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Ethnobotanical Knowledge of Umbelliferae Family: A Review

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Abstract:
The purpose of this review is to discuss pharmacological and traditional therapeutic properties on Coriandrum sativum, Foeniculum Vulgare, Ferula foetida, Cuminum cyaminum, Pimpinella anisum which contribute to many folk and ancient medicaments because of its properties like aromatic, flavouring agent stomachic, carminative, expectorant, stimulant, anti-allergic, anti-antibiotic activities. The review's future focus will be on using the biochemical and signalling pathways impacted by coriander, fennel, asafoetida, cumin, anise using the chemical constituents present in them in order to develop novel and effective disease-eradication formulations. This review article discusses the importance of the medicinal plants of Umbelliferae family in the field of medicine, like the use of the plant's basic extract to treat a variety of ailments, growth constraints, morphology, biological activities, biochemical composition, projects sanctioned to this plant species, research work done, and the anticipation of such salient abandoned species of plants for the sake of research in the fields of natural products and plant tissue culture.

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I. Introduction:

Herbal drugs are a type of dietary supplements which can be taken regularly in one's diet either for some therapeutical purpose or as such generally [1]. Except for Allopathy, all of India's officially recognized health systems such as Unani, Ayurveda, Homeopathy, Yoga, Siddha, and Naturopathy include a significant portion of herbal medications. Above 72% Indians still rely on these medical systems. According to "Indian Drugs Act" there is no distinct category for nutritional supplements or herbal medications in present times, nevertheless, there is an ample amount of experiential confirmation for the same. Reverse pharmacology and Observational therapeutics stand to benefit greatly from this [2]. There are some good examples of Herbal drugs being used in routine life some of which include Green Tea, Giloy, Ashwagandha, Amla, Neem, Ginger, Aloe Vera, Fennel, Cardamom, Cinnamon, Lemon etc. Indian medicative plants are a valuable source of antioxidants, which are known to play a role in preventing or delaying various diseases. These plants exhibit antioxidant properties at various levels, offering protection against oxidative damage associated with different health conditions [2]. The worldwide knowledge about Indian herbs and Ayurveda is expected to be enriched by understanding the diverse beneficial compounds present in medicinal plants, including those used in functional foods. This enhanced understanding of the evidence-based properties of these plants is anticipated to yield significant benefits in the future [3]. Plants are thought to be responsible for roughly 25% of all medicines prescribed worldwide, with 121 active chemicals in use. Only 11 percent of the 252 medicines on the WHO's essential medicine list are made entirely of plants [4]. Traditional remedies are used by almost 80% of African and Asian people to elevate basic health management [5]. Over 81% of the village inhabitants employs therapeutic plants or traditional medical methods [6]. The Indian herbal business uses over 960 plant species, with 178 of them producing more than 101 metric tonnes per annum [7]. The herbal sector of India is expanding rapidly, with sales expected to attain more than Rs 143,000 million in 2012 and exports expected to reach above Rs 85,000 million with a Compound Annual Growth Rate of around 21% and 26% respectively [8]. Using herbal plants is entirely unharmed, as it either has null or extremely minimal negative effects. The biggest benefit of these treatments is their alignment with nature. The undeniable reality is that herbal remedies can be utilized by individuals of any gender or age. Medicinal herbs are believed as abundant source of constituents which could be used to manufacture synthetic, pharmacopeial, non-pharmacopeial medicines. In addition, these plants have had a significant impact on the development of human societies around the globe. Moreover, certain plants are recognized as vital sources of nourishment and are therefore recommended for their medicinal qualities [9]. Umbelliferae is also known as Apiaceae Family. There are about 200 genera and 2900 species which fall under the Family Umbelliferae [10]. The Specialty about this family is that the flowers arising on the plants of Umbelliferae family are of "Umbel" or "Umbrella shaped," which is the main reason it is termed as "Umbelliferae Family." Another interesting fact about this family is that

the plants of this family consist of volatile oils which provide them their specific kind of odour and taste. Also due to this fact these plants have various therapeutic and pharmacological benefits.

II. Review of Literature:

The benefits of herbal drugs cannot be denied because of the significant therapeutic properties it possesses. Moreover, Umbelliferae family plays vital role in this. There are numerous plants which fall under the Family Umbelliferae such as Celery, Parsley, Wild Carrot, Cumin, Asafoetida, Dill, Caraway, Carum, Masterworts etc. Some of these are explained in the given study such as "*Foeniculum Vulgare (Fennel), Coriandrum sativum (Coriander), Ferula foetida* (Asafoetida), *Cuminum cyaminum* (Cumin) and *Pimpinella anisum* (Anise)."

