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A COMPREHENSIVE INSIGHT INTO *ANETHUM GRAVEOLENS* COMPOSITION AND ITS MEDICINAL POTENCY

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ABSTRACT: *Anethum graveolens* (Dill) leaves and seeds of the plant are mainly used for traditional health treatments like diuretics and stomach disorders. Various observations of *Anethum graveolens* plant oil and other extracts showed antidepressant, analgesic, antiproliferative, antimicrobial, anti-inflammatory, analgesic, antioxidant activity, effects on gastrointestinal system, hyperlipidaemic effects, contraindications and adverse effects, and effects on reproductive system. Further, it is also used to prevent food spoilage or contamination. In the food industry, it is also used for flavoring foods. The important isolated molecules reported are carvone, dihydrocarvone, limonene, cymen, carvacrol, phellandrene, coumarins, flavonoids, phenolic acids, steroids, etc. The various traditional uses of the plant parts are stomachic and diuretic in Ayurvedic practices.

INTRODUCTION: The Apiaceae family is popularly known for its medicinal applications. The *Anethum graveolens* belong to this family and are uniquely known as dill, Sthatpushpi, Sowa, Soya, and Shibth (English, Sanskrit, Hindi, Punjabi, and Arabic). All parts of the plant are traditionally used for different medicinal applications such as antidepressant, analgesic, antiproliferative, antimicrobial, anti-inflammatory, analgesic, antioxidant activity, effects on gastrointestinal system, hyperlipidaemic effects, contraindications and adverse effects, and effects on reproductive system. Further, it is also used to prevent food spoilage or contamination. In the food industry, it is also used for flavoring foods. In Ayurvedic medicine also, *Anethum graveolens* seeds are used for diuretic and stomach-related issues.

The important isolated molecules reported are carvone, dihydrocarvone, limonene, cymen, carvacrol phellandrene, flavonoids, phenolic acids, coumarins, and steroids. Many other molecules were extracted from seeds, like coumarins, steroids, and flavonoids¹⁻² **Fig. 1.**



FIG. 1: ANETHUM GRAVEOLENS PLANT SEED, LEAF AND FLUORESCENCE

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Chemical Constituents: The various chemical constituents that exist in different parts of *Anethum graveolens* were listed below³⁻⁷ **Fig. 2.**

