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Ocimum basilicum (Sweet Basil): An Ethnomedicinal Plant

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ABSTRACT

Ocimum basilicum, also known as Sweet Basil, is a widely used herb in Italian and Southeast Asian gastronomy, particularly in Thailand and Vietnam. Basil is said to possess anti-inflammatory, antioxidant, and antibacterial properties in Ayurvedic medicine. Scientific research has verified the antibacterial activity and anti-inflammatory characteristics of this substance. In the field of Turkish medicine, it has the ability to inhibit the occurrence of diabetes and cardiovascular problems. Basil is employed in Indian Siddha medicine to treat facial acne, migraines, and dermal infections. The essential oil of Ocimum basilicum contains a variety of chemicals, such as eucalyptol, linalool, α-terpineol, eugenol, bergamotene, guaiene, germacrene D, cubenol, and others. The extract from the leaves comprises 32.23 ± 4.453 phenolic components, which make up 97.9% of the oil. The phytochemical screening and elemental analysis indicate the presence of saponins, tannins, and cardiac glycosides. Ocimum basilicum, a plant renowned for its myriad ethnomedicinal uses, has been employed for millennia in the treatment of gastrointestinal and neurological ailments. The essential oil possesses antiviral, larvicidal, antinociceptive, and antibacterial properties. This review examines the distinct pharmacological effects of Ocimum basilicum,encompassing its anticonvulsant, anti-hyperlipidemic, anti-inflammatory, antioxidant, antiplatelet, and antithrombotic capabilities. The article also examines potential basil product makers while cautioning against their negative impacts. A potential future study could entail the development of transgenic basil plants to target certain chemical elements associated with human ailments. The review highlights the significance of safeguarding and utilizing Ocimum basilicum

Keywords: Ocimum basilicum Linn, anticonvulsant, anti-hyperlipidemic, anti-inflammatory, anti-oxidant, antiplatelet properties, and anti-thrombotic

1. INTRODUCTION:

Ocimum basilicum (O. basilicum), commonly referred to as sweet basil, is an extensively grown herbaceous perennial plant belonging to the Lamiaceae family (Figure 1). Figure 1: *O. basilicum Linn* Ocimum contains about 30 different types of shrubs and herbs. Morphology, flower color, growth patterns, chemical makeup, leaves, and stems were all highly variable. Asia, central and southern America, and Africa are the genus's natural regions. The plant of kings was the name given to it by the ancient Greeks. *O. basilicum L.* is known in English as basil, but in French, German, and Spanish it is named basilic, basilikum, and albahaca, respectively. Due to its powerful metabolites, this herb is widely used in Italian and Southeast Asian cuisines in countries like Thailand and Vietnam. It is employed in traditional medicine, cultivated for ornamental purposes, and utilized in the production of commercial fragrances. Sweet basil serves as a nourishment for pollinators and possesses compounds that combat inflammation and act as antioxidants [1–5]. The geographical range of *O. basilicum* Linn. is essential for comprehending its distribution and environmental requirements. The plant has been examined for its chemical composition of basil oil and its culinary and medicinal characteristics. Basil thrives on soil that has good drainage andreceives abundant sunlight. It may be cultivated both inside and outdoors. This plant is widely available in grocery shops and marketplaces worldwide, and it has several uses. Due to its widespread popularity, this herb has become a fundamental component in numerous cuisines, making it easily obtainable for both cooking and therapeutic uses [6,7]. *O. basilicum,* an

indigenousplant to many cultures, has been utilized for ethnomedicinal intentions across various societies. It is indigenous to tropical areas in Asia and Africa and flourishes in hot conditions with well-drained soil and abundant sunlight. *O. basilicum* is employed in traditional medicine and cultivated as an ornamental plant because of its potent metabolites. Basil tea is employed to treat acne, snake bites, and bug stings and is renowned for its antioxidant effects [8, 9]. In the context of traditional Chinese medicine, this substance enhances the process of digestion and alleviates the symptoms associated with colds and influenza. Essential oil extracts are utilized as food flavors and have been included in commercial scents to enhance the shelf life of food goods [10, 11]. *O. basilicum* has been documented in the fields of agriculture, food, and medicines. *O. basilicum*, an indigenous herb to tropical and sub-tropical areas, has been utilized by Ayurveda and Unani practitioners to treat skin conditions such as ringworm and rashes [12–14]. Since 1930, basil oil's chemical composition and its use as a kitchen herb and decorative plant have been the subject of study.

O. basilicum is extensively utilized in the food, medicinal, cosmetic, aromatherapy, and perfumery sectors, mostly for its flavor, especially in Mediterranean cuisine. There are more than 100 herbs and shrubs that are grown and maintained globally [15–23].

Figure 1: Ocimum basilicum Linn.

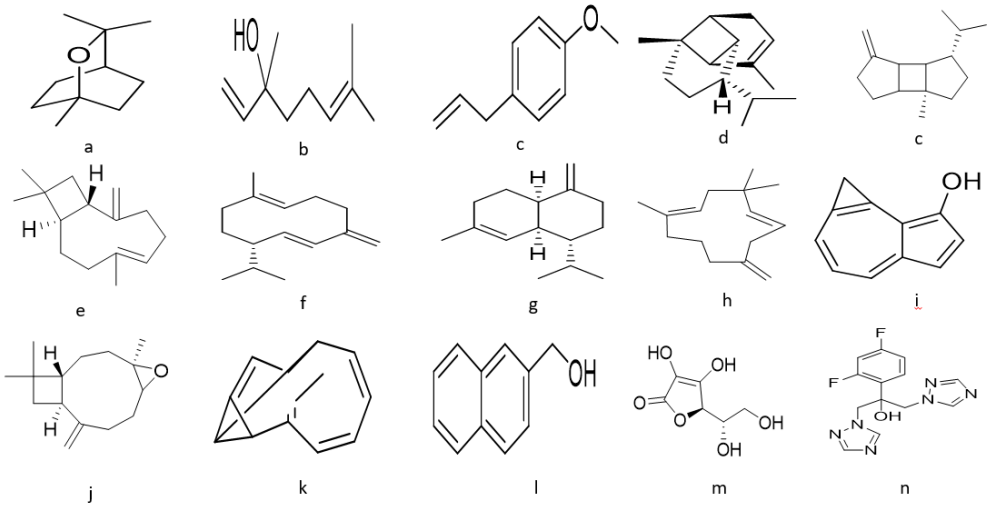

Figure 2: (a) Eucalyptol (b) Linalool (c) Estragole (d) Copaene (e) (-)-. beta.-Bourbonene (f) Caryophyllene (g) Germacrene D (h) .gamma.-Muurolene (i) Humulene (k) 1H-Cycloprop[e]azulen-7-ol (l) Caryophyllene oxide (m) 1,2,4-Methenoazulene (n) 2-Naphthalenemethanol (o) Ascorbic acid (p) Fluconazole.

