IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A REVIEW ON ANTIOXIDANT PROPERTIES OF SUNFLOWER OIL, TURMERIC OIL AND TULSI OIL

1Sabir Ali, 2Neelam Painuly

1Student, 2Associate Professor

1Dev Bhoomi Institute of Pharmacy & Research, Dehradun,

2School of Pharmacy & Research, DBUU, Dehradun

Abstract

Antioxidants are pivotal in safeguarding cellular health by counteracting oxidative stress, a process implicated in various diseases and aging. This paper delves into the significance of antioxidants in combatting free radicals, unstable molecules that inflict cellular damage and inflammation. Natural sources of antioxidants, including fruits, vegetables, nuts, seeds, and spices, are highlighted, emphasizing the benefits of a diverse and balanced diet for optimal health. The study focuses on three natural oils—turmeric oil, tulsi oil, and sunflower oil—evaluating their antioxidant properties and potential skincare applications. Turmeric oil, derived from the rhizomatous herb Curcuma longa, showcases significant antioxidant effects attributed to compounds like curcumin. Various assays demonstrate its efficacy, positioning it as a promising natural antioxidant for both food and cosmeceutical products. Sunflower oil, rich in vitamin E and phenolic compounds, exhibits notable antioxidant properties, making it a valuable component in combating oxidative stress and promoting health. Additionally, tulsi oil, extracted from *Ocimum sanctum*, showcases diverse medicinal attributes, including antioxidant, antibacterial, and antiviral effects. Its flavonoid-rich composition highlights its potential as a radioprotector and skincare ingredient. It discusses general methods for detecting antioxidant properties, such as DPPH and ABTS assays, providing insights into the evaluation of antioxidant efficacy. The study underscores the potential of turmeric, tulsi, and sunflower oils as natural antioxidants for skincare formulations, aligning with consumer preferences for safe and effective products derived from natural sources. Further research and formulation advancements are warranted to optimize their efficacy and stability in skincare applications, offering innovative solutions for maintaining healthy and radiant skin.

Keywords: Antioxidant, inflammation, Free Radicals, Degeneration, Collagen

1. Introduction

Antioxidants play a vital role in maintaining the body's health by combating oxidative stress, a process linked to various diseases and aging. They operate by counteracting free radicals, which are unstable molecules capable of harming cells and DNA.[1] By donating electrons to stabilize free radicals, antioxidants help prevent cellular damage and inflammation, thereby reducing the risk of chronic conditions like cancer, cardiovascular disease, and neurodegenerative disorders.

Antioxidants are naturally abundant in a variety of fruits such as berries, citrus fruits, and grapes, along with vegetables like spinach, kale, and broccoli. Other rich sources include nuts, seeds, green tea, and dark chocolate. Additionally, spices such as turmeric and cinnamon contain potent antioxidant compounds [2].

Regular consumption of antioxidant-rich foods is associated with improved immune function, enhanced skin health, and better overall well-being. While supplements are available, obtaining antioxidants through a diverse and balanced diet remains the optimal approach for harnessing their health benefits [2]. Incorporating a variety of colourful fruits and vegetables into meals ensures a broad spectrum of antioxidants, supporting optimal health and longevity.

An antioxidant opposes the actions of free radicals, unstable oxygen molecules that harm skin cells and contribute to wrinkles, thereby preventing cellular damage.

Facial creams contribute to restoring a youthful complexion by lightening skin tone, providing moisture, and forming a protective layer. These creams effectively remove skin flaws, ensuring smoothness and maintaining moisture [5]. These products can be classified as ayurvedic, herbal, or allopathic, and may include one or more medicinal ingredients that are dissolved or dispersed within an appropriate base. It shields underlying structures from injury and microbial invasion. Antioxidants have a vital function in neutralizing free radicals, which are unstable oxygen molecules accountable for the deterioration of skin cells and the formation of wrinkles, thereby preventing cellular impairment. These antioxidants also inhibit inflammation, preventing collagen depletion, offering Prevention from photodamage and skin cancer. Moreover, they may mitigate the effects of trace elements, smoke, and pollution. Some skin experts suggest that directly applying antioxidant cream to the skin could potentially delay the degeneration process[5].