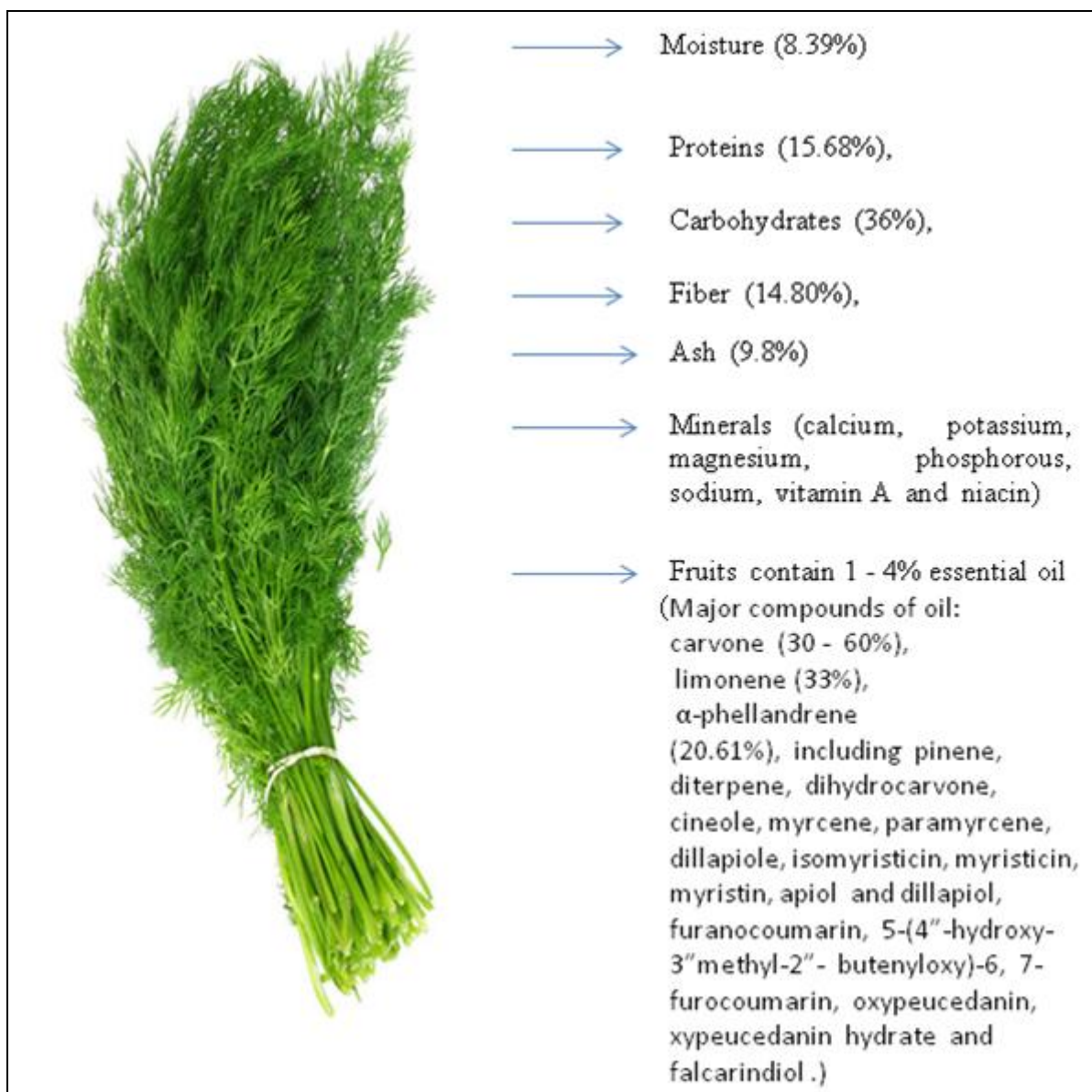


FIG. 2: CHEMICAL CONSTITUENTS OF ANETHUM GRAVEOLENS

Medicinal uses: Traditionally the aerial parts of the plant (*Anethum graveolens*) were practiced for different medicinal applications such as for colic pain, flatulence, diuretic, galactagogue, stimulant, stomachic, intestinal spasms, appetite, bad breath, stimulating milk flow, piles, urinary-related issues, and mental-related issues, and also used as condiments, tea, pickles, salads, sauces, and soups, flavoring in the food industry, perfume industry, detergents, and soaps⁸⁻²³.

Phytoconstituents: The phytoconstituent analysis of *Anethum graveolens* plant observed that terpenoids, glycosides, flavonoid, and tannins are

the major constituents of roots, stems, and leaves²⁴.

Medicinal Significance:

Antidepressant Effect: The aqueous extract was given orally and showed excellent antidepressant potency in comparison with sertraline and tramadol, dose: 250 mg/kg body weight²⁵.

Antiproliferative Effect: Mohammed *et al.* (2018) reported that the *Anethum graveolens* seeds against the HepG2 cell line showed good antiproliferative effects by using the ethyl acetate fraction.

Further, it was observed that stems above parts of the plant are highly effective against uterus cancer²⁶.

Antimicrobial Effects: Chahal *et al.* 2017 observed that the existence of carvone and limonene in various extracts may be responsible for the various activities such as antimicrobial, anti-inflammatory, and antioxidant²⁷.

Hanan Y. Aati. 2022 reported that oil extracted from seeds of *Anethum graveolens* plant exhibited

significant antimicrobial potency against used microbial strains (*Aspergillus parasiticus*, Standard: Itraconazole)²⁸. Further extracted oil from *Anethum graveolens* showed various other biological potencies, such as diuretic²⁹, antidiabetic³⁰, and analgesic³¹ potencies. Acetone extract and extracted oil exhibited good antimicrobial potency against used strains compared with standard. The observed activity due to the presence of coumarin, limonene, and carvone may be responsible³²⁻³⁴ **Fig. 3.**



FIG. 3: SOXHLET EXTRACTION APPARATUS, OIL AND ANTIMICROBIAL POTENCY

Analgesic and Anti-inflammatory Effects: The hydroalcoholic extract exhibited good anti-inflammatory activity in rats. The extracted oil and diclofenac gel exhibited excellent anti-inflammatory activity against rats compared to standard.