2. Geographical Availability of *O. basilicum* Linn. Biogeography and ecology are essential for comprehending the distribution and habitat preferences of plant species. An example of a species that is of importance is *O. basilicum,* which is generally referred to as sweet basil. This herbaceous plant is indigenous to tropical parts of Asia and Africa but has been extensively cultivated globally because of its culinary and medicinal attributes [24, 25]. Sweet basil flourishes in warm biogeographic regions characterized by well-drained soil and abundant sunlight. It is commonly encountered in gardens, farms, and urban locations, where it can be conveniently cultivated for personal or commercial usage. *O. Basilicum's* ability to adapt to diverse climatic circumstances renders it a flexible plant suitable for cultivation in numerous places worldwide [26–29]. Sweet basil has a notable ecological importance as it serves as a vital food source for pollinators like bees and butterflies. The fragrant leaves of this plant contain essential oils that have the dual function of attracting pollinators and acting as a natural insect repellant. In addition, *O. basilicum* has been utilized in traditional medicine due to its anti-inflammatory and antioxidant characteristics, emphasizing its significance beyond its culinary uses [30–32]. The geographical distribution of *O. Basilicum Linn*., usually referred to as basil, is a crucial aspect to take into account when researching this plant. Basil is indigenous to tropical regions of Asia and Africa, where it flourishes in hot and humid environments. This plant has been cultivated for millennia and is being farmed in many regions worldwide because of its culinary and medicinal applications [33–36]. For optimal growth, basil thrives in soil that is well-drained and receives ample sunlight. It is a multifunctional plant that can be cultivated in both indoor and outdoor environments, allowing it to be easily grown by a diverse group of cultivators [37]. However, certain types may have distinct climate preferences, like Thai basil, which thrives in hotter temps. When assessing the geographical distribution of O. basilicum Linn., it is noteworthy that this herb is widely available in grocery shops and markets across the globe. Due to its widespread popularity, this item has become a fundamental component in several cuisines, ranging from Italian pasta dishes to Thai curries [38–41]. In general, the widespread distribution of basil makes it readily available as an herb for both cooking and medicinal uses.

3. Taxonomical Hierarchy of *O. basilicum:* *O. basilicum* is referred to by various names in different languages worldwide, including the Indian subcontinent. The plant is commonly referred to as Basil, Common Basil, or Sweet Basil in English, but in Hindi and Bengali, it is known as Babui Tulsi. The plant is referred to as Badrooj, Hebak, or Rihan in Arabic; as Nasabo or Sabje in Gujrati; and as Jangli Tulsi in Urdu. Tohrakhurasani and Okimon are the designated names of the plant in Persian and Unani languages. O. Basilicum is classified within the Plantae kingdom, which includes all plant species found on Earth, at the kingdom level. Basil is classified under the category Magnoliophyta, which encompasses all flowering plants within the plant kingdom. Descending the hierarchy, O. Basilicum is categorized within the order Lamiales and family Lamiaceae. O. Basilicum belongs to the genus Ocimum within the Lamiaceae family, which also includes other species of basil. O. basilicum, at the species level, is classified into various cultivars, including sweet basil (O. basilicum var. Genovese) and Thai basil (O. basilicum var. Thyrsiflora) [42].

4. Morphological Features of *O. basilicum:* *O. Basilicum* is characterized by its fragrant green leaves, which possess a sleek texture. The leaves exhibit an opposing arrangement along the stem and possess an ovate or elliptical form. One noteworthy characteristic of *O. basilicum* is its petite white flowers that blossom in clusters at the apex of the plant. The blossoms of this plant have the ability to allure pollinators, such as bees and butterflies, thereby facilitating the reproductive process of the plant. *O. basilicum* has square-shaped and slightly hairy stems, which contribute to its distinctive appearance. The roots of *O. basilicum* possesses a fibrous and shallow structure, facilitating efficient absorption of nutrients from the soil [42]. This attribute renders it a perfect herb for growth in containers or raised garden beds. In general, the morphological characteristics of *O. basilicum* enhances its decorative appeal as well as its applications in cooking and medicine. *O. basilicum* is a tall, upright herb that branches out. It has a smooth and hairy look, reaching a height of 0.6 to 0.9 meters. The leaves of the plant are uncomplicated, arranged in pairs, measuring 2.5–5 cm in length. They have an oval shape, pointed tips, and are either toothed or lobed. Additionally, the leaves have many little oil glands that release volatile oil [43]. The whorls are densely arranged in a racemose pattern, with the terminal raceme being longer than the lateral ones. The bracts are pedunculate, shorter than the calyx, ovate, and sharp. The calyx measures five millimeters in length, increasing in size while the fruit develops, and has a relatively short pedicel.

The corolla measures 8–13 mm in length and is covered with fine hairs. It can be white, pink, or purple in color. The higher filaments of the stamen, which are slightly extended, have toothed bases. The ovary is positioned above, and it consists of two carpels, with four compartments and a fruit that is divided into four parts, each containing an achene.

5. Ethnomedicinal Uses of *O. basilicum*: The ethnobotanical applications of *O. basilicum* have been extensively recorded in various civilizations globally. Basil is said to possess anti-inflammatory, antioxidant, and antibacterial properties in Ayurvedic medicine. It is employed for the treatment of several afflictions, including respiratory diseases, digestive problems, and skin conditions. Basil leaves are frequently ingested in tea or incorporated into recipes due to their therapeutic attributes [44–46]. Basil is utilized in traditional Chinese medicine to enhance digestion and alleviate symptoms associated with colds and influenza. Basil essential oil is utilized in aromatherapy due to its tranquilizing and anxiety-reducing properties. Scientific research has validated certain traditional medical applications of *O. basilicum.* Studies have demonstrated that basil extracts exhibit antibacterial action against a range of infections [47, 29]. Additional research has shown the anti-inflammatory and antioxidant characteristics of basil components. *O. basilicum* is a conventional Turkish

remedy employed for the prevention and treatment of diabetes and cardiovascular ailments. Indian Siddha medicine utilizes it for treating facial acne. Basil has historically been employed for the treatment of headaches, coughs, diarrhea, kidney dysfunctions, insect stings, snake bites, and skin infections. In Bulgaria, it is employed for alleviating physical discomfort, while in Spain, it is utilized as a calming agent [49, 50].