The main aim was to study the antioxidant activity of Turmeric oil, Tulsi oil and sunflower oil. Today natural medicine or ayurvedic medicine which provide good health with no side effect or least of side effects. Natural product also attracts a large of population and help to development of economic of country.

Report said appropriately 49% of the population tries to use natural product in USA. Turmeric oil, Tulsi oil and sunflower Oil properties and other multiple medicinal and pharmacological activity and easily available in any geographical area. Many allopathic systems of medicine are available in market which has numerous side effect and adverse effect[6].

1.2 Turmeric oil:

Turmeric (Curcuma longa), a rhizomatous herb from the Zingiberaceae family, in South Asian and Middle Eastern countries. Turmeric serves as a spice, coloring agent, and traditional medicine with significant presence in Indian households. The active ingredient known as curcumin, present in turmeric, demonstrates a range of health advantages, encompassing anti-arthritic, anti-cancer, antioxidant, anti-malarial, and anti-inflammatory properties. The chemical composition analysis highlights the prevalence of monoterpenoids as major constituents in turmeric

flowers, with sesquiterpenoids such as β-sesqui phellandrene, Zingiberene, β-caryophyllene, β-bisabolene, ar-curcumene and €-β-farnesene in significant amounts in the flower oil[3].

A variety of techniques, such as the DPPH radical scavenging assay, Ferric Reducing Antioxidant Powder assay, β-carotene-linoleate model system, Phospholipid Peroxidation method, and phosphor molybdenum method, are utilized to assess the antioxidant characteristics of turmeric oil. Factors affecting antioxidant activity include the assay type, standard antioxidant, extraction methods, and chemical profile. Fresh turmeric rhizome oil showed stronger antioxidant effects than dried rhizome oil due to a notable loss of certain components. Different studies compared turmeric oil antioxidant activities, with variations observed among Curcuma species. The turmeric oil, especially from waste oleoresin shows promise as a natural antioxidant suitable for use in both food and cosmeceutical products.

- **Composition of turmeric oil**

The presence of volatile oils in different parts of the turmeric plant, like its flowers and leaves, offers a significant reservoir of compounds such as 1,8-cineole, terpinolene, and p-cymene. In flower oil, key constituents include p-cymene, terpinolene, and 1,8-cineole. Leaf oil concentrations feature terpinolene, α-phellandrene, p-cymene and 1,8-cineole. Turmeric roots primarily contain oxygenated compounds and sesquiterpenoids, with the primary components found in the root are ar-turmerone, ar-curcumene, and dehydrocurcumene. The rhizome consists of ar-turmerone, α-turmerone, β-turmerone, and ar-curcumene[7].

The leaves of Curcuma longa and C. aromatica were subjected to hydro-distillation, resulting in a volatile oil yield of (*Curcuma longa*) and (*Curcuma aromatica*). *Curcuma longa* showed high levels of α-phellandrene, C8-aldehyde, 1,8-cineole, p-cymene, α- and β-pinene, whereas C. aromatica displayed elevated levels of 1,8-cineole, linalool, α- and β-pinene, C8-aldehyde, and caryophyllene. This diversity led to increased applications in pharmaceutical, cosmeceutical, and surfactant industries[6]. The chemical makeup of turmeric oil extracted from Indian species, such as *Curcuma longa*, *Curcuma aromatica*, *Curcuma amada*, and *Curcuma zedoaria*, displayed diverse compounds. *Curcuma aromatica* leaf oil was abundant in 1,8-cineole and p-cymene, while *Curcuma zedoaria* had α-phellandrene, 1,8-cineole and p-cymene. *Curcuma amada* oil was dominated by myrcene. Turmeric oil exhibited high concentrations of ar-turmerone, ar-turemerol, β-bisabolene, and zingiberene.[4]

1.3 Sun flower oil:

Antioxidant properties of sunflower oil are primarily implied to its high content of vitamin E, specifically gamma-tocopherol. Vitamin E functions as a powerful antioxidant, safeguarding cells against oxidative harm induced by free radicals. Additionally, sunflower oil contains other antioxidants such as phenolic compounds, which contribute to its overall antioxidant capacity. Regular consumption of sunflower oil may play a role in promoting health by combating oxidative stress in the body[5][16].