The organic extract (ethanol) of the fruits showed good activity compared with standard³⁵⁻³⁷. Racz-Kotilla E *et al.* 1995. Observed that the water extract of the fruit and oil exhibited excellent potency in mice by using the hot plate method³⁸.

Other Observed Effects: *Anethum graveolens* plant seed extract exhibited excellent effect in the gastrointestinal system observed in mice, and it reduces acidity and content of acid. The crude extract of *Anethum graveolens* showed good anti-hypercholesterol and anti-hyperlipidaemic potency. The powder and oil of the plant also showed good hypolipidaemic potency in rats³⁹⁻⁴⁹.

Contraindications and Adverse Effects: Chui A M *et al.* 2000 & Nath D *et al.* 1992 reported that some rarely it exhibits allergic effects, sometimes

swelling in tongue & throat. Further, it is advised to not used during pregnancy time, respectively⁵⁰⁻⁵³.

Effects on Reproductive System: The *Anethum graveolens* plant aqueous and organic (ethanol) extract showed excellent potency observed in female rats. Results showed that both extracts exhibited good effects on reproductive systems⁵⁴⁻⁵⁸.

Antioxidant Activity: The essential oil isolated from the plant *Anethum graveolens* exhibited excellent antioxidant activity compared with standard⁵⁹⁻⁶⁰.

Isolated Molecules of *Anethum graveolens*: Hanan Y. Aati *et al.* (2022) reported the various molecules isolated from the seed, flower, leaves, and stem of *Anethum graveolens* are listed below **Fig. 4.**

From our group, different synthetic, natural product and their biological activities recent updates may be useful for the new researcher in designing new active drugs⁶¹⁻⁸².

