

A Brief Review on: *Mirabilis Jalapa* Plant

Akshay Sanjay Argade*¹, Dr. Himanshu Solanki*²

*Student Department of Pharmaceutics SSR College of Pharmacy, Silvassa, India

*Assistant professor, Department of Pharmaceutics SSR College of Pharmacy Silvassa, India

Date Of Submission: 15-05-2021

Date Of Acceptance: 26-05-2021

ABSTRACT: Plants have been used for medicine and health purposes for thousands of years. There are approximately 250000 higher plant species on the planet. It is known that 35000 to 70000 organisms have been used for medicinal purposes in certain cultures at one time or another. *Mirabilis Jalapa* L. (Nyctaginaceae) is a perennial bushy herb with a height of around 1 metre that is propagated by seeds or root tubers and is commonly known as "four o'clock." Flowers are born in perfusion, opening late in the afternoon and closing early the next morning. Ethno botanically, the herb's roots were used for cathartic, emetic, and purgative properties, while leaves were used to cure inflammations *Mirabilis jalapa* L., for example, has long been used as a purgative and emetic to treat a variety of gastrointestinal problems, including dysentery, diarrhoea, muscle discomfort, and abdominal colic. Apart from that, it has antiviral, antimicrobial, antimalarial, anthelmintic, antioxidant, and cytotoxic properties. The goal of this study is to include a literature review of its Traditional use, morphology, phytochemical, and pharmacological properties.

KEYWORDS: *Mirabilis Jalapa* L., Phytochemical constituents, Pharmacology.

I. INTRODUCTION

Mirabilis is a genus of herb many a times shrubs, primarily an American native and known as "four o'clock" (The wealth of India, Raw materials, 1998). About 25 species of genus have been reported (Kirtikar and Basu, 1991) out of which *Mirabilis Himalaya* is indigenous to Himalayas. [1]

Plants are a major source of chemical compounds for the commercial market. Proteins, flavonoids, alkaloids, steroid & triterpenes were found to be abundant in the extracts from this herb, according to phytochemical analysis. Other compounds identified from extracts of this plant include alanine, alpha-amyrins, arabinose, beta-amyrins, campesterol, daucosterol, and dopamine. [6,10,11]

It is used in herbal medicine to treat diarrhoea, dysentery, conjunctivitis, edoema, inflammation, swellings, muscular discomfort, and abdominal colics by people from various nations, and its extract has antibacterial, antiviral, and antifungal properties. Antispasmodic and antinociceptive effects have also been discovered. [1,2,3,5]

Table 1. Taxonomic classification.

- * **Kingdom:** Plantae
- * **Sub kingdom:** Tracheobionta
- * **Division:** Angiosperms
- * **Class:** Dicotyledons
- * **Subclass:** Caryophyllidae
- * **Order:** Caryophyllales
- * **Family:** Nyctaginaceae
- * **Genus:** *Mirabilis*
- * **Species:** *Jalapa*

Morphology:

Mirabilis jalapa Linn. grows to a height of 0.6 to 0.9 m and a width of the same. The leaves are needle-like, and the Flowers bloom late in the day., one of the most well-known names. Three-dimensional flowers with five green bracelets that circle the perigonium; normally yellowish; red, ivory, or multicoloured; opens in the late at night .Five gamophyllous perigonium lobes, five stamens with uneven fiberanectariferous disc circles the superior ovary, which is unilocular and has a single ovule. Aleathery, ribbed, continuous perianth surrounds the fruit achene. The best flowers have a single-ovule ovary with 5 or 6 stamens, and they are self-compatible. Tuberous stems are prominent. and the fruits are coriaceous obovoid. Since maturing, the round, wrinkled, and black single-seeded fruits are spherical, wrinkled, and black., after starting out greenish-yellow. [1,2,3,4,8]

Pollen morphology: -

M. jalapa pollen grains have a rounded, oblate rounded form, with a diameter of 125-140 metres and a thickness of 10-15 metres. Exineembellish is a form of decoration that is used

to enhance the appearance Spinulose; 0.5 to 1 meters high spinules, uniformly spaced aperture style pantoporare with numbers ranging from 18 to 20; spinules 0.5 to 1 m high, spinules 0.5 to 1 m high, spinules 0.5 to 1 m high, spinules 0.5 opening diameters range from 6.3 to 10 mm, of a Spinulose and granule-filled ornate membrane on the margin This genus has a lot of pollen dimorphism (white-pink, mixed, and mixed radiated), with the rare appearance of giant, dimorphic anomalous, deformed, and joint grains. But for giant pollen

grains, all of these unusual pollen grains are sterile.[1,2,3,4,8]

VERNACULAR NAMES: -

Maharashtra: Gulbakshi **Andhra Pradesh:** Chandrakantha; **Assamese:** Godhuligopal; **Bengal -** Krishnakeli, Sarpamani; **English -** Four o' clock, Marvel of Peru **Bengali:** Sandhyamaloti; **Brazil:** Marvel; China: Xizaohua; **Guajarati-** Gubbaji; **Hindi -** Gul-abbas; **Kannada -** Sanjamalligie, Chandramalligie; **Malayalam -** Antmalari; **Indonesia:** Bungapukulempat; [1,2,3,5,8]

***PARTS OF THE MIRABILIS JALAPA PLANT: -**



**WHOLE PLANT
OF MIRABILIS
JALAPA**



**LEAVES OF
MIRABILIS**



**FLOWER OF
MIRABILIS**



**SEEDS OF MIRABILIS
 JALAPA**



**ROOT OF MIRABILIS
 JALAPA**

Table No: 2
The Morphological characteristics of Mirabilis Jalapa Linn.