Recent studies have emphasized the existence of aromatic constituents like flavonoids, alkaloids, and tannins, in various components of the sunflower plant, including both seeds and leaves[13].

Studies by Ali (2014) and Juniarti & Herdiana (2003) emphasize the antioxidant activities found in ethanolic extracts of sunflower seeds and all components of the plant possess characteristics such as anti-tumor and antimicrobial properties. Additionally, Dwivedi and Sharma (2015) note antioxidant, antidiarrheal, and antihistamine activities in ethanol extracts of sunflower leaves[8].

Phenolic compounds, particularly flavonoids, are highlighted as significant contributors to the antioxidant capabilities of sunflower plants. Alfian & Susanti (2012) and Sahala, Aldo (2012) suggested that these compounds, known as biologically active substances, play a role in blocking and healing degenerative diseases. The study conducted by Sahala and Aldo (2012) particularly highlights the connection between potent antioxidants and the

presence of total phenolic compounds. It suggests that increased phenol and flavonoid levels are associated with enhanced antioxidant properties.[6]

1.4 Tulsi oil:

Tulsi, a traditional plant of the Indian subcontinent, China, and Southeast Asia, is renowned for its medicinal attributes and its incorporation into traditional customs and beliefs. It suggests that Tulsi, known as the "Mother Medicine of Nature," has health benefits backed by ancient Ayurvedic wisdom. The plant is believed to be a tonic for the body, mind, and spirit, addressing various health issues[14]. Tulsi is said to offer a lifestyle approach to health, influencing factors like voice, intelligence, stamina, and emotional well-being. Additionally numerous ailments that Tulsi is believed to alleviate, both internally and externally, showcasing its versatile medicinal value.[8]

Ocimum sanctum, commonly known as Tulasi or holy basil, found in India and revered by Hindus. It outlines its traditional uses in Ayurveda and Siddha for treating various ailments. Medicinal properties, such as hypotensive, hypoglycemic, antibacterial, antiviral, antioxidant, and insecticidal effects[15].

The antioxidant properties of flavonoids from *Ocimum sanctum* (holy basil). It suggests a potential link between these antioxidants and radiation protection. Studies indicate that the aqueous extract of Ocimum leaves effectively inhibits OH radical-induced deoxyribose degeneration, outperforming DMSO[9]. The plant's compounds, including oleanic acid, ursolic acid, and flavonoids like orientin and vicenin, demonstrate strong antioxidant activity, protecting against lipid peroxidation and free radical damage. Combining Ocimum extract with a synthetic radioprotector enhances OH radical inhibition[10].

The morphology underscores the role of flavonoids in scavenging free radicals, proposing their potential as radioprotectors with implications for in vivo antioxidant activity.[7]

The plant is an upright, branched shrub, reaching a mature height of 30-60 cm. Its simple, aromatic leaves are opposite, elliptical, and have dentate margins, measuring up to 5cm in length. The flowers form elongated racemes in tight whorls, displaying a purple hue. The radish-yellow seeds and small fruits are characteristic. Cultivation occurs after the rainy season, with harvest occurring a few months later [14][17].

The chemical composition of Tulsi is intricate, with varying nutrient and biologically active compound proportions among strains and even within the same field. Factors like growth, harvest, processing, and storage conditions impact constituent quantities[18]. The traditional use of the whole herb leverages synergistic interactions among diverse phytochemicals, making it challenging to replicate Tulsi's effects with isolated compounds or extracts. Modern science has yet to achieve standardization due to the inherent botanical and biochemical complexity of Tulsi[12].