Coriandrum sativum:

It is an annual herb, green in color with long stalks and flat/bipinnate fragrant leaves. Its leaves and seeds both are used as therapeutic agents, also as a condiment and spice. The leaves of Coriandrum sativum varies in shape, with lobes that are broad at the base and become feathery and slender as they ascend along the flowering stems. Flowers of coriander display a range of colors from pink to whitish, and they are arranged in clusters known as umbels. The seeds of coriander are yellowish-brown, with a gentle aroma and a taste reminiscent of a blend of lemon peel and sage, offering a refreshing flavour profile. It may taste soapy as its leaves contains high levels of organic compounds called aldehydes which are generally found in soaps and lotions. Coriander is grown in various regions of India including Rajasthan, Maharashtra, U.P., Jammu, and Kashmir, and is also found in the anti-wild in the eastern part of England. Apart from India, coriander is commercially cultivated in Eastern European countries like Russia, Hungary, and Africa. It is also grown in France, Morocco, Spain, Romania, Italy, Myanmar, Netherlands, Pakistan, Mexico, Turkey, Argentina, as well as Western and Southern Australia. It is also found to a certain extent in the USA and UK. [11]. Coriander contains dried mature fruits obtained from plant Coriandrum sativum plant and commonly it is known as Kothmir, Dhana/Dhania, Fructus coriandri, Cilantro. Coriander seeds are sown in dry weather, either in March or in early autumn. They are sown in shallow furrows that are approximately 7-9 inches apart 1/2 inch deep, but germination may be slow. The plants are annual herbs that grow to a height of 1 to 3 feet, with branching and slender stems. Its flowers are arranged in umbels on short stalks, with five to ten rays. The seeds naturally fall from the plant when they are ripe, which usually occurs in August and is accompanied by an unpleasant odour. The plants are then harvested by cutting them down with sickles, and the fruits are collected and dried. As the fruits dry, they develop a fragrant aroma, and the unpleasant odour dissipates. [12]. Coriander is a roundish fruit, referred to as cremocarp, with approximately 10 primary ridges and 8 secondary ridges. The diameter of coriander fruits ranges from 2 to 4 mm, while their length typically falls between 4 to 8 mm., The colour of coriander varies from tan to brown, it is pleasant-smelling, spicy and soapy characteristic taste. 100 coriander fruits weigh approximately 1 g. The main ridges of coriander seeds are undulating and not easily noticeable, described as "Endospermic". On the other hand, the secondary ridges are straight and characterized as "Coelospermic". [13]. In the phytochemical screening, it is revealed that coriander seeds should contain at least 0.30% to 1% of the volatile oils. The main composition of coriander is volatile oil, which comprises of 70% to 90% of coriandrol (D-linalool), small quantities of L-borneol, pinene and geraniol [14]. Coriander seeds also comprises of minor quantities of fixed oil, accounting for approximately 13% of their composition, as well as a protein content of around 20%. Flavonoids, glycosides, saponins, oleoresins, Citronellol are other constituents present in coriander. The leaves and seeds of coriander contains mixed polyphenols and terpenes, including linalool which gives plant its particular aroma and flavour. The leaves of coriander are abundant in Vitamin A, and coriander is a key ingredient used in the preparation of 'compound spirit of orange and cascara elixir' [15]. Coriander is believed to have several pharmacological attributes because of existence of vast number of phytoconstituents. Commercially, it is utilized as a 'spice and condiment' and for the preparation of 'Coriander oil,' also utilized as a flavouring agent. The use of coriander is also beneficial for Skin problems, oral Hygiene, bones as it has anti-allergic and anti-biotic properties [16]. It acts as an aromatic, carminative, stimulant. It also shows diuretic activity which is due to the presence of flavonoids, glycosides and saponins [17]. It is same as that of furosemide [18] i.e., it inhibits the sodium-potassium-2-chloride co-transporter located ascending limb of loop of Henle [19]. The incorporation of Propidium iodide and loss of cellular functions like respiratory activity, efflux activity and other such activities showed that the main mechanism of coriander is damaging the membrane of bacteria which ultimately leads to death of the bacterial cell [20]. This states the anti-microbial or anti-bacterial activity of coriander which is due to the presence of linalool [21]. Anti-inflammatory activity was shown by coriander by inhibiting protein denaturation [22]. It is also used as a refrigerant. Coriander oil in combination with any purgative can be used against gripping. It regulates blood pressure; cholesterol levels and prevents anemia. Further, treatment of diarrhea, Rheumatism, and ulcers can be done using the same [23].