Parts of plant	Morphological features
Flowers	Tubular, clustering, funnel-shaped, single or double, fragrant, Usually purple and violet, yellow or pink, three flowers in a cluster of five green bracteols across the perianth, normally yellow, crimson, white, or variegated, and open in the evening.
Leaves	Opposite, ovate to sub-cordate, 3.5-7.5 cm wide, 5-10 cm long, uneven.
Seeds	Olive, brown or black in colour
Roots	Perennial tuberous stems, thickened at nodes, stem swollen

Traditional uses:

It has been widely used in nearly all folklore therapies around the world to cure a range of conditions. Indigenous Mexicans have been reported to use various decoctions and preparations of *M. jalapa* Linn for the treatment of dysentery. It is widely used for muscular discomfort, diarrhoea and stomach colic by people from other countries. Leaves have a sharp flavour, mature and are commonly used in inflammation. Leaves are often used to bind to boils, phlegmons and whitlows as a ripening agent. Roots are known as aphrodisiacs and are ideal for syphilitic sores. In China, traditional Chinese medicines and ethnic drugs have been used to cure diabetes, constipation, genitourinary system diseases and accidents. Apart from medicinal purposes, *Mirabilis Jalapa* Linn. Flowers are steeped in water to produce a crimson dye that is used in China to stain cakes and jellies

made from seaweed. In Japan, powdered seeds are used to make cosmetics. [1,2,4,8,18]

Toxicity:

Children have been poisoned after eating *M. Jalapa* Linn's roots, seeds, or fruits. [2]

Phytochemical Constituents:

According to phytochemical research, the roots of *M. Jalapa* Linn. include alkaloids, glycosides, sugars, and phytosterols. Trigonelline is one of the components of *M. jalapa* Linn. Origin, according to literature. In rats and humans, trigonelline has been shown to lower blood glucose levels. The plant contains flavonoids, tannic acid, and phenolic, according to preliminary phytochemical analysis. Beta-sitosterol, stigmasterol, ursolic acid, oleanolic acid, and brassica sterol are all found in the aerial portions of plants. [1,2,3,13]

Physicochemical characteristics of *Mirabilis Jalapa*:

Mirabilis jalapa seeds contain 98.73 percent total carbohydrates, 0.8 percent protein, 0.23 percent lipids, 0.24 percent ash, and 8.60 percent amylose, according to chemical review. *Mirabilis Jalapa*'s thermal analysis revealed normal starch activity during mass loss (TG/DTG) and gelatinisation (DSC), with gelatinization temperatures and enthalpies of

about 80 °C and 5.62 J g⁻¹, respectively. Because of their high adsorption potential, the tiny (around 1µm) diameter of *M. Jalapa* starch may be suitable for use in the cosmetic and pharmaceutical industries. It can also be used in the food industry to encase flavours, essences, and other ingredients. [2,3,7,8,12]

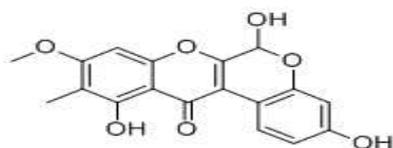
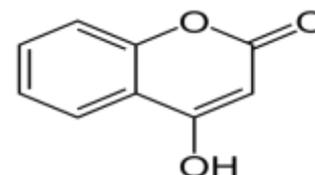
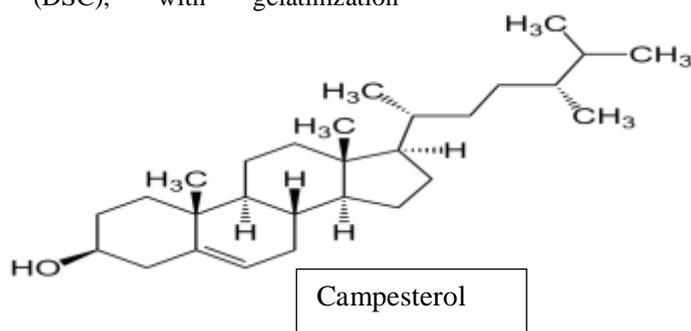


Figure 1: Chemical structure of some active constituents of *mirabilis jalapa* linn.

Details of the biological activities of *Mirabilis Jalapa* Linn.