6. Chemical Content of *O. basilicum:* Eugenol is a prominent chemical compound present in O. basilicum, contributing to the herb's distinct spicy aroma. Sweet basil is a beneficial element in natural therapies for infections and inflammation due to its antibacterial qualities, which are also possessed by eugenol. *O. basilicum* not only contains eugenol but also other beneficial chemicals, including linalool, cineole, and methyl chavicol [51, 52]. These chemicals have been researched for their ability to prevent oxidation, reduce inflammation, and relieve pain. *O. basilicum* includes approximately 20 chemicals, such as linalool, estragole, methyl eugenol, and 1,8-cineole, which have been discovered using gas chromatography-mass spectrometry (GC-MS). The monoterpenes found in it consist of camphor, limonene, thymol, citral, α-linalool, β-linalool, and estragole. Methyl eugenol serves as the primary compound, whereas chichoric acid is present in the leaves of fresh basil. The crude extracts from different morphological parts contain a high concentration of phenolics, resulting in a vibrant purple color caused by anthocyanins. The primary constituents of the substance are linalool (52.42%), methyl eugenol (18.74%), and 1,8-cineol (5.61%), while secondary constituents consist of myrcene, borneol, and neral. Ocimum extracts exhibit potent inhibitory effects on HIV-1 reverse transcriptase and platelet aggregation [53]. The essential oil composition of *O.basilicum* includes eucalyptol, linalool, α-terpineol, eugenol, β-elemene, bergamotene, guaiene, germacrene D, cubenol, tau-cadinol, camphor, bornil acetate, β-cariophylene, α-cariophylene, elixen, β-cadinene, α-copaene, metil eugenol, β-farnesene, epibiciclosesquiphelandrene, tau muracol, α-bisabolol, δ-gurjunene, and δ-cadinene [1]. The concentration of phenolic compounds in the extract from the leaves is 32.23 ± 4.453. The hydrodistilled essential oil obtained from the aerial portions of O. basilicum was examined using gas chromatography/mass spectrometry (GC-MS). The analysis identified a total of forty-seven components, which accounted for 97.9% of the oil. The components consist of monoterpenoids, sesquiterpenoids, oxygenated monoterpenes, menthone, estragol, isoneomenthol, menthol, pulegone, limonene, sesquiterpene hydrocarbons, trans-caryophyllene, germacrene D, trans-β-farnesene, α-amorphene, α-Cadinol, menthyl acetate, and methyl eugenol. The phytochemical screening and elemental analysis detected the presence of saponins, tannins, and cardiac glycosides. The extracts were analyzed for amounts of potassium, calcium, sodium, and magnesium. O. Basilicum possesses bioactive chemicals and minerals that have the potential to improve overall health [54].

7. Pharmacological Activity of *O. basilicum:* *O. basilicum*, a plant renowned for its myriad ethnomedicinal uses, has been employed for millennia in the treatment of gastrointestinal and neurological ailments. The antimicrobial efficacy of its essential oil has been evaluated against bacterial strains including S. aureus, E. faecalis, E. coli, P. aeruginosa, and Candida albicans [55]. The oil has been documented to possess antiviral, larvicidal, antinociceptive, and antibacterial properties. Additionally, it has been employed for alleviating muscle cramps, acting as an insecticide, managing diabetes, and treating respiratory diseases. It is renowned for its antioxidant, anti-inflammatory, febrile, emetic, cephalalgia, colicky, gonorrheal, dysenteric, cephalic, colic, vertiginous, hemorrhoidal, cough, paralytic, neurotic, and anesthetic properties. Basil tea is employed for the treatment of acne as well as for alleviating the symptoms of snake bites and bug stings. Additionally, it is recognized for its antitoxic properties and its ability to treat kidney and respiratory disorders [56, 57].

7.1 Anti-Bacterial Activity: The study revealed that basil oil exhibits significant antibacterial efficacy against Gram-negative bacteria, specifically Aeromonas hydrophila, Citrobacter freundii, Escherichia coli, Hafnia alvei, and Klebsiella pneumoniae. The minimum inhibitory concentration (MIC) for these strains varied between 0.25% and 1.0%. Nevertheless, all of the concentrations failed to entirely suppress the development of Pseudomonas aeruginosa and Salmonella enteritidis. Basil oil is regarded as a potent natural substance for the formulation of medicinal and cosmetic products [58]. This study conducted an in vitro assessment of the phytochemical constituents, antioxidant capacity, and antibacterial properties of basil essential oil (BEO). The oil was separated and examined using gas chromatography-flame ionization detector (GC-FID) and gas chromatography/mass spectrometry (GC-MS).

The predominant chemicals identified were methyl chavicol, 1,8-cineol, trans-alpha-bergamotene, and linalool. The study revealed that BEO, or Basil Essential Oil, reduced the growth rate of Staphylococcus aureus bacteria in beef burgers and enhanced their overall acceptance. The study conducted by Sharafati-Chaleshtori et al. in 2018 [59] did not find any notable variations in raw beef burgers. The objective of the study was to analyze the chemical makeup of a methanolic extract obtained from the aerial portions of O. basilicum. A total of 31 bioactive phytochemical substances were identified through the use of GC-MS and FT-IR studies. The extract underwent testing for its antibacterial effectiveness against a range of microorganisms utilizing diffusion techniques. The range of inhibition zones for all treatments was between 5.70±0.10 and 0.55±0.29 mm [60].

7.2 Antioxidant Activity: The antioxidant potential of a methanolic extract of sweet basil was investigated utilizing several in vitro assay methods. Fraction IV had the most potent activity, with V and VI following closely behind. The primary antioxidant molecule was identified as rosmarinic acid, which has the ability to trap 1.52 radicals and exhibits a synergistic impact with α-tocopherol [61]. The objective of the study was to isolate phenolic components from basil leaves and assess their antioxidant activity. The extraction process was optimized using response surface methods, with methanol chosen as

the most effective solvent. The phenolic-rich extract obtained from basil demonstrated significant antioxidant activity, as indicated by its IC50 value of 285.36 µg/mL. This finding suggests that basil holds great potential as a valuable source of phenolic compounds for medicinal applications [62]. Basil, an herb commonly used in traditional medicine, has usage in both culinary and medicinal contexts. An investigation of 23 different Iranian basil samples demonstrated diverse degrees of antioxidant activity and total phenolic content. The study discovered a direct and positive correlation between the antioxidant activity and the total phenolic acid content. This suggests that Iranian basils possess significant antioxidant qualities that can be utilized in both culinary and medical applications. The study emphasizes the versatility of basil in many contexts [63, 64].

