DOI: https://doi.org/10.54393/df.v2i01.42

DIET FACTOR
Journal of Nutritional & Food Sciences
https://www.dietfactor.com.pk/index.php/df
Volume 2, Issue 1(Jan-Jun 2021)

Review Article

Pharmacological Potential of Sweet Violet (Gul-e-Banafsha) on Human Body

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Keywords: *Viola odorata*, Ethnomedicine, Anti-Oxidant, Anti-Fungal, Dyslipidemia, Pharmacological Potential

How to Cite:
Ashfaq, M., Arshad, M., & Rizwan, B. (2021). Pharmacological Potential of Sweet Violet (Banafsha) on Human Body. *DIET FACTOR (Journal of Nutritional &Amp; Food Sciences)*, *2*(01). https://doi.org/10.54393/df.v2i01.42

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Article History
Received: 18th May 2021
Accepted: 23rd June 2021
Published: 30th June 2021

ABSTRACT

Sweet Violet commonly known as Gul-e-Bafasha or Banafsha is an herb widely used as ethnomedicine in dried form in Pakistan for the treatment of various disease or symptoms. *Viola odorata* had phytochemical constituents (flavonoids, flavanols, ascorbic acid, phenolics) and antioxidative properties. **Objective:** To emphasize *Viola odorat*'s (Gul-e-Banafsha) therapeutic benefits on human health. **Methods:** This review literature is assessed from the previous data from google scholar, Medline and PubMed. After going through the published articles, researches and literature, initially 104 articles were included, after excluding irrelevant and repeated articles, 37-full text articles and abstract were relevant and found eligible for the study. **Conclusions:** Sweet Voila had acclaimed the therapeutic effect on human health as antiseptic, antifungal, anti-inflammatory, antioxidant, antilipidemic and hepatoprotective activity due to the presences of phenolics, flavonoids, tannins, saponins, alkaloids and coumarins.

INTRODUCTION

Sweet violet scientifically known as *Viola odorata* has been widely used as ethnomedicine in rural areas of Pakistan for the treatment of skin infection, insomnia, inflammation, cough, fever and CVD with very low adverse side effects. Its leaves are used as antiseptic used as ointment and its flower has a laxative effect. It is rich in flavonoids like widely known for its therapeutic properties. Due to its phenolic property, it had antioxidant and antimicrobial property, presences of flavonoids had an anti-cancerous effect, it had tannins which reduces the mutagenic activity and it had saponins which reduces blood glucose levels in body. Presence of saponins in Sweet violet lead to the anticarcinogens, melanogenesis, neuroprotective, antimicrobial and anti-inflammatory property. Presence of Isoquinoline alkaloids constituent led to expectorant and antipyretic effect. *Viola odorata* is used as phytopharmaceuticals and nutraceutical agent. Plants are the most extravagant sources of phytochemicals, cancer preventing agents (antioxidant) and flavonoids that shields human body from harm brought by extraneous factors and free radicals which increases the oxidative stress in the body [1].

The modern pharmacological treatment is exorbitant and related with different symptoms that brought about patient resistance. Because of limited researches in the field of ethnomedicine there is a need to investigate further as alternate treatment with the help of home-grown medicinal plant which is less financially burdened with minimal aftermath side effects [2]. Plants produce a good amount of complex synthetic phytochemicals that we can use as medicine to "control and fix" illness [3]. The identification of medicinal plants has a vital role in improving the health of the public and verdant treatments are considered as alternate and positive approach toward the improvement of human health [4]. Medicative herbs had been are studied particularly because of their antioxidant properties and great effect as antimicrobial agent. According to the report of WHO (World Health

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Organization), 70-80% of the world plants are used as medicine and traditional medicine for the treatment of disease and symptoms [5]. There are eight thousand plant species in Iran, 1800 of which have medicinal properties. Banafsha, *or Viola* odorata *(Violaceae),* is a perennial stoloniferous plant native to Europe and Asia, as well as North America and Australia [6].

Plant metabolites had a great beneficial affect for people and had a vital role in identifying the effective plans that can be used as drugs [7]. The herb had an outstanding property for its pharmaceutical significance in Ayurvedic and Unani therapeutic framework [8]. The herb sweet violet is often used to treat pertussis. Anti-inflammation, diuretic, laxative agent, anti-pyretic, diaphoretic, emollient, and expectorant are some of the other uses for it. Salicylic acid, which is used to create aspirin, was found in *Viola odorata*, making it particularly helpful and for treatment of headaches, migraines, and sleeplessness [9]. The alkaloid violin is produced by the subterranean sections of plants, such as roots, and is used as an expectorant. As anti-inflammatory, diaphoretic, diuretic, expectorant, hypertensive, and laxative substances, all sections of the plant have medicinal promise. Aromatherapy uses essential oils extracted from the flowers and leaves of *V. odorata* [10].