JP5912243B2, discloses that using coriander extract in beer-taste fermented beverage in a small amount enhanced the taste and refreshing feeling of the beverage. It also enhanced the thickness of the beverage without

highly altering the design quality of the product. The coriander extract was prepared by immersing the seeds of coriander in alcoholic aqueous solution containing malt in very less proportion or not containing malt at all. Coriander extract masks the bitter taste of malt (if present) and makes it easy to engulf. Therefore, it was concluded that use of coriander extract in alcoholic beverages can be beneficial [24]. Another patent AU2005209073B2, discloses about the therapeutic properties of coriander. It states that the coriander oil when used along with any preparation or separately shows antimicrobial activity and antiphlogistic activity. It can be widely used to treat microbial as well as fungal infections of skin and mucous membrane including pyoderma, mycoses yeast and mould infections, dermatoses, psoriasis, acne etc., and oral cavity infections like halitosis, paradontis, dental caries, plaque formation, and viral diseases like herpes, libalis etc. It can be administered topically in the form of spray, ointment, lotion, cream, paste, powder etc. or orally in the form of tablet, solution, emulsion, syrup, tincture, powder etc. It can also be used in the form of a candy, mouth-rinsing solution, chewing gum, cellulose film or breath strip, toothpaste, pastille for refreshing breath [25]. Additionally, JP7150482B2, shows that adding roasted coriander to foods and beverages as a flavouring agent enhances the richness of food products. It enhances the crunch, aroma, flavour and taste, freshness of foods and beverages. Also used for masking odour especially in livestock meat products. Thus, coriander is called 'The Natural Taste Enhancer' [26]. Further, CN1268231C, discloses a method for preparation of instant powdery microcapsule containing coriander as a flavouring agent. In this method fresh coriander was obtained, it's crude extract was obtained using pre-pulverization and squeezing technique. It was then purified using filtration and purified juice of coriander was obtained by heating and filtering the plant. A mixture of maltodextrin and arabic gum was used as microcapsule wall and the water content of purified juice was then reduced by drying in spray mode. Hence, instant powdery coriander microcapsule was obtained which has been claimed as a convenient in use and safe and sanitary and highly hydrophilic flavouring agent to consume [27] and CN105747053A, describes a new drink made with tomato, hot pepper, and coriander juices. The process involves cleaning and preparing each juice separately, mixing them together, and adding sugar, oyster sauce, and a stabilizing agent. The drink is homogenized, degassed, and sterilized before being packaged. This vegetable juice drink is said to be unique in flavour, fresh, and tasty, and can be enjoyed by people of all ages. It is also believed to have health benefits and is convenient to drink [28].

Foeniculum Vulgare:

It is a perennial herb grown for its edible leaves, shoots, and seeds. The fennel plant is highly fragrant and its various parts are utilized for adding flavor to food. Additionally, the stem base of the Florence fennel variety known as Azoricum, resembling a bulb, and the pale shoots of the plant which have been whitened are consumed as a vegetable. The dried, ripe fruits of Foeniculum vulgare plant are what make up fennel. It is commonly known as Fennel fruits, Fructus Foeniculum, Saunf etc. Fennel is originally from Southern Europe and Asia Minor, but it is now grown in moderate climates across the world. However, in certain regions of the United States and Australia, it is classified as an invasive species [29]. Largely harvested in Russia, Rumania, France, Germany, and Japan. In India it is cultivated in Gujrat, Rajasthan, Punjab, Uttar Pradesh, Maharashtra, and West Bengal. The method used for Cultivation of Fennel is Dibbling. The seeds are sown just before Spring season to obtain higher quality of fruit germination. To allow the herb to branch out freely and for the stems to be positioned correctly, it is necessary to leave a substantial amount of space between each plant and row. As a result, when planting, it is advisable to sow four to five seeds at a time, with each group spaced 26 centimetres apart. For the cultivation of fennel, calcareous soil which is drained well and situated in sunny location is found to be most favourable. The crop is then kept weed-free and suitable fertilizers are provided to it. The fennel plant that is grown through cultivation typically has a height of around 1 meter (equivalent to 3.8 feet) and features stalks with leaves that are finely divided into many awl-shaped or linear segments. The plant's compound umbels are gray in colour and produce small flowers of yellow colour. Once the fruits have ripened, they are harvested and dried thoroughly in sunlight. A technique called 'thrashing' is employed to separate the fennel fruits. Fennel is a Straight or Slightly Curved seed, greenish-brown to tan in colour with strong fragrance and mucilaginous taste and sweet-smelling odour. The size of the seed is typically between 5-10 millimetres in diameter and 2-4 millimetres tall. Fennel has 5 Primary rides with a bifid stylopod at the top. On transverse cutting of fennel fruit 2 commissural vittae and 4 dorsal vittae can be seen. The dried fennel seeds are small and oblong, ranging from green to tan coloured, and measuring around 6 millimetres (or a quarter of an inch) in length. They feature five notable longitudinal dorsal ridges. The seeds within the fruits contain roughly 3-4% of volatile oil, which includes fenchone and anethole as the primary constituents. In the phytochemical screening, it is revealed that fennel constitutes 3-8% of the essential oil, approximately 19-21% of fixed oil and proteins each. The key component of essential oil is fenchone, ketone (around 19-21%) and anethole, phenolic ether (around 49-51%). Alternative Components that fennel consists of includes limonene, phellandrene, anisic aldehyde, methyl chavicol, etc. [30,31,32]. Fennel has various therapeutic and pharmacological properties because of existence of specific kind of phytochemicals which makes it special among other plants in the family. It has been used since ages as a carminative, an aromatic and stimulant, as a natural expectorant etc. [33]. Pharmaceutically and generally fennel

