

Since 2022, scholarly observations, studies, and trials have explored several novel uses and treatments involving basil (*Ocimum basilicum*), with some demonstrating particularly promising results:

#### **Studies with Extraordinary Promise**

##### **• Neuroprotection and Memory Enhancement:**

◦ A study conducted from late 2022 to early 2023 investigated the neuroprotective action of *Ocimum basilicum* L. var. *thrysiflora* leaf extract<sup>1</sup>. It demonstrated that a lower dose (200 mg/kg) of the extract significantly reversed scopolamine-induced non-spatial memory deficits in rats, showing effects similar to the positive control, piracetam<sup>12</sup>. The extract also alleviated the scopolamine-induced increase in mRNA expressions of genes (NA7, M1, nNOS, HTR3A) implicated in cognition and neuroprotection, suggesting its potential to prevent memory impairment by altering gene expression related to memory processes and neuroprotection<sup>12</sup>. This research contributes significantly to the understanding of basil's role in cognitive health<sup>2</sup>.

##### **• Antiviral against Japanese Encephalitis Virus (JEV):**

◦ Research posted in August 2024 (with underlying work from inferred 2022-2023) conducted a comprehensive *in silico* and *in vitro* screening of *Ocimum basilicum* phytoconstituents against the JEV envelope (E) protein<sup>3</sup>. Chicoric acid (CA), rutin, and salvianolic acid A (SA) from basil exhibited outstanding docking scores, outperforming the reference drug mycophenolate<sup>3</sup>. Molecular dynamics simulations showed that CA and rutin maintained strong stability on the protein's binding pocket and had lower free binding energy<sup>3</sup>. An *in vitro* study further supported the antiviral potential of CA and rutin at the early stage of the virus's lifecycle, highlighting their therapeutic potential as novel anti-JEV agents<sup>34</sup>.

##### **• Anti-Toxoplasmosis in Diabetic and Hypertensive Mice:**

◦ A study published in August 2024 assessed the prophylactic and therapeutic effects of basil on toxoplasmosis in diabetic and hypertensive mice<sup>5</sup>. All treated groups showed a statistically significant reduction in median tissue cyst counts compared to infected control groups<sup>5</sup>. Notably, combined therapy with basil and spiramycin resulted in the highest reduction rates (60.5%) of *T. gondii* cysts in both hypertensive and diabetic mice<sup>56</sup>. Histopathological assessments revealed moderate to marked improvement of brain, spleen, and kidney inflammation in all treated groups, especially with the combined therapy<sup>5</sup>. The study highlights basil's promising antiparasitic effect and is noted as the first to assess these effects in hypertensive mice<sup>57</sup>.

##### **• Anti-Oral Cancer (*in vitro*):**

◦ Published in June 2024, a study investigated the impact of ethanolic basil leaf extract on Ca9-22 oral cancer cells<sup>8</sup>. The findings demonstrated that the extract exerts potent cytotoxic effects by inhibiting key regulators of cell proliferation and inflammation<sup>9</sup>. It effectively suppressed the expression of inflammatory mediators such as COX-2, iNOS, TNF- $\alpha$ , IL-1 $\beta$ , and IL-6<sup>10</sup>. This research suggests that basil extract holds promise as a novel therapeutic option against oral cancer and warrants further investigation<sup>11</sup>.

##### **• Anti-Cervical Cancer (HPV-positive) with Immunomodulatory Effects (*in vitro*):**

◦ A 2025 study explored the potential of medicinal plant extracts, including *Ocimum basilicum* (basil), as alternatives to conventional chemotherapy for HPV-positive cervical cancer<sup>12</sup>. The basil extract (OBE) showed cytotoxic effects against cancer cells while having limited impact on normal cells, indicating a favorable safety profile<sup>13</sup>. Importantly, OBE also exhibited immunomodulatory properties, specifically an increase in Interferon-gamma (IFNG) production, which suggests it may support immune responses against cancer<sup>13</sup>.