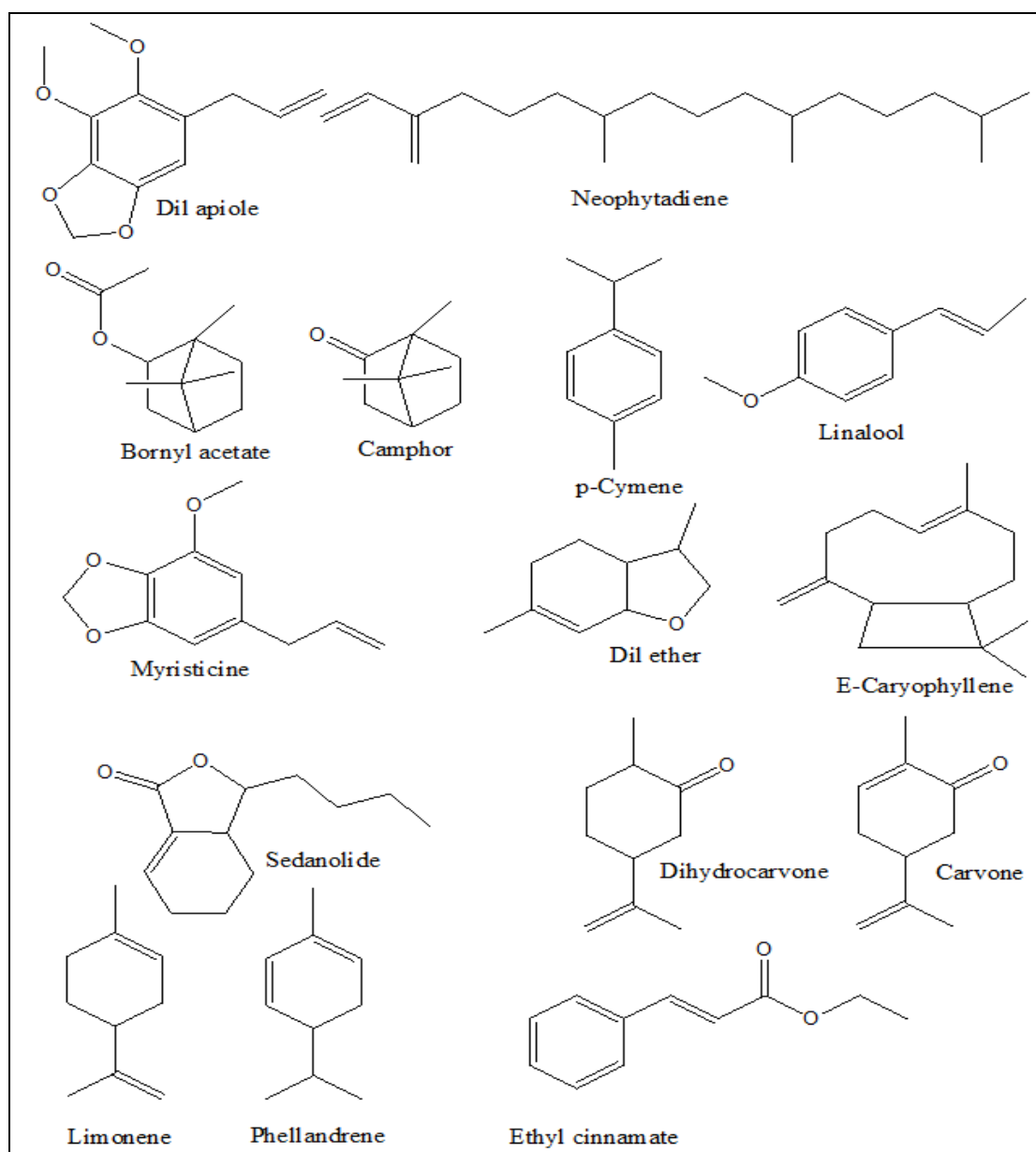


FIG. 4: THE VARIOUS MOLECULES ISOLATED FROM SEED, FLOWER, LEAVES AND STEM OF ANETHUM GRAVEOLENS

CONCLUSION: The leaves and seeds of the *Anethum graveolens* plant are mainly used for traditional health treatments like diuretics and stomach disorders. Various observations reveal that the whole plant has medicinal applications such as antidepressant, analgesic, antiproliferative, antimicrobial, anti-inflammatory, analgesic, antioxidant activity, effects on gastrointestinal system, hyperlipidaemic effects, contraindications and adverse effects, and effects on reproductive system. Further, it is also used to prevent food spoilage or contamination. In the food industry, also used for flavoring foods. The important isolated molecules reported are carvone, dihydrocarvone, limonene, cymen, carvacrol

phellandrene, coumarins, flavonoids, phenolic acids, and steroids.

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REFERENCES:

1. Jana S: "*Anethum graveolens*: An Indian Traditional Medicinal Herb and Spice". *Pharmacognosy Reviews* 2010; 4(8): 179-184.