is also as a flavouring agent and a condiment. It can be easily available in Indian households. It has been proven that fennel can be used to relieve dysmenorrheal signs, to reduce the duration of menstrual cycle which means it has been proven beneficial for menopause, to relieve menstrual cramps [34]. This activity of fennel is due to the presence of anethole which mimic the effect of oestrogen and helps in relaxation of uterine muscles by inhibiting spasms in muscles [35].

CN102204663B, discloses that the addition of essential oil of fennel in a tomato sauce enhances the quality of tomato sauce by enriching the flavour and odour of tomato sauce. Also, it aids in increasing the shelf life of tomato sauce. Fennel acts as a natural preservative and an antioxidant agent so no artificial preservatives were required to be added in the preparation. It has been regarded beneficial for the safety, nutrition, and non-harmful future development [36], in addition to this, CN107048402A, discloses the addition of fennel extract in fermented yoghourt which enhanced the therapeutic properties of yoghourt. It increases the production of good bacteria in the gut and helps in digestion and assimilation, better coordination of intestine and stomach. It eliminates cold to stop stomach-ache, abdominal pain, cold hernia, and diseases like dysmenorrhea and elevates good gut health [37]. CN104770686A, discloses addition of fennel extract oil in shredded pepper which gave the preparation a ruddy bright colour, characteristic flavour, and fragrance of fennel to the product. As well as it also provided a proper sticky & easy to chew texture. Fennel is used extensively in shredded pepper as it exhibits antibacterial property to it [38]. Moreover, CN105535047B, reveals the preparation of soft capsule from cumin and tricaprin solution of volatile fennel oil. The fennel soft capsule preparation exhibited better quality of stability, higher bioavailability, and strong effect of drug (strong therapeutic activity) and it has been proved to cure primary dysmenorrhea, cough, asthma, stomach cold, emesis [39] and CN104642613B, discloses the preparation of fennel fruit scented tea. Fennel seeds are warm in nature so these have the ability to prevent cold and relieving pain and gastric disorders and it regulates vital energy. Fennel seeds have also known to show analgesic, anti-ulcer activities. Fennel tea is seen to moistening intestine, provide anti-aging effect, harmonizing stomach, preventing from cold and pain, reducing blood lipid content, enhancing beauty, and strengthening spleen and kidney [40].

Ferula foetida:

In Latin language ferula denotes "carrier" or "vehicle." It is herbaceous, monoecious, and perennial plant, an 'aromatic oleo gum resin' extracted from roots and rhizome of the plant 'Ferula foetida regel, Ferula rubricaulis boissier'. Asafoetida has been used widely as since earliest ancient times (till now) and is believed to play vital roles as an effective therapeutic agent in 'Indian systems of medicine like Ayurveda, Siddha and particularly in Unani system of Medicine' [41] [42]. It is commonly known as hing. Other synonyms of asafoetida include Food of Gods, Devil's drug, ferula, gum asafoetida, incense of devil, stinking gum [43]. Asafoetida is originally from Central part of Asia, stretching from 'Eastern Iran to Afghanistan.' Nowadays, it is primarily cultivated in Iran and Afghanistan, and then distributed to other regions worldwide. [44]. Asafoetida can be obtained from plants with dense and massive taproots that reach a diameter of 12-16 centimetres at the crown by the time of about five years. Immediately prior to flowering of plants, typically in March to April, the top part of the living rhizome root is exposed, and then stem is removed near the crown. The exposed surface is then covered with a 'dome-shaped' twig and soil enclosure and a milky juice is released from the cut surface. A few days later, the secretions are cleared away, and a newly cut root segment is trimmed to obtain more latex. This process is repeated until plant secretions stops, which usually occurs about 3.5 months after the first cut. At times, the collection of resin is done from the cuts produced at the intersection of rhizome, taproots, or stem in successive steps. [41]. It has cream converting to rust colour with Strong, persistence, perceptive and pungent odour and Acrid, bitter and alliaceous taste. Its shape exists in two different forms – Tears (having diameter of 0.50 to 3.0 centimetre) and Masses [44]. On analysing hing it was found that it comprises of carbohydrates 68% per 100 grams, protein 4.2%, moisture 15.7%, minerals 7.2%, fat 1.10%, and fibre 4.15%. As for its vitamin and mineral content, asafoetida contains noteworthy amounts of phosphorus, calcium, carotene, iron, niacin, and riboflavin. In addition, it has a gummy substance consisting of umbelliferon and ferulic acid, which makes up about 39-65% of the plant [46] [47], farnesiferols A, B, and C, asaresinotannols, [48] [49]. Approximately 25.0% resin which is made up of a combination of galactose, glucose, rhamnose, l-arabinose, and glucuronic acid. It also has volatile oil (3.0-17.0%) that consists mainly of disulphides, with 2-butyl prop-2-enyl disulfide being the most prominent component, along with some free valeric acid and ferulic acid, as well as trace amounts of vanillin. [50]. The primary cause of the oil's unpleasant odour is said to be the disulfide.. According to 'Ayurveda' Hing is grouped as "deepniya and sanjna-sthapaka". Hing plays a role of 'antidote of opium' [51]. Asafoetida is a versatile spice that serves various purposes, such as aiding digestion, as a condiment in pickles, and food. In contemporary herbal medicine, it is utilized for curing various medical conditions, such as bronchitis, hysteria, whooping cough, and asthma. Historically, it has been used to treat flatulent colic and infantile pneumonia [52]. The resinous gum of asafoetida is carminative, antispasmodic, expectorant, sedative, and laxative. The essential oil present in the gum is expelled through the lungs, which makes it an effective remedy for asthma. Additionally, the pungent odour of asafoetida can be noticed in secretions, breath, gastric eructations and flatulence [45]. It shows antispasmodic action via