##### **• Multi-target Efficacy of Basil Seed Essential Oil:**

◦ A 2023 study reported the first comprehensive biological investigations of essential oil extracted from Palestinian *Ocimum basilicum* seeds<sup>1415</sup>. The essential oil demonstrated potent antioxidant, anti- $\alpha$ -glucosidase (antidiabetic), anti-obesity, and antimicrobial effects against gram-positive and gram-negative bacteria, as well as *Candida albicans* fungus<sup>1516</sup>. It also showed potential cytotoxic activity against MCF-7 and Hep3B cancer cell lines<sup>15</sup>. This broad range of activities from the seed essential oil positions it as a significant source of natural agents for various health applications<sup>15</sup>.

##### **• Significant Hypoglycemic and Antioxidant Effects in Rats:**

◦ A study published in 2025 investigated the therapeutic potential of basil (*Ocimum basilicum* L.) aqueous extract on glycemia and oxidative stress in normoglycemic and diabetic rats<sup>17</sup>. The findings revealed a significant hypoglycemic effect in both healthy and diabetic animals, along with a decrease in lipid peroxidation and an increase in the activity of antioxidant enzymes<sup>18</sup>. Furthermore, when combined with monocetoholic acid (MKC), the basil extract demonstrated enhanced hypoglycemic and antioxidant effects, as well as regenerative effects on pancreatic Langerhans islets in alloxan-induced damage, highlighting its synergistic potential for metabolic disorders<sup>19</sup>.

#### **Other Novel Uses and Treatments**

##### **• Antimicrobial for Urinary Tract Infections (UTIs):**

◦ A 2023 study determined the inhibitory activity of ethanolic extracts from *Ocimum basilicum* seeds against bacteria causing urinary tract infections<sup>20</sup>. The ethanolic extract proved significantly effective, more so than the hexane extract, with higher concentrations (100% and 75%) yielding greater inhibition rates against both gram-positive and gram-negative bacterial strains<sup>20</sup>.

##### **• *In silico* Anti-aging Skin Agent:**

◦ Research from 2023 explored the potential of basil's chemical compounds as an *in silico* anti-aging skin agent<sup>21</sup>. Five specific compounds (ladanein, acacetin, luteolin, 5-hydroxy-7,4'-dimethoxyflavone, and genkwanin) were predicted to exhibit anti-aging properties by demonstrating strong binding affinity to Matrix metalloproteinase 1 (MMP1), a protein related to skin aging<sup>2122</sup>.

##### **• Drug Delivery Carrier/Enhancer:**

◦ Basil seed mucilage has been investigated as a novel material for sustained drug release, particularly for wound dressing applications<sup>2324</sup>. Additionally, essential oils from sweet basil have been shown to accelerate transdermal drug delivery<sup>25</sup>.

##### **• Antimicrobial Additive in Dental Material:**

- A 2025 study is evaluating ethanolic basil leaf extract as a potential antibacterial additive to Resin-Modified Glass Ionomer Cement (RMGIC) matrix, aiming to counter secondary caries by inhibiting bacteria like *Streptococcus mutans*<sup>26</sup>....

- **Anxiolytic and Cytotoxic Potential (New Basil Variant):**

- A 2024 study investigated the crude methanol extracts of *Ocimum basilicum* Linn. var. pilosum, a newly studied variant of sweet basil. It identified anxiolytic and cytotoxic potentials in these extracts, although further research is needed to determine the precise mechanisms and effective components<sup>29</sup>....

- **Antimicrobial Activity (Leaf Extracts):**

- A 2025 study is evaluating the antimicrobial activity of *Ocimum basilicum* L. leaf extracts due to the increasing prevalence of drug-resistant bacteria<sup>32</sup>. Initial findings indicate superior inhibition against pathogenic bacteria compared to some conventional medicines, attributing these properties to compounds such as hexadecenoic acid methyl ester and 9,12,15-octadecatrienoic acid<sup>33</sup>.

- **Anti-Hypertensive (in rats):**

- A 2023 study investigated the efficacy of *Ocimum basilicum* leaves methanolic extract as an anti-hypertensive agent in an L-Name induced hypertensive rat model<sup>34</sup>. The research suggests basil as a promising therapeutic candidate for blood pressure control and oxidative stress reduction, as it contains bioactive chemicals that target pathways linked to hypertension<sup>35</sup>.