- **Therapeutic properties:**

Certain varieties of basil are a nutrient powerhouse, offering vital elements such as Vitamin A, Vitamin C, calcium, and phosphorus. Vitamin A, found in basil, contributes to improved eyesight. Additionally, basil boasts antioxidants like beta carotene, which play a role in preventing cellular damage[15]. "Tulsi," commonly known as holy basil, is renowned globally for its healing properties. Its leaves aid in enhancing memory, treating fever and common cold, and serving as an anti-stress agent[19]. Moreover, holy basil contributes to blood purification, reducing the risk of heart attacks and lowering cholesterol levels. Basil leaves also demonstrate effectiveness in treating mouth ulcers and oral infections.[9]

2. General Methods Used to Detect Antioxidant Properties:-

- **Assay by DPPH (2,2-Diphenyl-1-picrylhydrazyl):**
  - DPPH is a stable free radical. When antioxidants interact with DPPH, it causes a shift in colour from purple to yellow, a change that can be quantified using spectrophotometry.
  - The degree of discoloration indicates the scavenging ability of the antioxidant.[20]

- **Assay by ABTS (2,2'-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid)):**
  - The ABTS assay assesses the capacity of antioxidants to counteract the ABTS radical cation.
  - The reduction in absorbance at a particular wavelength indicates the presence of antioxidant activity.

- **FRAP Assay:**
  - The FRAP assay evaluates how effectively antioxidants can convert ferric (Fe^3+) ions into ferrous (Fe^2+) ions.
  - The minimization is evaluated through alterations in absorbance or fluorescence levels.

- **ORAC Assay:**
  - The ORAC assay quantifies the ability of antioxidants to scavenge peroxyl radicals induced by AAPH (2,2'-Azobis(2-amidinopropane) dihydrochloride) or equivalent to oxidizing agents.
  - The decrease in fluorescence or absorbance indicates the antioxidant capacity.

- **TPC Assay:**
  - This method measures the total phenolic content in a sample, as phenolics often exhibit antioxidant properties.
  - Folin-Ciocalteu reagent is commonly used to determine TPC, followed by spectrophotometric measurement[17].

Conclusion

The study underscores the potential of Turmeric oil, Tulsi oil, and Sunflower oil as natural antioxidants for skincare applications. Their diverse phytoconstituent and antioxidant activities make them promising candidates for formulating antioxidant creams aimed at protecting the skin from oxidative stress, preventing premature aging, and promoting overall skin health. Harnessing the benefits of these natural extracts aligns with the growing consumer demand for safe and effective skincare products derived from natural sources. More advancement in research and formulation are warranted to optimize their efficacy and stability in skincare formulations. The combine effect of tulsi, turmeric and sunflower oil having greater efficacy and potency then marketed available allopathy preparation. Thereby offering innovative solution for maintaining healthy and radiant skin.