inhibition of calcium influx through voltage-dependent calcium channels, which reduces the release of intracellular calcium and results in muscle relaxation. Additionally, asafoetida may also activate potassium channels, leading to further hyperpolarization and relaxation of smooth muscles [53]. It also shows sedative, anthelmintic, expectorant, stimulant, and menstrual stimulant properties. Also believed to reduce blood pressure and in thinning the viscosity of blood [54] [55].

AU2015200753A1 declares that Asafoetida can be used against numerous insects and reptiles. Asafoetida is considered as a natural snake repellent as it highly prevents the chances of snake bites, although it's effect can be mounted when used along with chemicals [56]. Patent CN102885864A reveals the preparation of an anti-tumour drug using seed extract of Chinese asafoetida. The seeds of Chinese asafoetida were derived via the process called 'steam distillation' and was observed using 'gas chromatography & mass spectroscopy' technique. It has been observed as the seed extract was strongly effective against hepatoma cells, colon cancer and cervical cancer and this anti-tumour medicament could be given in any dosage form. It is widely used for treating patients with tumours [57]. Moreover, KR100581438B1 claims that any eatable consisting of asafoetida helps in improving the cognitive functioning of brain. It enhances the ability of learning, reasoning, memorizing, and understanding things in an efficient manner. Moreover, it does not show any side effects or toxicity and has been seen very safe & useful in food products [58]. Also, US8709440B2 describes an invention that is designed to eliminate parasites from birds, humans, or mammals naturally without using any synthetic pesticides or insecticides. The agent used for this purpose is a herbal plant known as Ferula Asafoetida. According to the author, this product is highly effective in getting rid of parasites [59] and CN105907731B describes a novel method for enhancing microbial laccase production in the field of microbial fermentation. The method involves the addition of beta carotene and other carotenoid substances during liquid sate fermentation of higher fungi, such as asafoetida mushroom, to promote the growth of beta carotene organisms. The resulting extract, containing beta carotene and other carotenoid substances, is then used to improve the activity of laccase, resulting in an increase in the activity rate of up to 12 times to that of the samples not treated with the extract. The method is straightforward to implement and has a significant potential for applications in enhancing laccase activity [60].

Cuminum cyaminum:

It is a small annual, slim, and branched stem that can reach up to 19-31 centimetre in height. Its leaves are long, measuring around 4-10.2 centimetre, and are composed of 'thread-like' leaflets that are either pinnate or bipinnate. The plant produces small flowers that come in pink hues or white and grow in umbels [49] [50]. It has oil canals. Cumin seeds are utilized as a spice in numerous cuisines worldwide, particularly in India. India has the highest production of cumin globally, accounting for about 75% of the world's production, and consumes 91% of it. Cumin is a crop with huge possibility and heavy requirement worldwide, owing to modifying food utilization patterns and the growing need for premium items like powder and oil. [60]. It possesses a potent fragrance that is sweet and its flavour is somewhat pungent and bitter which is obtained from the dehydrated matured fruit of 'Cuminum cyminum' [61]. Cumin is commonly known as jeera or zeera [50], cumin seed (black cumin), caraway (green cumin) [62]. Cumin, a versatile herb is grown in China, India, Middle East, and various Mediterranean countries, including 'Tunisia' [49]. It is native drug of Egypt, Syria, Turkey. It is a key crop of India, Argentina, Cyprus, Denmark, Mexico, Pakistan, Iran, Indonesia, Japan, and Southern Russia [63]. Cumin has been traditionally used to alleviate respiratory conditions like asthma and bronchitis. Additionally, it possesses medicinal properties such as immune system modulation, pain relief, anti-cancer effects, antimicrobial properties, antioxidant activity, blood pressure reduction, and liver protection [65]. The antioxidant and antimicrobial activity of Cumin is due to the presence of cuminaldehyde, flavonoids, cymene which works by safeguarding cells from oxidative stress which can lead to various health issues by either blocking the production of harmfull free radicals or by eliminating them from the body. This approach helps to prevent a wide range of pathological processes. [66] In addition, cumin has a history of usage in traditional medicine for treating various illnesses such as diabetes, cancer, and hypolipidemia [65]. Mechanism involved behind cumin essential oil being used as a stimulant carminative and stomachic is due to the presence of cuminaldehyde and thymol which reduces the number of gastric ulcers and increases the gastric mucus secretion, suggesting a protective effect on gastric mucosa [68] [69]. Cumin seeds are brownish-yellow in colour with particular and intense odour. It has Zesty or spicy, bitter, sweet-smelling, unpleasant taste and oblong in shape [70]. Moreover, it is used as an astringent and useful against diarrhoea and dyspepsia. Also used in veterinary medicines. According to the findings, cumin seeds grown organically possess a strong and distinct scent because of the high concentration of essential oils (4-5.3%). The volatile oils of all the samples tested contained the primary components γ-terpinen-7-al (20.6-28.4%), cumin-aldehyde (30.5-33.3%), α-terpinen-7-al (around 14%), β-pinene (3.11-5.4%), γ-terpinene (6.2-13%), p-mentha-1,4-dien-7-ol (0.72-1%), and β-cymene (4.2-5.4%). Observations suggest that the volatile oils from cumin seeds are grown in oases which are amazing native origin of antioxidants, utilized for preserving food and improving health [69] [71] [72].

US10487290B2, describes a technique to speed up the oxidation of lipids using cumin. The process involves exposing a lipid mixture to cumin at high temperatures for an extended period. In addition, the resulting oxidized lipid mixture can be used in various food products such as seasoning concentrates, flavourings, sauces, gravies, or pre-prepared meals. Moreover, dried powder of cumin also enhanced the flavour of food component [73]. Additionally, CN103651601B, pertains to a pesticide composition that includes cumin and wild marjoram extract, along with its preparation method and application. The main objective of this invention seeks to provide a pesticide composition that is eco-friendly, plant-based thus naturally obtained, readily available and is cost efficient. The active component of this composition is extracted from the crude drug, which contains cumin (1 part) and wild marjoram (0.2-4 parts). The extract has been found to be effective in preventing crop gray mold and powdery mildew. Since it uses Chinese herbal medicine as its raw material, it does not leave behind any pesticide residue, making it environmentally friendly. Additionally, the low drug effect concentration required and low cost make it an economically viable option for use [74]. Another patent CN106135383A, reveals the extraction and purification of antibacterial components present in cumin essential oil. The method involves the extraction of Fructus Cumini Cymini using petroleum ether to obtain cumin essential oil which is then separated into four components - saturated hydrocarbons, aromatic hydrocarbons, non-hydrocarbons, and colloids using column chromatography technique. Through this process, the effective antibacterial components present in the cumin essential oil are obtained. Empirical testing has confirmed that these components exhibit notable antibacterial and fungistatic effects. Since they are derived from the extract of the Fructus Cumini Cymini plant, they can be used as a natural food preservative, which is both safe and reliable [75]. Moreover, CN105341742A, reveals the invention and method of preparation of cumin roasted sausage. The sausage is made from a mixture of beef, pork, carrots, mutton, garlic, red wine, butter, pepper seeds, salt, vinegar, cumin and sausage casings in specific quantities. The making process involves several steps such as mincing, pickling, baking, and packaging. This invention has improved the mouth feel and has increased nutrient components due to the addition of pork, beef, mutton, and carrots. The chopped meat is appealing and has a excellent mouth feel because of the method of pickling before baking. Additionally, the sausage is fragrant, fresh, salty, and tasteful due to addition of garlic and cumin. The sausage casings are processed to eliminate impurities and fish-like palate of the sausage casings [76] and CN107853666A, describes a method for preparing a flavouring agent for baked foods, which consists of microcapsules containing cumin oil and onion oil compounded with a coating material. The microcapsules are made up of a core and a wall material that is coated onto the outside of the core. The preparation method involves three steps: preparing a hydrosol for the wall material, preparing an aqueous emulsion for the core, and preparing the microcapsules flavouring agent. The core of the microcapsules contains cumin oil, onion oil, siritch, sucrose ester, arachic acid ethyl ester, and enuatrol in specific percentages. The present invention utilizes edible high polymer material to encapsulate cumin oil and onion oil, resulting in microcapsules with sustained release properties that improve the heat resistance of spices. The microcapsules also require less essential oil, resulting in baked bread with a high aroma concentration and long-lasting aroma, while reducing costs by more than half compared to traditional methods [77].