2. Kaur GJ: Bioactive potential of *Anethum graveolens*, *Foeniculum vulgare* and *Rachyspermum ammi* belonging to the family Umbelliferae - Current status. Journal of Medicinal Plants Research 2010; 4(2): 87-94.
3. Ishikawa TM: Water-soluble constituents of dill. Chem Pharm Bull 2002; 55: 501-507.
4. Khafagy SM: Phytochemical investigation of the fruit of Egyptian *Anethum graveolens*. I. Examination of the volatile oil and isolation of dillapiole. Acta Pharmaceutica Suecica 1968; 5: 155-162.
5. Stavri M: The antimycobacterial constituents of Dill (*Anethum graveolens*). Phytother Res 2005; 19: 938-941.
6. Radulescu V: Chemical composition of the volatile oil from different plant parts of *Anethum graveolens* L. (Umbelliferae). Farmacia 2010; 58: 594-600.
7. Yazdanparast R: Evaluation of the effect of *Anethum graveolens* L. crude extracts on serum lipids and lipoproteins profiles in hypercholesterolaemic rats. DARU 2008; 16(2): 88-94.
8. Pulliah T: Medicinal Plants in India. New Delhi: Regency Publications New Delhi 2002; 1: 55-6.
9. Hornok L: Cultivation and processing of medicinal plants: Academic publications 1992; 338.
10. Sharma R: Agro techniques of medicinal plants. New Delhi: Daya Publishing House 2004; 3-8.
11. Duke JA: Handbooke of Medicinal Herbs. London: CRC Press 2001; 42.
12. Fleming T: PDR for Herbal Medicines. New Jersey: Medical Economics Company 2000; 252.
13. Nair R: Antibacterial activities of some medicinal plants of the western region of India. Turk J Biol 2007; 31: 231-6.
14. Blank I: Evaluation of potent odorants in dill seed and dill herb (*Anethum graveolens* L.) by aroma extract dilution analysis. J Food Sci 1991; 56: 63-7.
15. Huopalathi R: Composition and content of aroma compounds in dill, *Anethum graveolens* L., at three different growth stages. JAF 1983; 31: 331-3.
16. Lawless J: The illustrated encyclopedia of essential oils. Shaftesbury, Dorset: Element 1995; 83.
17. Pulliah T: Medicinal Plants in India. Vol. 1. New Delhi: Regency Publications New Delhi 2002; 55-6.
18. Pulliah T: Medicinal Plants in India. New Delhi: Regency Publications New Delhi 2002; 1: 55-6.
19. Hornok L: Cultivation and processing of medicinal plants: Academic publications 1992; 338.
20. Sharma R: Agrotechniques of medicinal plants. New Delhi: Daya Publishing House 2004; 3-8.
21. Duke JA: Handbooke of Medicinal Herbs. London: CRC Press 2001; 42.
22. Fleming T: PDR for Herbal Medicines. New Jersey: Medical Economics Company 2000; 252.
23. Nair R and Chanda S: Antibacterial activities of some medicinal plants of the western region of India. Turk J Biol 2007; 31: 231-6.
24. Aiyelaagbe OO: Phytochemical screening for active compounds in *Mangifera indica* leaves from Ibadan, Oyo state. Plant Sci Res 2009; 2: 11-3.
25. El Mansouri A: Antioxidant activity of aqueous seed extract of *Anethum graveolens* L. Int J Pharma Sci Res 2016; 7: 1219-1223. doi: 10.1097/MJT.000000000000090.
26. Mohammed: *Anethum graveolens* (dill) – a medicinal herb induces apoptosis and cell cycle arrest in HepG2 cell line. J Ethnopharmacol 2018; 219: 15-22. doi.org/10.1016/j.jep.2018.03.008.
27. Chahal: Chemistry and biological activities of *Anethum graveolens* L. (dill) essential oil: a review. J Pharmacogn Phytochem 2017; 6(2): 295-306. doi.org/10.1016/j.heliyon.2022.e09051.