7.3 Anti-hyperlipidemic activity: The study examined the effects of basil seeds on hyperlipidemia in a sample of 60 cardiovascular patients in Pakistan. The participants were categorized into three groups: G0, which received no treatment; G1, which consumed 5.0 g of basil seeds per patient per day; and G2, which consumed 10.0 g of basil seeds per patient per day. Data was gathered at intervals of 0, 45, and 90 days.

The findings demonstrated that both doses of basil seeds had a substantial impact on reducing the patients' biomass index (BMI), total cholesterol (TC), and triglyceride levels. The impact was more noticeable in the second administration, specifically at a dosage of 10.0 g of basil seeds per patient each day. The research findings indicated that basil seeds exert a notable impact on reducing the biomass index, total cholesterol, and triglyceride levels in individuals with cardiovascular conditions [64].

7.4 Anti-hypertensive Activity: *O. basilicum Linn.* is a fragrant herb commonly used in cooking that has potential use in the field of medicine. The study sought to identify the chemical components present in extracts of basil leaves and assess their potential as antioxidants and antihypertensive agents. The GC-MS analysis detected a total of 75 chemicals, which included monoterpenes, hydrocarbons, sesquiterpenes, triterpenes, phytosterols, and phthalates. The primary constituents comprise linalool, terpineol, tau-cadinol, methyl palmitate, palmitic acid, linolenic acid, and methyl linolenate. Electron spray ionization mass spectrometry (ESI-HRMS/MS) detected the existence of alkaloids, phenolic acid, amino acid, coumarin, lignin, flavonoid, and terpene derivatives. The ethyl acetate extract exhibited the highest levels of phenolic content and flavonoid content. All samples exhibited substantial antioxidant activity in both the DPPH and ABTS cation decolorization tests. All extracts demonstrated inhibitory effects on AAPS-induced oxidation in human erythrocytes in ex vivo investigations. The methanol extract of *O. basilicum* demonstrated a notable reduction in systolic blood pressure in hypertensive rats induced by l-Name. The study conducted by Qamar F et al. in 2023 [65] found a strong positive association between the total phenolic content and the antihypertensive action. This indicates that phenolic compounds have a significant impact on the inhibition of hypertension.

7.5 Neuroprotective Activity: This study examined the neuroprotective effects of an extract from the leaves of *O. basilicum* on non-spatial memory impairments induced by scopolamine in rats. The sample was extracted using 80% ethanol and subsequently analyzed for the presence of rosmarinic acid. Male Wistar rats were administered *O. basilicum* or piracetam for a duration of 14 days prior to receiving a scopolamine injection. We collected hippocampi and analyzed the mRNA expression of four genes: nicotinic acetylcholine α7 subunit (NA7), muscarinic M1 receptor (M1), neuronal nitric oxide synthase (nNOS), and 5-hydroxytryptamine receptor 3A (HTR3A), using qPCR. The administration of a lower dosage of *O. basilicum* (200 mg/kg) effectively counteracted the memory impairments generated by scopolamine in rats, with results comparable to those of piracetam.

O. basilicum also mitigated the upregulation of mRNA expressions of NA7, M1, nNOS, and HTR3A genes induced by scopolamine, as reported by Tikus S et al. in 2023 [66]. The study examined the neuroprotective and antioxidant properties of *O. basilicum* in countering seizures generated by pentylenetetrazole (PTZ). The mice were categorized into several groups, and the research revealed that the hydro-ethanolic extract (HE) as well as the ethyl-acetate (EAF), N-hexane (NHF), and water fractions exhibited anticonvulsant effects. PTZ administration resulted in an increase in malondialdehyde and dark neurone formation. However, the administration of HE and its fractions reduced these effects. The extract and fractions exhibited neuroprotective properties and provided protection against oxidative damage to the brain [67].

7.6 Cardioprotective Activity: The study examined the cardioprotective properties of *O. basilicum*, a botanical extract, on Wistar rats. The leaves were isolated and subjected to colorimetric analysis in order to quantify flavonoids and phenolic substances. The rosmarinic acid concentration was quantified using high-performance thin-layer chromatography (TLC) analysis and CAMAG's TLC scanning. The findings demonstrated that the extract effectively inhibited the increase in ST-segment elevation caused by isoproterenol, enhanced the healing of damaged heart tissue, reduced the formation of scar tissue, and decreased the rise in malondialdehyde levels in both the blood and heart muscle. The cardioprotective effects of *O. basilicum* may be attributed to its antioxidative activities, indicating that the cardioprotective effects of *O. basilicum* may be linked to its antioxidant activities [68]. Cisplatin, a highly effective chemotherapy medication, can have adverse effects such as myelotoxicity, gastrointestinal toxicity, ototoxicity, neurotoxicity, cardiotoxicity, and nephrotoxicity. Cardiotoxic symptoms encompass a range of conditions affecting the heart, such as heart failure, angina, acute myocardial infarction, thromboembolic events, autonomic cardiovascular dysfunction, hypertension, myocarditis, pericarditis, and severe congestive cardiomyopathy. This study examines the cardioprotective effects of the ethanol extract of *O. bacilicium* on rats

that were stimulated with cisplatin. The findings indicate that the ethanol extract of O. Bacilicium has the ability to decrease the levels of CK-MB and LDH, which are cardiac biomarkers. This suggests that *O. bacilicium* possesses cardioprotective properties [69].

7.7 Nephroprotective Activity: The hydroalcoholic extract of *O. basilicum* demonstrated notable nephroprotective effects against cisplatin-induced acute renal damage in albino rats. The extract has shown the ability to decrease high levels of blood urea and serum creatinine and restore normal histological changes in the curative treatment. This suggests that the extract has potential as a treatment for acute renal injury induced by nephrotoxins such as cisplatin [70]. The study assessed the efficacy of *O. basilicum* in managing STZ-induced diabetes mellitus in rats and protecting kidney structure against diabetes-induced nephropathy. The findings demonstrated that rats treated with metformin and *O. basilicum* exhibited a notable decrease in blood glucose levels (BGL), an increase in total antioxidant capacity (TAC), and a reduction in creatinine and blood urea nitrogen (BUN) levels. The kidney examination showed a small number of deteriorated renal tubules and decreased levels of desmin and αsmooth muscle actin immune expression. The study determined that *O. basilicum* exhibited biochemical and histological effects that resulted in the reduction of glucose levels and the promotion of antioxidant activity. These findings indicate the need for additional clinical investigations to be conducted [71].