- **Prebiotic Effect of Basil Seed Gum:**

- Research in 2023 and 2024 indicated that crude oligosaccharides derived from the enzymatic hydrolysis of basil seed gum possess prebiotic properties<sup>36</sup>. While hydrated basil seeds showed mixed results in directly stimulating *Lactobacillus paracasei* growth, further research with other probiotics is suggested to fully understand its prebiotic potential<sup>37</sup>.

- **Anti-Colitis Effects (in rats):**

- A 2023 study examined the anti-inflammatory, antioxidant, and anti-colitis effects of a combination of *Acacia arabica* and *Ocimum basilicum* in an animal model of ulcerative colitis<sup>38</sup>. The plant combination significantly reduced macroscopic factors of colitis (e.g., wound area), enzymatic factors, and proinflammatory cytokines, while increasing antioxidants and anti-inflammatory cytokines<sup>39</sup>.

- **Topical Ointment for Dermatological Conditions:**

- Published in 2024, a study developed and evaluated a herbal ointment formulated from sweet basil leaves for topical use on common dermatological conditions<sup>40</sup>. The ointment demonstrated antibacterial activity against acne-causing bacterial strains, reduced redness and inflammation, and exhibited wound healing properties for minor cuts and eczema<sup>41</sup><sup>42</sup>.

- **Antitumoral Activity (in vivo mice model):**

- A 2024 study aimed to evaluate the antitumoral activity of an ethanol extract from *Ocimum basilicum* L. aerial parts against Ehrlich experimental tumor (EET) in mice<sup>43</sup><sup>44</sup>. This research sought to provide *in vivo* evidence for basil's previously noted *in vitro* antiproliferative and pro-apoptotic effects<sup>45</sup>.

- **Wound Healing (topical):**

- A 2025 study investigated the healing effects of topically applied *Ocimum basilicum* L. extract on excisional wounds in mice with dysfunctional inflammatory processes<sup>46</sup>. The basil extract demonstrated a reduction in leukocyte infiltrate and promoted a more normal architecture and higher density of collagen fibers in the newly deposited matrix, supporting its role in influencing wound healing stages<sup>47</sup><sup>48</sup>.

- **Nutritional Support (via Amino Acids):**

- A 2025 analysis of *Ocimum basilicum* highlighted the presence of significant amino acids such as Aspartic acid, Glutamic acid, Arginine, and Cysteine<sup>49</sup>. These compounds support basil's nutritional value, contribute to antioxidant defense through glutathione synthesis, and aid in cardiovascular health and immune modulation via nitric oxide production, reinforcing the plant's traditional medicinal uses<sup>49</sup>.

- **Alleviation of Insulin Resistance and Hepatic Steatosis (in mice):**

- A 2024 experimental work evaluated the effects of consuming a fiber-rich fraction of partially defatted basil seeds on insulin resistance and hepatic steatosis induced by a high-fat diet in mice. Researchers hypothesized that the dietary fiber and polyunsaturated fatty acids in the basil seeds would ameliorate these conditions through synergistic mechanisms<sup>50</sup>.

- **Antibacterial via Nanoparticle Synthesis:**

- A 2023 study identified *Ocimum basilicum* as a promising candidate for developing green synthesized silver nanoparticles (AgNPs) that exhibit significant antibacterial activity against *Escherichia coli*<sup>51</sup>. This application suggests the potential use of basil extracts in creating antibacterial agents for medical devices and antimicrobial systems<sup>51</sup>.

- **Anti-Solar Activity (Leaf Extract Cream):**

- A 2024 study conducted a comparative test on the anti-solar activity of a cream formulated from basil leaf extract<sup>52</sup>.

- **Anti-Diabetic Effects (via Insulin Signaling):**

- Research initiated in 2024 aims to investigate how extracts from *Ocimum basilicum* (among other plants) affect the expression of key insulin signaling proteins, including IRS1, AS160, PTEN, and GLUT4<sup>53</sup><sup>54</sup>. This study's goal is to develop new plant-based treatment approaches that enhance insulin sensitivity and glucose metabolism<sup>54</sup>.

- **Mosquito Larvicidal:**

- A 2023 study revealed that essential oils extracted from *Ocimum basilicum* (along with *Ocimum americanum*) exhibited reasonable mosquito larvicidal potentials, in addition to their antioxidant and antibacterial properties<sup>55</sup>.