Pimpinella anisum:

Anise seed is one of the most ancient spice herbs that have been used for a long time in traditional and modern medicine, as well as in the pharmaceutical industry, due to its aromatic properties [78]. Anise, also called ‘aniseed, anise fruits, sweet cumin, star anise, Chinese anise [79] or rarely anix’ is a flowering plant originated in Eurasia and that its seeds have a distinct flavour and scent, which bear some resemblance to the flavour and aroma of alternative herbs and spices like liquorice, star anise, tarragon, and fennel. It comprises of mature dehydrated seeds of ‘Pimpinella anisum’ [80]. It is cultivated in Spain, Mexico, Mediterranean, West Asia, Middle East and Egypt, [81], Crete, Greece, and a little part of Asia and currently is grown in ‘European countries’ including Northern part of Africa, Malta, Italy, Bulgaria, Mexico, Russia, and Germany [79]. Its propagation is carried out with the help of seeds which are sown in dehydrated, aerated soil, on cozy, sun-drenched border throughout beginning of April. The herb blossoms during the month of ‘July’ and the fruits mature during ‘autumn.’ After the seeds ripens, the plant is cut down, and the seeds are separated from the plant through the process of threshing. The colour of anise varies from Ground-grey to Greyish-brown with Agreeably aromatic odour, Sweet, aromatic, resembles as that of black liquorice taste. The anise fruits are of oval shape with short stocks attached to it and are 3 to 5 mm in length [82] [83]. Anise is characterised as a fragile annual herb with white flowers and feather-like green leaflets, growing up to 19 inches tall. Anise is a singular cremocarp with a beige-grey, ovate-conic shape, ranging in size from 3.0 to 5.0 millimetre in length and 1.53 to 2.1 millimetre in width. The fruit's surface appears rough due to the existence of small, conical epidermal trichomes. Anise has a pleasant fragrance and a sweet, flavourful taste [84]. Its seeds contain a syrup-like and aromatic essential oil that makes up around 2.4 to 3.6% of its composition. The essential oil is primarily composed of ‘trans-anethole’, which accounts for about 90.5% of its aroma, as well as other compounds like anisic acid, estragole, linalool, anise ketone, anisaldehyde, β-caryophylline, various anethole polymers. Anise fruit also contains coumarins such as scopoletin and umbelliferon,

flavonoid glycosides like isovitexin, rutin, and quercetin, as well as phenylpropanoids. Additionally, the fruit contains carbohydrates, fatty acids, lipids, proteins, and sterols [85]. It is mainly composed of trans-anethole which gives anise its characteristic aroma, also, due to which it is commonly used as a carminative, which means that it can help to relieve bloating and flatulence by promoting the expulsion of gas from the gastrointestinal tract. It is also believed to have expectorant and spasmolytic properties, making it useful for treating coughs and respiratory infections. The expectorant and spasmolytic effect is thought to be due to the ability of anise to increase the production of mucus in the respiratory tract, which helps to loosen and expel phlegm [86]. Presence of estragole in anise provides it antimicrobial properties, inhibiting the growth of various bacteria and fungi. It has also been shown to have anti-inflammatory effects, reducing the production of inflammatory cytokines, and decreasing inflammation in animal models [87]. Traditionally, Anise is also used as an antioxidant, anthelmintic, antifungal, insecticidal, antinociceptive, secretolytic, gastroprotective, anti-inflammatory, sedative activity, and oestrogen-like properties [84]. Anise has a variety of potential benefits, including improving memory, treating conditions such as bronchitis and asthma, and promoting lactation. It may also help alleviate symptoms of menopause and whooping cough, and can be used externally for treatment of scabies and internally for flatulent colic in infants. Additionally, anise can be useful for relieving nausea and aiding digestion [88]. Moreover, it comprises of compounds that can mimic the effects of estrogen, reduce inflammation, and repel insects. As a result, anise is used for various purposes such as relieving constipation, treating indigestion, alleviating migraines, and easing symptoms relating to menopause [85].