7.8 Anti-Diabetic Activity: The synthesis of silver nanoparticles (AgNps) has been achieved by utilizing aqueous leaf extracts derived from *O. basilicum* and Ocimum sanctum. These nanoparticles show promise in the field of diabetic therapy. The AgNps were quickly formed at room temperature because of the high concentration of the extracts, resulting in a faster reaction rate compared to typical chemical procedures. The silver nanoparticles (AgNps) obtained from O. sanctum and *O. basilicum* demonstrated the ability to decrease the activity of the Bacillus stearothermophilus α-glucosidase enzyme model, suggesting an increased biocatalytic capability. The AgNps produced from biological sources also showed antimicrobial properties against many bacterial species, including Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Bacillus subtilis, and Salmonella species. This suggests that there is a requirement for dual diabetes treatments. The study examined the involvement of glucose transporter-4 (GLUT4) in the therapeutic effects of methanol, hexane, and dichloromethane extracts derived from *O. basilicum* (OB) in treating diabetes. The phytochemical research identified a total of 53 substances, out of which 17 were previously unknown in the field of OB. The cytotoxic and anti-diabetic activities were assessed by utilizing L6-GLUT4myc muscle cells. There were no harmful effects on cells, and the movement of GLUT4 to the outer layer of the cell membrane increased by 3.5 and 7 times following the therapy. The results indicate that the OB extracts may possess anti-diabetic activities, which might be attributed to one or more of the discovered chemicals [72, 73]. The study investigated the in vitro hypoglycemic efficacy of basil aqueous extract. The analysis revealed the presence of reducing sugars, cardiac glycosides, tannins, saponins, glycosides, flavonoids, and steroids in the extract. Estimations were made for the total polyphenol content, flavonoids content, DPPH radical inhibition, and total antioxidant status. The extract exhibited substantial inhibitory effects on rat intestinal sucrase, rat intestinal maltase, and porcine pancreatic α-amylase, with the level of inhibition increasing in proportion to the dosage. The study determined that basil aqueous extract may have good effects in managing diabetes by acting as an antioxidant and perhaps suppressing α-glucosidase and α-amylase activities. The findings indicate that basil aqueous extract could be a promising therapeutic choice for diabetes [74].

8. Toxicity Profile of *O. basilicum*: The acute study results indicate that the LD50 of O. basilicum is greater than 5 mg/kg. No negative effects were reported on the serum parameters of male and female rats in the subchronic investigation. The hematological data revealed a decrease in hematocrit, platelets, and red blood cells in both males and females. There were no irregularities detected in the other metrics. According to the findings of this investigation, the current data indicate that the hematologic system could be affected by the oral toxicity of this plant [75]. The toxicity of a hydrogel-forming polysaccharide derived from the seeds of O. Basilicum was assessed in white albino rats and rabbits. The animals were categorized into four groups, with the treatment group being administered varying quantities of basil seed hydrogel (BSH). Throughout the 14-day study period, the researchers observed and recorded the animals' physical well-being, food and water intake, body weight, and behavioral habits. The hematological and biochemical parameters exhibited similarity to those of the control group, and there were no indications of irritation or allergic reactions upon the application of BSH to the skin or eyes [76].

2. CONCLUSIONS:

This review examines the distinctive pharmacological effects of *O. basilicum,* encompassing its anticonvulsant, anti-hyperlipidemic, anti-inflammatory, antioxidant, antiplatelet, and antithrombotic capabilities. The text also examines possible basil product makers but cautions against their negative impacts. Future research could entail the development of transgenic basil plants to target certain chemical components related to human ailments. The review highlights the significance of safeguarding and utilizing *O. basilicum.*

Conflict of Interest: None

REFERENCES

[1] Shahrajabian MH, Sun W, Cheng Q. Chemical components and pharmacological benefits of Basil (Ocimum

basilicum): A review. International Journal of Food Properties. 2020 Jan 1;23(1):1961-70.

[2] Jirovetz, L.; Buchbauer, G.; Shafi, M. P.; Kaniampady, M. M. Chemotaxonomical Analysis of the Essential Oil Aroma Compounds for Four Different Ocimum Species from Southern India. Eur. Food Res. Technol. 2003, 217 (open in a new window), 120–124. DOI: 10.1007/s00217-003-0708-1.

[3] Calin-Sanchez, A.; Lech, K.; Zumny, A.; Figiel, A.; Carbonell-Barrachina, A. A. Volatile Composition of Sweet Basil Essential Oil (Ocimum Basilicum L.) As Affected by Drying Method. Food Res. Int. 2012, 48(open in a new window), 217–225. DOI: 10.1016/j.foodres.2012.03.015.

[4] Filip, S. Basil (Ocimum Basilicum L.) A Source of Valuable Phytonutrients. Int. J. Clin. Nutr. Diet. 2017, 3(open in a new window), 118. DOI: 10.15344/2456- 8171/2017/118.

[5] Qin L, Li C, Li D, Wang J, Yang L, Qu A, Wu Q. Physiological, metabolic and transcriptional responses of Basil (Ocimum basilicum Linn. var. pilosum (Willd.) Benth.) to heat stress. Agronomy. 2022 Jun 15;12(6):1434.

[6] Pandey AK, Singh P, Tripathi NN. Chemistry and bioactivities of essential oils of some Ocimum species: an overview. Asian Pacific Journal of Tropical Biomedicine. 2014 Sep 1;4(9):682-94.

[7] Geetha A, Pidigam S, Rao PS, Thuraga V, Mohammad SK, Suresh J. Holy Basil (Ocimum sanctum L.): An Important Indian Medicinal and Aromatic Plant: Its Properties, Utilization and Genetic Improvement. InMedicinal and Aromatic Plants of India Vol. 2 2023 Nov 1 (pp. 13-35). Cham: Springer International Publishing.

[8] Chavda H, Patel C, Anand I. Biopharmaceutics classification system. Systematic reviews in pharmacy. 2010;1(1):62.