The essential oil content of *Viola odorata* L. leaves grown naturally in Kashan, central Iran, was extracted by using hydro distillation–solvent extraction process and evaluated by GC–MS. In the examination 25 different compounds were verified to be present in *Viola odorata*, accounting for 92.7% of the essential oil, with the 2 main components butyl-2-ethylhexylphthalate (30.10 percent) and 5,6,7,7a-tetrahydro-4,4,7a-trimethyl-2(4H)-benzofuranone (12.03 percent). For the first time, the antioxidant and antibacterial activities of oils, methanol, and chloroform extracts were studied [11]. The odorant principle, blue coloring pigment, and sugar are all present in the *Viola odorata* flower. Viola-quercetin may be found throughout the plant. This therapeutic plant has also provided salicylic acid (natural aspirin) [12]. Sweet violet leaves, roots, blooms, and seeds contain an emetocathartic alkaloid. Sweet violet extracts, including n-hexane, butanol, methanol, and aqueous extracts, include saponins, flavonoids, alkaloids, glycosides, and tannins, according to phytochemical studies [13]. These metabolites are responsible for a wide range of pharmacological effects in various formulations. In a 50 percent methanol extract of sweet violet flower, tiny levels of melatonin 1.1±0.1 ng/g were discovered using the enzyme-linked immunosorbent assay (ELIZA) method of measurement. The essential oil in flower of *Viola odorata* yielded high levels of monoterpenes and sesquiterpenes [14].

Monoterpenes and Sesquiterpene obtained from flowers [10]
Linalool
Benzyl alcohol
Phenyl butanone
α-cadinol, globulol
Viridiflorol
Monoterpenes and Sesquiterpene obtained from leaves [15]
Butyl-2-ethylhexyl phthalate
5,6,7,7a-tetrahydro-4,4,7a-trimethyl-2(4H) benzofuranone

Table 1. Monoterpenes and Sesquiterpene obtained from flowers and leaves

Traditional medicine considered sweet violet to be an effective therapy for palpitations and tachycardia [16]. *Viola odorata* is used to cure a variety of ailments, including the common cold, persistent cough, dyspnea, asthma, shortness of breath, sepsis, respiratory distress, and respiratory diseases [17]. In terms of digestive qualities, sweet violet is a laxative herb that has been used to treat constipation and gastritis [18]. In pediatrics, sweet violet leaf extract is beneficial for the treatment of rectal prolapse [19]. Common violet has traditionally been used to cure eczema, urticaria, allergic dermatitis and many other skin conditions. This plant's oil has been used as a hair and nail tonic in the past [20].

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In TPM, the plant and its formulations have been used to treat a variety of inflammations. The use of common violet as a treatment for carcinogenic or malignant tumors, as well as a hard and persistent inflammation, has been documented. Antihypertensive effect of *Viola odorata*: From several previous studies it had been studied that *Viola odorata* had an antihypertensive effect in body. The data gathered indicated that the alkaloids present in sweet violet had a vasodilating effect which helps in lowering the blood pressure [21].