CN103156192A relates to a method for preparing microcapsules containing anise volatile oil. The method involves the preparation of volatile oil of anise, followed by the preparation of a wall material liquid made of Arabic gum and maltodextrin. A mixed emulsifier of monostearin and sucrose ester is added to create lactescence, which is then mixed with heartwood, emulsified, sprayed, and dried to produce microcapsule particles. The method is uncomplicated and readily accessible, and the microcapsule particles produced are round, uniformly sized, and possess a strong fragrance of anise. Each microcapsule contains between 40-95mg/g of anise volatile oil, with an encapsulation efficiency of above 95%. The product obtained exhibits good thermal stability and dissolving dispersion, thus, is suitable for use in the food, daily use chemical, and pharmaceutical industries [89]. One of the patents, CN105713732B provides a novel method for extracting star anise oil. This method involves two stages: steam distillation followed by ethanol extraction. The steam distillation process removes impurities from the aniseed while also extracting some of the anise oil. The ethanol extraction method is then used to extract the remaining anise oil from the aniseed, thereby enabling the secondary extraction and utilization of the aniseed's effective components. This method overcomes the limitations of the organic solvent extraction process and significantly improves the yield and quality of the star anise oil. Additionally, the method is cost-effective, easy to implement, and suitable for industrial mass production [90]. Moreover, US10588872B2 describes the preparation of a liquid medication with an anise flavour which has an analgesic effect. Anise is used as a flavouring agent to mask the bitter taste and unpleasant odour of the drug. The medication comprises phenylephrine and an anethole analogue that lacks significant amounts of aldehyde groups. For instance, 1-methoxy-4-n-propylbenzene could be used as the anethole analogue [91]. Additionally, ES2732455T3 involves combining active ingredients derived from an extract of the aqueous fruit of anise and hyaluronic acid in effective quantities. The unique feature of the combination is that the hyaluronic acid used has a molecular weight between 40,000 and 60,000 g/mol, with 52,000 g/mol being the preferred weight. It is protective against disorders occurring due to harsh environmental conditions like dry skin, acne etc as it provides hydrating effect to the skin, anti-aging properties. Also, it can be used against ‘orange peel’ disorder and to enhance elasticity of skin, hair and nails [92]. At last, US6395286B1 pertains to cosmetic skincare compositions that incorporate a blend of anise seed extract and retinoids. It is a cosmeceutical for preventing or treating signs of skin aging, such as wrinkles, lines, dryness, flakiness, photodamage, as well as improving skin thickness, elasticity, flexibility, and plumpness by enhancing the amount of retinoic acid present in cells binding protein in fibroblasts of skin. This is accomplished by applying the cosmetic composition directly to the skin [93].

III. Discussion and Conclusion:

Finally, scientific study on Umbelliferae family reveals that this plant has enormous biological potential. It is frequently used in Ayurvedic medicine to treat a variety of diseases. It is firmly thought that the extensive information on biological and microbiological characteristics of the extracts reported in this study will offer detailed proof for the usage of this plant in various treatments. Coriandrum sativum, Foeniculum Vulgare, Ferula foetida, Cuminum cyaminum, Pimpinella anisum are the plants that contains Alkaloids, steroids, glycosides, vitamins, and other bioactive chemicals. In this study we focus on the anti-diabetic activity, antioxidant activity, antimicrobial activity, antibacterial activity, hypolipidemic effect, anticancer, antiparasitic, antitoxic effects, wound healing properties. The future dose for many immune related chronic illnesses might be determined based on these findings. Future research trials incorporating In vitro and In vivo pharmacokinetics, bioavailability, and toxicological investigations, as well as following clinical trials to verify efficacy, will be able to do this.

Furthermore, future possibilities necessitate extensive and in-depth research into plant tissue culture employing cutting-edge biotechnological technologies such as genomes and proteomics, allowing for effective disease targeting.

Moreover, the said plants have also used in the preparation of several formulations, which are mentioned in various national and international patent applications. Such as Coriandrum sativum is used in preparation of beverages, to treat various microbial and fungal infections of skin and mucous membrane like acne, psoriasis, and oral cavity infections, used as natural taste enhancer, for preparation of instant powdery microcapsules, and for topical administration. Foeniculum vulgare is used to enhance the flavour and odour of sauces, fennel scented tea, yogurt, shredded pepper and helps in the preparation of soft capsules for the treatment of cough, emesis, asthma, stomach cold, reducing lipid content in blood, strengthening spleen and kidney and for enhancing beauty. Ferula foetida can be used against variety of insects and reptiles including snakes. It can be used to prepare anti-tumour drug, to fight against colon and cervical cancer, improving functioning of brain by enhancing the ability to learn, memorize and understand, eliminates parasites naturally and enhances microbial laccase production. Cuminum cyaminum can speed up oxidation of lipids, it enhances the flavour, odour of beverages, sauces and other kind of meals, masks foul smell and acts as a natural preservative. It has been categorized as a natural & eco-friendly pesticide. It is used as anti-diabetic, anti-cancer, analgesic, hypotensive agent. Also effective in veterinary treatments. Pimpinella anisum has been used to mask bitter taste of drugs, as a flavouring agent, as an analgesic, used in cosmetics in combination with other ingredients like hyaluronic and retinoic acid to combat issues like wrinkles, dry skin, photodamage, acne, anti-aging, and hydrating effect, to enhance elasticity of hair, nails, and skin. Used against 'Orange peel' disorder.

The plants of valuable resource that has a lot to give the research in terms of medicine as a result, effective awareness and conservation efforts are required.

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