[9] Lobenberg, R., Amidon, G.L., Modern bioavailability, bioequivalence and biopharmaceutics classification system. New scientific approaches to international regulatory standards. Eur J Pharm Biopharm 2000; 50: 3-12.

[10] Che Q, Luo T, Shi J, He Y, Xu DL. Mechanisms by which traditional Chinese medicines influence the intestinal flora and intestinal barrier. Frontiers in cellular and Infection Microbiology. 2022 Apr 28; 2:863779.

[11] Li Y, Ji S, Xu T, Zhong Y, Xu M, Liu Y, Li M, Fan B, Wang F, Xiao J, Lu B. Chinese yam (Dioscorea): Nutritional value, beneficial effects, and food and pharmaceutical applications. Trends in Food Science & Technology. 2023 Apr 1; 134:29-40.

[12] Sahu A, Nayak G, Bhuyan SK, Bhuyan R, Kar D, Kuanar A. A comprehensive review on nutritive value, phytochemicals, and pharmacological activities of Ocimum basilicum var. thyrsiflora. Journal of Herbmed Pharmacology. 2022 Dec 31;12(1):1-2.

[13] Kumar KP, Bhowmik D, Tripathi KK, Chandira M. Traditional Indian herbal plants tulsi and its medicinal importance. Research Journal of Pharmacognosy and Phytochemistry. 2010;2(2):93-101.

[14] Dailah HG. The ethnomedicinal evidences pertaining to traditional medicinal herbs used in the treatment of respiratory illnesses and disorders in Saudi Arabia: A review. Saudi Journal of Biological Sciences. 2022 Sep 1;29(9):103386.

[15] Spence C. Sweet basil: an increasingly popular culinary herb. International Journal of Gastronomy and Food Science. 2024 Mar 30:100927.

[16] Dube, S.; Upadhyay, P.; Tripathi, S. Antifungal, Physicochemical, and Insect-repelling Activity of the Essential Oil of Ocimumbasilicum. Can. J. Bot. 1989, 2085–2087. DOI: 10.1139/b89-264.

[17] Simon, J. E.; Quinn, J.; Murrary, R. G. Basil: A Source of Essential Oils. In Adv. New Crops; Janick, J., Simon, J. E., Eds.; Timber Press: Portland, OR, 1990; pp 484–489.

[18] Makri, O.; Kintzios, S. Ocimum Sp. (Basil): Botany, Cultivation, Pharmaceutical Properties, and Biotechnology. J. Herbs Spices Med. Plants. 2008, 123–150. DOI: 10.1300/J044v13n03_10.

[19] Hossain, M. A.; Kabir, M.; Salehuddin, S.; Rahman, S. M.; Das, A.; Singha, S. K.; Alam, M. K.; Rahman, A. Antibacterial Properties of Essential Oils and Methanol Extracts of Sweet Basil (Ocimum Basilicum) Occurring in Bangladesh. Pharm. Biol. 2010, 504–511. DOI: 10.3109/13880200903190977.

[20] Singh, R.; Soni, S. K.; Patel, R. P.; Kalra, A. Technology for Improving Essential Oil Yield of Ocimum Basilicum L: (Sweet Basil) by Application of Bionoculant Colonized Seeds under Organic Field Conditions. Ind. Crops Prod. 2013, 335–342. DOI: 10.1016/j.indcrop.2013.01.003.

[21] Saha, S.; Monroe, A.; Day, M. R. Growth, Yield, Plant Quality and Nutrition of Basil (Ocimum Basilicum L.) Under Soilless Agricultural Systems. Ann. Agric. Sci. 2016, 181–186. DOI: 10.1016/j.aoas.2016.10.001.

[22] Aldarkazali, M.; Rihan, H. Z.; Carne, D.; Fuller, M. P. The Growth and Development of Sweet Basil (Ocimum

Basilicum) and Bush Basil (Ocimum Minimum) Grown under Three Light Regimes in a Controlled Environment. Agronomy. 2019, 9, 743.

[23] Zhakipbekov K, Turgumbayeva A, Akhelova S, Bekmuratova K, Blinova O, Utegenova G, Shertaeva K, Sadykov N, Tastambek K, Saginbazarova A, Urazgaliyev K. Antimicrobial and other pharmacological properties of Ocimum basilicum, Lamiaceae. Molecules. 2024 Jan 12;29(2):388.

[24] Jenkins DG, Ricklefs RE. Biogeography and ecology: two views of one world. Philosophical Transactions of the Royal Society B: Biological Sciences. 2011 Aug 27;366(1576):2331-5.

[25] Jetz W, McGeoch MA, Guralnick R, Ferrier S, Beck J, Costello MJ, Fernandez M, Geller GN, Keil P, Merow C, Meyer C. Essential biodiversity variables for mapping and monitoring species populations. Nature ecology & evolution. 2019 Apr;3(4):539-51.

[26] Azizah NS, Irawan B, Kusmoro J, Safriansyah W, Farabi K, Oktavia D, Doni F, Miranti M. Sweet Basil (Ocimum basilicum L.)—A Review of Its Botany, Phytochemistry, Pharmacological Activities, and Biotechnological Development. Plants. 2023 Dec 13;12(24):4148.

[27] Camlica M, Yaldiz G. Basil (Ocimum basilicum L.): Botany, genetic resource, cultivation, conservation, and stress factors. InSustainable agriculture in the era of the OMICs revolution 2023 Jan 1 (pp. 135-163). Cham: Springer International Publishing.

[28] Yaldiz G, Camlica M, Pradhan Y, Ali A. Chemical characterization, biological activities, and some medicinal uses of different sweet basil (Ocimum basilicum L.) genotypes. InNatural Product Experiments in Drug Discovery 2022 Sep 21 (pp. 41-61). New York, NY: Springer US.

[29] Wirtu SF, Mishra AK, Jule LT, Ramaswamy K. Ocimum basilicum and Ocimum americanum: A Systematic Literature Review on Chemical Compositions and Antimicrobial Properties. Natural Product Communications. 2024 Apr;19(4):1934578X241247640.

[30] Ch M, Naz S, Sharif A, Akram M, Saeed M. Biological and pharmacological properties of the sweet basil (Ocimum basilicum). British Journal of Pharmaceutical Research. 2015 Jan 10;7(5):330-9.

[31] Dudai N, Nitzan N, Gonda I. Ocimum basilicum L.(Basil). Medicinal, Aromatic and Stimulant Plants. 2020:377-405.