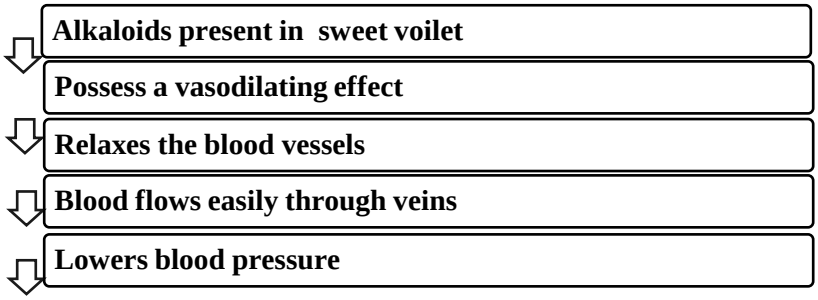

Figure 1: blood pressure-lowering effect of sweet violet

The anti-inflammatory efficacy of an ethanolic extracts of *Viola odorata* was equivalent to that of hydrocortisone. The anti-inflammatory activities of a crude extracts of *Viola odorata* to hydrocortisone were studied [22]. Before and after inducing lung injury by nebulizing formalin, the region of bleeding, thickness of the alveolar epithelium, disruption of the alveolar septa and
alteration of the epithelial layer of the bronchial tubes were microscopically examined in rats treated with extract. In helping the restoration of formalin-induced lung damage, prophylactic treatment of *Viola odorata* extract inhibited lung damage to a degree equivalent to that of hydrocortisone. In the treatment of lung inflammation, the *Viola odorata* extract was discovered to be more effective and safer alternative to corticosteroids [18]. The plant of *Viola odorata* had shown a significant reduction in blood sugar level [23]. The anti-dyslipidemic impact of the leaves of *Viola odorata* extract in anaesthetized rats revealed a reduction in total cholesterol, triglyceride, and LDL-C, as well as an increase in HDL-C, which might be related to lipid production and absorption inhibition as well as antioxidant activities. The anti-dyslipidemic effect of sweet violet may be due to inhibition of synthesis and absorption of lipids and antioxidative property of *Viola odorata*. Therefore, the previous studies had proved a pharmacological property of medicine plant sweet violet [24].

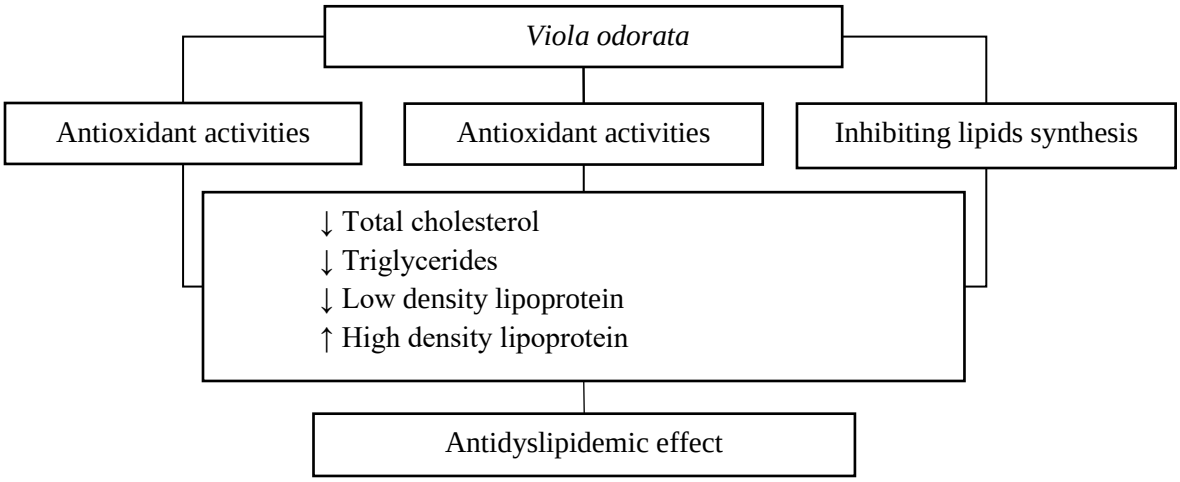

Figure 2: Effect of sweet violet on dyslipidemia

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Antioxidant and diuretic properties have been found for the plant. The antioxidant effectiveness of all extracts is well shown by the results acquired in in vitro models [25]. Flowers of the *Viola odorata* had being extracted with water, filtered, and lyophilized for three days. It was discovered that the extracted material had antioxidant capacity by scavenging 2,2-diphenyl-1-picrylhydrazyl radicals during extraction [26]. The findings demonstrate that the cyclotides from *Viola odorata* had substantial antibacterial action against gram-negative bacteria that cause plant pathogens. Cyo2 is a cyclotide derived from *Viola odorata* that has anti-gram-negative bacteria action [27]. Previous researches had shown that cyclotides from gul-e-Banafsha possessed high antibacterial action against gram-negative bacteria that cause plant pathogens [28]. The plant's entire aerial section, including the flowers, leaves, and stems, has anticancer effects. The plant has been described as a pharmacological instrument, as well as a potential anticancer agent. Cycloviolacin is a plant-derived cyclotide that has anticancer effects and causes cell death by membrane permeabilization [29]. Through signaling pathways, several cyclotides exert anti-migratory, anti-metastatic, anti-proliferation, and apoptotic actions on cancer cells at low doses. In contrast to drug-resistant breast cancer, a number of cyclotides with considerable cytotoxicity have been demonstrated to have chemo-sensitizing action [30].

