cardiovascular complications and rupture of uterus. Therefore, in recent years consumption of herbal medicine has widely increased.

The herbs are used by many women during pregnancy for different reasons. They believe that dill seed consumed with boiling water at the beginning of labor causes augmentation of uterine contraction and fasten the labor. They believe that if a women wants to have a shorter and painless labor she should drink dill seeds infused in boiling water. Dill has been used as a traditional medicine for more than 2000 years. It also increases the milk in nursing mothers and helps to prevent colic in babies.

Additionally dill seeds are also used to reduce blood cholesterol, lipid levels and menstrual bleeding.

Dill is an aromatic herb and its seeds chemical combination includes tanin, a resin material and also a volatile oily essence is formed of limonene, ketone, carvon and oily material. Its essence has a anethole. Tannins are basically from polyphenels, which contains a contractive. Mahdavian *et al* (2001) reported that the oral consumption of 6-7 gm of dill seed extracted decreases the postpartum hemorrhage which is due to the contractive characteristics compared to oxytocin. Result of the study determined that this herb has a contractive effect on uterine myometrium and this effect is due to limonene presented in the dill herb. In this study the plant was collected from an area around Tabas (East of Iran), and was performed in the maternity part of Omalbanin Hospital between May 2009 and August 2010 under an institutional review board approved protocol. Detailed was being explained to the women who met the inclusion criteria.

The women who had consumed dill seed infusion (1 tablespoon whole dill seed soaked in whole or half cup of boiling water for 3-4 mins) before being taken to the hospital in the beginning of the uterus contraction were placed in case group and simultaneously those women who had not consumed the herbal drugs were placed at control group.

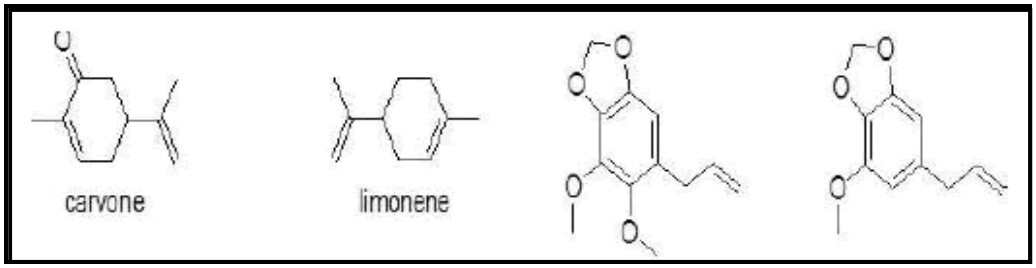
In the beginning of the active phase (dilatation 3-4cm) while in a supine position during monitoring, a sensor was applied to the abdomen. It was placed between the umbilicus and the fundus of uterine fasten by a belt to keep a track and record the uterus contractions.

The recordings were recorded and studied by the researchers. The mother was being controlled and managed as the labor was in progress. The recording of labor included the duration process, amount of oxytocin consumption, time of performing amniotomy, consumption rate of liquid and also included sex, weight, height, head circumference which was completed.

Data was analyzed by SPSS version 16. Test was used for comparing means between two groups.

There was no significant difference between the two groups in terms of mean of age. Study and analysis of Dill seed effect of uterus contractions shows that the number of contractions was different between two groups. The F:R ratio in women who consumed the herbal drugs was 1.2 +- 0.27 and in those who had not consumed was 1.42+-0.35: a statistically significant difference was being observed. Two groups were not different in terms of sex, weight, height and head circumference.

The commercial importance, for example: as flavorings, fragrances and pharmaceuticals has increased their yields through in vitro technology. Simultaneously, with the help of suspension culture, various physiological and biochemical parameters could be analyzed which can be commercially important plant species. Powerful techniques, with most sophisticated analytical tools such as NMR, HPLC, GC-MS, LC-MS etc. in plant cell and tissue culture have great potency of exploiting the totipotent biosynthetic and biotransformation capabilities of plant cell under *in vitro* conditions. Therefore, there is much wider scope to enhance the secondary metabolites of this plant.



Scheme No.1: Structure of major components found in essential oils and oleoresins

CONCLUSION

The result of the study determined that the Dill seed enhances frequency of. Fall time in relation to rise time, in the women who consumed the Dill seeds was shorter than the control group.

Further, it was determined that it shortens duration of the first stage of labor. It can be used for augmentation of uterine contractions in labor and also prevention of post term pregnancy.

More studies about the effect of Dill seed on delivery and neonatal outcomes is recommended. In this study, researchers have investigated the effect of dill seed on the pattern of uterus contraction and there was no complication found.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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