[32] Poonkodi KA. Chemical composition of essential oil of Ocimum basilicum L. (Basil) and its biological activities-an overview. J. Crit. Rev. 2016;3(3):56-62.

[33] Zahran EM, Abdelmohsen UR, Khalil HE, Desoukey SY, Fouad MA, Kamel MS. Diversity, phytochemical and medicinal potential of the genus Ocimum L.(Lamiaceae). Phytochemistry Reviews. 2020 Aug; 19:907-53.

[34] Dzoyem JP, McGaw LJ, Kuete V, Bakowsky U. Anti-inflammatory and anti-nociceptive activities of African medicinal spices and vegetables. InMedicinal spices and vegetables from Africa 2017 Jan 1 (pp. 239-270). Academic Press.

[35] Li QX, Chang CL. Basil (Ocimum basilicum L.) oils. InEssential oils in food preservation, flavor and safety 2016 Jan 1 (pp. 231-238). Academic Press.

[36] Zheljazkov VD, Callahan A, Cantrell CL. Yield and oil composition of 38 basil (Ocimum basilicum L.) accessions grown in Mississippi. Journal of Agricultural and Food Chemistry. 2008 Jan 9;56(1):241-5.

[37] Boulaares I, Derouiche S, Niemann J. Ocimum basilicum L.: A Systematic Review on Pharmacological Actions and Molecular Docking Studies for Anticancer Properties. Journal of Biochemical Technology. 2024;15(1-2024):12-8.

[38] Özcan M, Chalchat JC. Essential oil composition of Ocimum basilicum L. Czech J. Food Sci. 2002;20(6):223-8.

[39] Dhama K, Sharun K, Gugjoo MB, Tiwari R, Alagawany M, Iqbal Yatoo M, Thakur P, Iqbal HM, Chaicumpa W, Michalak I, Elnesr SS. A comprehensive review on chemical profile and pharmacological activities of Ocimum basilicum. Food Reviews International. 2023 Jan 2;39(1):119-47.

[40] Chalchat JC, Özcan MM. Comparative essential oil composition of flowers, leavesand stems of basil (Ocimum basilicum L.) used as herb. Food Chemistry. 2008 Sep 15;110(2):501-3.

[41] Baritaux O, Richard H, Touche J, Derbesy M. Effects of drying and storage of herbs and spices on the essential oil. Part I. Basil, Ocimum basilicum L. Flavour and Fragrance Journal. 1992 Oct;7(5):267-71.

[42] Kamelnia E, Mohebbati R, Kamelnia R, El-Seedi HR, Boskabady MH. Anti-inflammatory, immunomodulatory and anti-oxidant effects of Ocimum basilicum L. and its main constituents: A review. Iranian Journal of Basic Medical Sciences. 2023;26(6):617.

[43] Eid AM, Jaradat N, Shraim N, Hawash M, Issa L, Shakhsher M, Nawahda N, Hanbali A, Barahmeh N, Taha B, Mousa A. Assessment of anticancer, antimicrobial, antidiabetic, anti- obesity and antioxidant activity of Ocimum basilicum seeds essential oil from Palestine. BMC Complementary Medicine and Therapies. 2023 Jul 4;23(1):221.

[44] Makinen S, Paakkonen K, Hiltunen R, Holm Y. Processing and use of basil in foodstuffs, beverages and in food preparation. Basil: the genus Ocimum. Netherlands: Harwood Academic Publishers. 1999.

[45] Bozyel ME, Altinoz E, Senturan M, Merdamert-Bozyel E, Altuner EM. Ocimum basilicum (Basil): A Medicinal Plant with Proven Ethnomedicinal Uses, Chemical Composition, Bioactivities, and Pharmacological Properties. InEthnomedicinal Plants for Drug Discovery: Current Developments 2024 Sep 1 (pp. 217-236). Singapore: Springer Nature Singapore.

[46] Chukwuma IF, Uchendu NO, Asomadu RO, Ezeorba WF, Ezeorba TP. African and Holy Basil-a review of ethnobotany, phytochemistry, and toxicity of their essential oil: Current trends and prospects for antimicrobial/anti-parasitic pharmacology. Arabian Journal of Chemistry. 2023 Jul 1;16(7):104870.

[47] Tohti I, Tursun M, Umar A, Turddi S, Imin H, Nicholas M. Aqueous extracts of Ocimum basilicum L. (Sweet basil) decrease platelet aggregation induced by ADP and thrombin in vivo arteriovenous shunt thrombosis in vivo. Thrombosis Research. 2006; 118: 733–9.

[48] Younas N, Akram A, Younis A, Hassan A, Akbar AF. Ocimum basilicum, A Comprehensive Exploration of Basil: A Review.

[49] Bora KS, Arora S, Shri R. Role of Ocimum basilicum L. in prevention of ischemia and reperfusion-induced cerebral damage, and motor dysfunctions in mice brain. Journal of ethnopharmacology. 2011 Oct 11;137(3):1360-5.

[50] Sharaf MH, Abdelaziz AM, Kalaba MH, Radwan AA, Hashem AH. Antimicrobial, antioxidant, cytotoxic activities and phytochemical analysis of fungal endophytes isolated from Ocimum basilicum. Applied biochemistry and biotechnology. 2022 Mar 1:1-9.

[51] Faiza Fedoul F, Meddah B, Larouci M, Tir Touil A, Merazi Y, Bekhti N, Piras A, Falconieri D, Cakmak YS. Medicinal Applications, Chemical Compositions, and Biological Effects of Algerian Ocimum basilicum L. var Genovese with the Conversion of Experimental Doses to Humans. Journal of Applied Biotechnology Reports. 2022 Jun 1;9(2):671-83.

[52] Ugbogu OC, Emmanuel O, Agi GO, Ibe C, Ekweogu CN, Ude VC, Uche ME, Nnanna RO, Ugbogu EA. A review on the traditional uses, phytochemistry, and pharmacological activities of clove basil (Ocimum gratissimum L.). Heliyon. 2021 Nov 1;7(11).

[53] Nguyen VT, Nguyen NQ, Thi NQ, Thi CQ, Truc TT, Nghi PT. Studies on chemical, polyphenol content, flavonoid content, and antioxidant activity of sweet basil leaves (Ocimum basilicum L.). InIOP conference series: Materials Science and Engineering 2021 Mar 1 (Vol. 1092, No. 1, p. 012083). IOP Publishing.