The entire ethereal parts of *Viola odorata* such as flowers, leaves, and stems are utilized to prevent diseases such as cancer. Previous studies reported the pharmacological property of *Viola odorata* plays a possible role as antitumor and anti-cancerous agent [31]. A cyclotide from *Viola odorota* Cycloviolacin O2 (cyo2), possesses anticancer properties and induces cell death by permeabilizing the cell membrane. Researchers discovered numerous cyclotides with high cytotoxicity, which they believe might be a promising chemo-sensitizing agent for drug-resistant breast cancer [32].The laxative activity of n-hexane, butanolic, methanolic, and aqueous extracts at dose levels of 200 and 400 mg/kg body weight was tested using the metabolic cage technique, and it was observed that the butanolic and methanolic extracts at a dose level of 200 mg/kg generated good results. At 400 mg/kg, the aqueous extract has a good laxative effect [33]. The diuretic activity of n-hexane, butanolic, methanolic, and aqueous extracts was studied at doses of 200 mg/kg and 400mg/kg body mass, and it was discovered that all extracts at a dose of 400 mg/kg demonstrated excellent results during the first 5 hours, with n-hexane and Methanolic extracts showing the best results after 24 hours. In preliminary tests, flavonoids were detected in a variety of extracts. Flavonoid glycosides have previously been found to have diuretic effects [34].

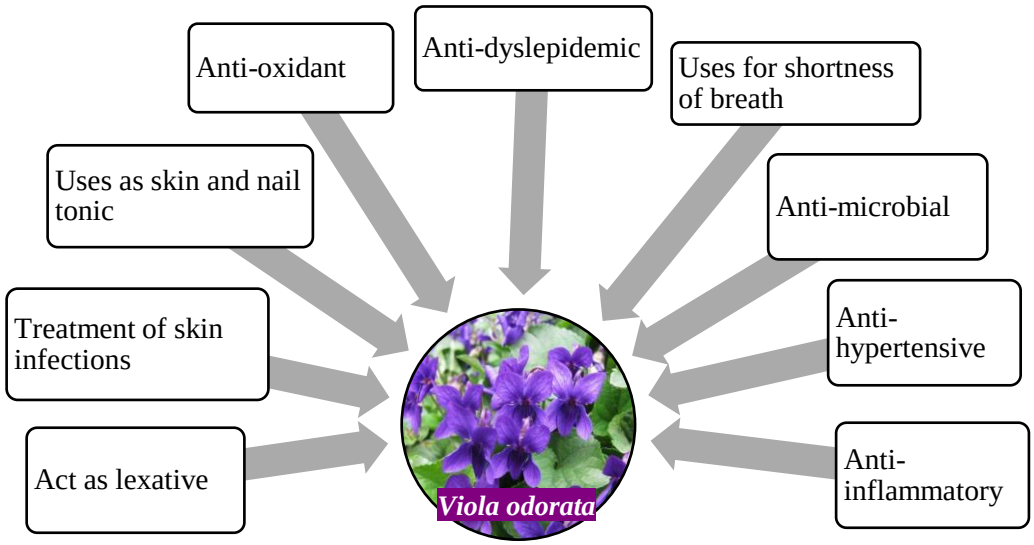

Figure 3: Pharmacological effects of *Viola odorata* (Gul-e-Banafsha)

DOI: https://doi.org/10.54393/df.v2i01.42

Viola odorata is a safe, well-tolerated, and efficient herbal treatment for people with recurrent insomnia.Mashhad University of Medical Sciences' Iranian Traditional Medicine Clinic, Mashhad, Iran, In Fifty individuals with persistent insomnia, an experimental pretest-posttest study of cycloviolacin present in *Viola odorata* efficacy was conducted. Patients were administered an intranasal droplet of *Viola odorata* every evening before sleeping for one month, two drops totaling 66 mg of *viola odorata* in each nostril [14]. All patients were requested to complete an Insomnia Severity Index (ISI) questionnaire before the start of the study and after one month of treatment. Patients who had received *Viola odorata* drop for a month had considerably bettersleep and ISI scores than those who had not had *Viola odorata* drop (P 0.05). A few individuals suffered VO-related problems, the majority of which were minor, and no substantial adverse events were documented [14].

CONCLUSION

In this critical review article, it had been concluded that *Viola odorata* contains various phytoconstituents and different phytocomponents that are responsible for pharmacological property of *Viola odorata*. Sweet Voila had acclaimed the therapeutic effect on human health as antiseptic, antifungal, anti-inflammatory, antioxidant, antilipidemic and hepatoprotective activity due to the presences of phenolics, flavonoids, tannins, saponins, alkaloids and coumarins. Further studies are required in field of medicinal plants to investigate the mechanism of medicinal plan on human health.

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