28. Hanan Y. Aati: Headspace solid-phase microextraction method for extracting volatile constituents from the different parts of Saudi *Anethum graveolens* L. and their antimicrobial activity, Heliyon 2022; 8(3): 09051.
29. Sahib: Effects of *Anethum graveolens* leave powder on lipid profile in hyperlipidemic patients. Spatula DD 2012; 2: 153-158.
30. Goodarzi: The role of *Anethum graveolens* L. (Dill) in the management of diabetes. J Trop Med 2016; 1(11): 1098916.
31. Naseri: The study of anti-inflammatory activity of oil-based dill (*Anethum graveolens* L.) extract used topically in formalin-induced inflammation male rat paw. IJPR 2012; 11(4): 1169-1174.
32. Aati HY: Headspace solid-phase microextraction method for extracting volatile constituents from the different parts of Saudi *Anethum graveolens* L. and their antimicrobial activity. Heliyon 2022; 8(3): 09051. doi: 10.1016/j.heliyon.2022.e09051.
33. Stavri M: The antimycobacterial constituents of Dill (*Anethum graveolens*). Phytother Res 2005; 19: 938-941.
34. Delaquis PJ: Antimicrobial activity of individual and mixed fractions of dill, cilantro, coriander and eucalyptus essential oils. Int J Food Microbiol 2002; 74: 101-109.
35. Rifat-uz-Zaman MS: *In-vitro* antibacterial screening of *Anethum graveolens* L. Fruit, *Cichorium intybus* L. leaf, *Plantago ovata* L. seed husk and *Polygonum viviparum* L. root extracts against *Helicobacter pylori*. Int J Pharmacol 2006; 2: 674-677.
36. Valady A: Anti-inflammatory and analgesic effects of hydroalcoholic extract from the seed of *Anethum graveolens* L. J Med Plants 2010; 9: 130-124.
37. Naseri M: The study of anti-inflammatory activity of oil-based dill (*Anethum graveolens* L.) extract used topically in formalin-induced inflammation male rat paw. Iranian J of Pharmaceutical Research 2012; 11(4): 1169-1174.
38. Okuyama T: Studies on cancer bio-chemoprevention of natural resources. X. Inhibitory effect of spices on TPA-enhanced 3H-choline incorporation in phospholipids of C3H10T1/2 cells and TPA-induced mouse ear edema. Zhonghua Yaoxue Zazhi 1995; 47: 421-430.
39. Racz-Kotilla E: Anti-nociceptive effect of dill (*Anethum graveolens* L.). Fitoterapia 1995; 2: 80-81.
40. Hosseinzadeh H: Effects of *Anethum graveolens* L. seed extracts on experimental gastric irritation models in mice. Pharmacol 2002; 2: 21.
41. Rifat-uz-Zaman: *In-vitro* antibacterial screening of *Anethum graveolens* L. Fruit, *Cichorium intybus* L. leaf, *Plantago ovata* L. seed husk and *Polygonum viviparum* L. root extracts against *Helicobacter pylori*. Int J Pharmacol 2006; 2: 674-677.
42. Shipochliev T: Pharmacological investigation into several essential oils. I. Effect on the smooth musculature. Veterinarno Meditsinski Nauki 1968; 5: 63-69.
43. Dhar ML: Screening of Indian plants for biological activity: part I. Indian J of Exp Biology 1968; 6: 232-247.
44. Yazdanparast R: Improvement of liver antioxidant status in hyper-olesterolaemic rats treated with *A. graveolens* extracts. Pharmacologyonline 2007; 3: 88-94.
45. Yazdanparast R: Antihyperlipidaemic and antihypercholesterolaemic effects of *Anethum graveolens* leaves after the removal of furocoumarins. Cytobios 2001; 105: 185-191.
46. Hajhashemi V: Hypolipidemic activity of *Anethum graveolens* in rats. Phytother Res 2008; 22: 372-375.