[54] Osei Akoto C, Acheampong A, Boakye YD, Naazo AA, Adomah DH. Anti-Inflammatory, Antioxidant, and Anthelmintic Activities of Ocimum basilicum (Sweet Basil) Fruits. Journal of Chemistry. 2020;2020(1):2153534.

[55] Pandey VK, Srivastava S, Dash KK, Singh R, Dar AH, Singh T, Farooqui A, Shaikh AM, Kovacs B. Bioactive properties of clove (Syzygium aromaticum) essential oil nanoemulsion: A comprehensive review. Heliyon. 2024 Jan 1.

[56] Nabrdalik M, Grata K. Antibacterial activity of Ocimum basilicum L. essential oil against Gram- negative bacteria. Postępy Fitoterapii. 2016;17(2).

[57] Sharafati-Chaleshtori R, Rokni N, Rafieian-Kopaei M, Drees F, Salehi E. Antioxidant and antibacterial activity of basil (Ocimum basilicum L.) essential oil in beef burger.

[58] Wani AR, Yadav K, Khursheed A, Rather MA. An updated and comprehensive review of the antiviral potential of essential oils and their chemical constituents with special focus on their mechanism of action against various influenza and coronaviruses. Microbial Pathogenesis. 2021 Mar 1;152: 104620.

[59] Jayasinghe C, Gotoh N, Aoki T, Wada S. Phenolics composition and antioxidant activity of sweet basil (Ocimum basilicum L.). Journal of Agricultural and Food chemistry. 2003 Jul 16;51(15):4442-9.

[60] Kadhim MJ, Sosa AA, Hameed IH. Evaluation of anti-bacterial activity and bioactive chemical analysis of Ocimum basilicum using Fourier transform infrared (FT-IR) and gas chromatography-mass spectrometry (GC-MS) techniques. Journal of pharmacognosy and phytotherapy. 2016 Jun 30;8(6):127-46.

[61] Brandão LB, Santos LL, Martins RL, Rodrigues AB, da Costa AL, Faustino CG, De Almeida S. The potential

effects of species Ocimum basilicum L. on health: A review of the chemical and biological studies. Pharmacognosy reviews. 2022 Jan;16(31):23.

[62] Do TH, Truong HB, Nguyen HC. Optimization of extraction of phenolic compounds from Ocimum basilicum leaves and evaluation of their antioxidant activity. Pharmaceutical Chemistry Journal. 2020 May; 54:162-9.

[63] Javanmardi J, Stushnoff C, Locke E, Vivanco JM. Antioxidant activity and total phenolic content of Iranian Ocimum accessions. Food chemistry. 2003 Dec 1;83(4):547-50.

[64] Irfan N, Bilal A, Ullah MA, Tufail T, Ullah I, Yousaf AA. Evaluating the effect of Basil Seeds (Ocimum Basilicum) On Hyperlipidemia. Pakistan Journal of Biotechnology. 2022 Dec 30;19(02):136-47.

[65] Qamar F, Sana A, Naveed S, Faizi S. Phytochemical characterization, antioxidant activity and antihypertensive evaluation of Ocimum basilicum L. in l-NAME induced hypertensive rats and its correlation analysis. Heliyon. 2023 Apr 1;9(4).

[66] Tikus S, YAP S, KAMISAH Y, AZMI N. Neuroprotective Effects of Ocimum basilicum L. var. thyrsiflora on Scopolamine-Induced Non-Spatial Memory Deficits in Rats. Sains Malaysiana. 2023;52(3):837-50.

[67] Mansouri S, Hosseini M, Alipour F, Beheshti F, Rakhshandeh H, Mohammadipour A, Anaeigoudari A, Jalili-Nik M, Khazdair MR, Jahani A. Neuroprotective effects of the fractions of Ocimum basilicum in seizures induced by pentylenetetrazole in mice. Avicenna Journal of Phytomedicine. 2022 Nov;12(6):614.

[68] Fathiazad F, Matlobi A, Khorrami A, Hamedeyazdan S, Soraya H, Hammami M, Maleki-Dizaji N, Garjani A. Phytochemical screening and evaluation of cardioprotective activity of ethanolic extract of Ocimum basilicum L.(basil) against isoproterenol induced myocardial infarction in rats. DARU Journal of pharmaceutical sciences. 2012 Dec;20:1-0.

[69] Sari DP, Siahaan JM, Andriana H, Purwoko RY, Halim B. Cardioprotective effect of Extract Ethanol Ocimum basilicum on Rat Induced Cisplatin. Research Journal of Pharmacy and Technology. 2023;16(12):5770-4.

[70] Zaveri M, Desai N, Movaliya V. Effect of Ocimum basilicum on cisplatin models of acute renal failure. Adv Res Pharm boil. 2011 Oct; 1:91-100.

[71] Malapermal V, Botha I, Krishna SB, Mbatha JN. Enhancing antidiabetic and antimicrobial performance of Ocimum basilicum, and Ocimum sanctum (L.) using silver nanoparticles. Saudi journal of biological sciences. 2017 Sep 1;24(6):1294-305.

[72] Almalki DA. Renoprotective effect of Ocimum basilicum (basil) against diabetes-induced renal affection in albino rats. Materia Socio-Medica. 2019 Dec;31(4):236.

[73] Kadan S, Saad B, Sasson Y, Zaid H. In vitro evaluation of anti-diabetic activity and cytotoxicity of chemically analysed Ocimum basilicum extracts. Food chemistry. 2016 Apr 1; 196:1066-74.

[74] El-Beshbishy HA, Bahashwan SA. Hypoglycemic effect of basil (Ocimum basilicum) aqueous extract is mediated through inhibition of α-glucosidase and α-amylase activities: An in vitro study. Toxicology and Industrial Health. 2012 Feb;28(1):42-50.

[75] Rasekh HR, Hosseinzadeh L, Mehri S, Kamli-Nejad M, Aslani M, Tanbakoosazan F. Safety assessment of Ocimum basilicum hydroalcoholic extract in wistar rats: acute and subchronic toxicity studies. Iranian journal of basic medical sciences. 2012 Jan;15(1):645.

[76] Lodhi BA, Hussain MA, Ashraf MU, Farid-Ul-Haq M, Haseeb MT, Tabassum T. Acute toxicity of a polysaccharide-based hydrogel from seeds of Ocimum basilicum. Cellulose Chemistry and Technology. 2020 Mar 1;54(3-4):291-9.