REFERENCE

1. Deshmane Subhash, kawarkhe Priya R., Biyani Kailash R. "Formulation and evaluation of antioxidant cream containing raspberry fruit and grape seeds extract" Research journal of Topical and Cosmetic Sciences 7(2):73 DOI:10.5958/2321-5844.2016.00012.1(2016).
2. Rowe Raymond C, Sheskey Paul J, Quinn Marian E "Handbook of Pharmaceutical Excipients" published by (PhP) pharmaceutical press 1 Lambeth High Street, London SE17JN, UK, pg no- 64, 155, 288- 289.
3. Kumar Ajay, Singh Monika, Prem Pratap Singh, Kumar Singh Sandee, Raj Pratima, Pandey D. Kapil "Antioxidant Efficacy and Curcumin content of Turmeric (CURCUMA LONGA L.) Flower" International Journal of Pharmaceutical Research ISSN-0975-7066(2016).
4. Kumar Ajay, Singh Monika, Prem Pratap Singh, Kumar Singh Sandee, Raj Pratima, Pandey D. Kapil "Antioxidant Efficacy and Curcumin content of Turmeric (*CURCUMA LONGA* L.) Flower" International Journal of Pharmaceutical Research ISSN-0975-7066(2016).
5. Tonolo Fedrica, Coletta Sara, Fiorese Fedrico, Grinzato Alessandro "Sunflower seed-derived bioactive peptides show antioxidant and anti-inflammatory activity: From *in silico* simulation to the animal model" Food Chemistry https://doi.org/10.1016/j.foodchem.2023.138124 (2023)
6. Salwa, Muhtadi "Antioxidant Activity of Sunflower (Helianthus Annuus l.) Ethanolic Extract with DPPH Method and Determination of Total Phenolic and Flavonoid Levels" Journal of Neutraceuticals and Herbal Medicine ISSN 2615-4609(2021).
7. Uma Devi P, "Radioprotective, anticarcinogenic and antioxidant properties of the Indian holy basil, Ocimum sanctum (Tulasi)" Indian Journal of Experimental Biology ISSN 185-190(2001)
8. Saravanan R, Ramamurthy Jaiganesh "Evaluation of Antioxidant Activity of ocimum Sanctum-An In Vitro Study" International journal of Dentistry and oral science (IJDOS) ISSN: 2377-8075(2021)
9. Rindhe Pooja Sudhakar "In Vitro Antioxidant Activity of Ocimum Sanctum Linn" International Journal of technical Research and Application ISSN: 2320-8163(2016).
10. Priyadarshini Harichandan SS, Kumar Sahu Ajay, Gautam Sakshi and Nemani Rahul (2019), Phytochemical Screening and antioxidant activity of methanolic extract of *Ocimum sanctum Linn.* Leaves DOI: 10.30574/gscbps.2019.8.2.0131(2019).
11. K. Sayuti and R. Yenrina, "Natural and Synthetic Antioxidants". Andalas University Press. Matter. 10-14. (2015).
12. Karamac Magdalena, Kosinska Agnieszka, Estrella Isabel "Antioxidant activity of phenolic compounds identified in sunflower seeds" DOI 10.1007/s00217-012-1751-6 (2012)

13. Ahmed F. Adel, Attia A.K. Fatma, Liu Zhenhua "Antioxidant Activity and Phenolic content of essential oils and extract of sweet basil *(Ocimum basilicum L.)* plants" Food Science and Human Wellness (2019) 299-305.
14. Hussain Abdullah ijaz, Hanif Muhammad asif, Ali Muhammad adnan, Kamal Ghulam Mustafa "Chemical composition and biological activities of essential oil and extracts from Ocimum sanctum" International journal of food properties ISSN 1094-2912 (2016)
15. Mulyati Hetti Sri, Yanti Rini, Supriyadi Supriyadi "Physiochemical Properties and Antioxidant Activity of essential oil from Fresh, Wilted, and Dried Leaves of Holy Basil (*Ocimum tenuiflorum* L.) Planted in Yogyarta" agriTECH, 43 (3) 2023, 218-229 ISSN 0216-0455 (2022)
16. Yamani Hanaa A. Pang Edwin C. Mantri Nitin "Antimicrobial Activity of Tulsi (*Ocimum tenuiflorum*) of Tulsi and their Major Constituents against Three Species of Bacteria" Frontiers in Microbiology doi: 10.3389/fmicb.2016.00681 (2016).
17. Khan Naeem Hasan, Xia Zhi Kang, Perveen Nabila "Physiochemical analysis, antibacterial and antioxidant activity determination of *Ocimum sanctum*" Pharmacy and Pharmacology International Journals Volume 6 Issue 6 – 2018;6(6):490-497 (2018)
18. Shi Linghong, Zhao Wanrong Yang Zihong, Vigasini Subbiah "Extraction and characterization of phenolic compounds and their potential antioxidant activities" Environmental Science and Pollution Research https://doi.org/10.1007/s11356-022-23337-6 (2022)
19. De'Nobili Maria, D. Bernhardt Dana C. Basanta Maria F. "Sunflower (Helianthus annus L.) Seed Hull Waste: Composition, Antioxidant Activity, and Filler Performance in Pectin-Based Film Composites" frontiers in Nutrition volume 8 doi: 10.3389/fnut.2021.777214 (2021)
20. Lung, JKS and Destiani, D. (2018). Antioxidant Activity Test of Vitamins A, C, E with DPPH Method. Farmaka, 15(1), 53–62.