47. Yazdanparast R: Evaluation of the effect of *Anethum graveolens* L. crude extracts on serum lipids and lipoproteins profiles in hypercholesterolaemic rats. DARU 2008; 16(2): 88-94.
48. Leung AY: Encyclopedia of common natural ingredients used in food, drugs and cosmetics. New York, John Wiley and Sons 1996.
49. Yazdanparast R: Evaluation of the effect of *Anethum graveolens* L. crude extracts on serum lipids and lipoproteins profiles in hypercholesterolaemic rats. DARU 2008; 16(2): 88-94.
50. African pharmacopoeia Lagos, Organization of African Unity, Scientific Technical and Research Commission 1985; 1.
51. Chui AM: Anaphylaxis to dill. Annals of Allergy, Asthma and Immunology 2000; 84: 559-560.
52. Nath D: Commonly used Indian abortifacient plants with special reference to their teratologic effect in rats. Journal of Ethnopharmacology 1992; 36: 147-154.
53. PDR for herbal medicines, Medical Economic Co. Montvale, New Jersey 1998; 647.
54. Hosseinzadeh H: Effects of *Anethum graveolens* L. Seed extracts on experimental gastric irritation models in mice. Pharmacol 2002; 2: 21.
55. Monsefi M: The effects of *Anethum graveolens* L. on female reproductive system of rats. DARU 2006; 14(3): 131-135.
56. Bertram GZ: Basic and Clinical Pharmacology, 8th ed, New York Mc Graw Hill 2001.
57. Mahdavian M: An investigation of effectiveness of oral dill extracts on postpartum hemorrhage. The Iranian J of Obstetrics, Gynecology and Infertility 2001; 4(8-7): 26-19.
58. Gharibn Aseri MK: Effect of *Anethum graveolens* fruit extract on rat uterus contractions. Iranian J Basic Med Sci 2005; 8(28): 263-270.
59. Committee for Veterinary Medicinal Products, EMEA/MRL "Juniperi Fructus is the dried berry like cones of Junipers communis", 1999.
60. Kazemi M: Phenolic profile, antioxidant capacity and anti-inflammatory activity of *Anethum graveolens* L. essential oil. Nat Prod Res 2015; 29(6): 551-3. doi: 10.1080/14786419.2014.951934.
61. Navneet Kaur: Antioxidant activity of *Anethum graveolens* L. essential oil constituents and their chemical analogues 2019 .doi.org/10.1111/jfbc.12782.
62. Goudgaon NM: Synthesis and Antimicrobial evaluation of 5- iodopyrimidine analogs. Indian J Pharm Sci 2009; 672. doi:10.4103/ 0250-474X.59551.
63. Goudgaon NM: Synthesis of 2-benzylthiopyrimidinyl pyrazole analogs and their antimicrobial activities. Indian J Heterocycl Chem 2009; 18(2009): 349-352.
64. Sharanabasappa B. Patil: Synthesis and antimicrobial activity of novel coumarone analogues. International Journal of Pharmaceutical Sciences and Research. IJPSR 2019; 10(2): 960-965. doi: 10.13040/IJPSR.0975-8232.10(2).960-65.
65. Sharanabasappa B. Patil: Medicinal Significance of Coumarin Analogues: A Review. Int J Curr Pharm Res 2021; 13(4): 1-5. doi:10.22159/ijcpr.2021v13i4.42733.
66. Sharanabasappa B. Patil: Medicinal significance of novel coumarin analogs: Recent Studies. Results in Chemistry 2022; 4: 100313. doi.org/10.1016/j.rechem.2022.100313.
67. Sharanabasappa B. Patil: Synthesis of 3-(Benzo(D)imidazol-2-yl Amino)-2-(3-Aryl-1-Phenyl-1h-Pyrazol-4-yl) Thiazolidin-4-ones. Indian Journal of Heterocyclic chemistry 2010; 19: 307-308.
68. Sharanabasappa B. Patil: Biological and Pharmacological Significance of Benzimidazole Derivatives: A Review. IJPSR 2020; 11(6): 2649-2654.
69. Goudgaon NM: Synthesis and Anti-microbial activity of Thiazole substituted Coumarins. Heterocyclic Communication 2009; 15(5): 343-348, doi.org/10.1515/HC.2009.15.5.343.
70. Sharanabasappa B. Patil: Medicinal Significance of Pyrazole Analogues: A Review. J Pharm Sci & Res 2020; 12(3): 402-404.
71. Naganna M. Goudgaon: Synthesis and antimicrobial activities of novel 5-substituted pyrimidin-2,4,6-triones. J Indian Chem Soc 2010; 87: 743-748.
72. Sharanabasappa B Patil: Biological and Medicinal significance of Pyrimidines: A Review. IJPSR 2018; 9(1): 44-52. doi: 10.13040/IJPSR.0975-8232.9(1).44-52.
73. Goudgaon NM: Anomalous reaction of hydrazine hydrate with 5-arylidene barbiturates: Formation of benzalazines. Indian J Heterocyclic Chemistry 2014; 21(3): 277-282.
74. Sharanabasappa B. Patil: Synthesis of 3-(1-Benzyl-1h-Benzo(d)Imidazol-2-IAmino)-2(3-Aryl-1-Phenyl-1h-Pyrazol-4-yl)Thiazolidin-4-ones and their antimicrobial activities. International Journal of Pharmaceutical Sciences and Research 2010; 1(6): 50-56. doi.org/10.13040/IJPSR.0975-8232.
75. Sharanabasappa B. Patil: Medicinal significance of Nigella sativa and its seeds: recent updates. Int J Pharm Sci & Res 2023; 14(9): 4277-84. doi: 10.13040/IJPSR.0975-8232.
76. Sharanabasappa B. Patil: Recent medicinal approaches of novel pyrimidine analogs: a review, Heliyon, 2023; 9(6): e16773. doi.org/10.1016/j.heliyon.2023.e16773
77. Naganna M. Goudgaon: A Facile route for the Synthesis of Novel 2-benzylthio-4,6-disubstituted Pyrimidine Analogues. Indian J Heterocycl Chem 2012; 21: 221-224.
78. Sharanabasappa B. Patil: Pharmacological Activities of Gongura (Roselle) leaf: Recent Advances. Journal of Natural Remedies 2023; 23(3). doi: 10.18311/jnr/2023/29281.
79. Sunil K: Synthesis, Characterization and Antioxidant activity of Schiff base compounds obtained using green chemistry techniques Pharmaceutical Chemistry Journal 2021; 55(1): 46-53.
80. Shivraj: A combined spectroscopic and TDDFT investigation of the solute-solvent interactions of two coumarin derivatives, Luminescence 2017; 1-11. doi.org/10.1002/bio.3329.
81. Sreeja V: Study of mechanical properties of steel quenched in a blend of biodegradable oils with quench Accelerators. Int J Latest Technol Eng Manag Appl Sci 2016; 5(5): 20-5.
82. Patil SB: Anticancer Potential of Novel Pyrimidine Analogs: Recent Updates. Med & Analy Chem Int J 2024; 8(1): 000189. doi: 10.23880/macij-16000189

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