1. Anti-inflammatory activity:

The property of a drug or medication that prevents inflammation or swelling is known as anti-inflammatory or anti-inflammatory. Extracts of the *Mirabilis Jalapa* leaves in alcoholic, aqueous, and ether form. L was tested for anti-inflammatory activity in Wistar albino rats using carrageenan-induced paw edema, formalin-induced paw edema, and cotton pellets-induced granuloma models. [7,9,14]

2. Antifungal activity:

In a laboratory analysis, plant extracts from various parts of several higher plants were shown to have antifungal properties. The extraction of three novel phenolic compounds was achieved using an organic extract of the cell mass from

manipulated plant cell culture of *Mirabilisjalapa*.L. Two phenolic compounds were discovered to have antifungal properties against *Candida albicans*. Antifungal activities of *Mirabilis Jalapa* L Methanol extracts against *Aspergillus Niger*, *Candida albicans*, and *Daedalea* were investigated. *M. Jalapa* has a possible inhibitory effect on *Aspergillus Niger* and *Daedaleaflavida*, but no effect on *Candida albicans*, according to the findings. [2,3,11,16]

3. Antioxidant activity:

The ability of a medicine to contract smooth muscles is known as antispasmodic action. The Methanolic extract of *Mirabilis jalapa*. L has inhibitory effects on gut smooth muscle contractility while also stimulating rabbit aortic muscle contraction in a concentration-dependent manner. Several compounds in the methanolic

extract of *Mirabilis Jalapa* flowers display spasmolytic action, including some rutioides (at least boeravinone F), sitosterol-d-glucoside, and ursolic acid. However, further research is required to determine the mode of action of *Mirabilis Jalapa* extract. [2,3,16]

4. Antimalarial activity:

Malaria is treated with herbal extracts from a variety of species. The tentative antimalarial behaviour of 46 separate species collected in the Moseteneethnia, which lives in the Andean Piedmont of Bolivia, was investigated, one of which was *Mirabilis Jalapa*. *Mirabilis jalapa* was found to be ineffective against malaria. [2,3,12]

5. Antiviral activity:

Antiviral compounds obtained from a variety of sources animal, fruit, and human viruses are also susceptible to the plant. Furocoumarins, terpenoids, alkaloids, linens, and other distinct proteins are all classified as furocoumarins, according to Zipf. The ribosome-inactivating proteins, which are commonly expressed in higher plants, are one of the plant-derived antiviral proteins.

Different scientists have observed *Mirabilis Jalapa*'s antiviral function. Infectivity assays and the nucleic acid spot hybridization test all showed that root extracts of *M. Jalapa* sprayed on test plants 24 hours before the virus or viroid inoculation blocked infection by nearly 100 percent. *Mirabilis jalapa* extracts reduced Tobacco mosaic virus replication by 50% when applied to the inoculum, according to Noronha et al. *Mirabilis jalapa* is well known for having an antiviral enzyme that works by inactivating ribosomes. It's not shocking that it only hosts a few pathogens due to its antiviral function. *M. jalapa* is the only known host of *Phytophthora mirabilis*. Just leaves and other aboveground plant sections are infected by *Phytophthora mirabilis*. *Parietaria mottle virus* and *Mirabilis mosaic virus* (family *Caulimoviridae*) are known to infect *M. Jalapa*. [2,3,15,18]

6. Antimicrobial activity:

The red flowered *Mirabilisjalapa* plant has high antibacterial ability & is active against a wide variety of microorganisms, according to the report. *Mirabilis Jalapa* is the plant with the least antibacterial activity; none of its four aqueous ethanolic extracts display antibacterial activity. *Mirabilis Jalapa* alcoholic extract has potential as a reservoir of active compounds against pathogenic enteric bacteria. It is now possible to isolate active

components in their purest form, which could be ideal candidates for the development of plant-based antibacterial drugs. It was discovered that neither the aqueous nor the non-methanolic extracts of *Mirabilis Jalapa* could inhibit either of the studied bacterial strains. The antibacterial efficacy of *Mirabilis Jalapa* stem extracts has been investigated. The methanolic stem extract of *Mirabilis Jalapa* had potent antibacterial activity against Gram positive bacteria, whereas the dichloromethane stem extract had potent antibacterial activity against Gram negative bacteria, though not as much as the normal medication. The medicinal efficacy of *Mirabilis jalapa* in folklore medicine is attributed to the existence of secondary metabolites such as alkaloids, saponins, tannins, and flavonoids, both of which have antimicrobial activity. The antimicrobial activity of *Mirabilis jalapa* methanolic extract should be investigated further as a natural broad spectrum antibacterial agent. The antibacterial activity of an ethanolic extract of *Mirabilis Jalapa*'s red colour flower was tested in vitro against *Staphylococcus aureus*, *Salmonella typhi*, *Escherichia coli*, *Bacillus subtilis*, *Vibrio cholera*, *Pseudomonas aeruginosa* and *Serratia marcescens*. *Bacillus subtilis* was inhibited the most by the ethanolic extract of the flower (47 percent), followed by *Staphylococcus aureus*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Vibrio cholerae*, and *Serratia marcescens*. Furthermore, qualitative phytochemical screening of the ethanolic extract revealed a high tannin content as well as moderate levels of alkaloids, carbohydrates, saponin and terpenes. The presence of a high volume of tannins in this plant's extract suggested that it may have antibacterial and antiviral effects. *Mirabilis Jalapa* flower extracts, both water and methanolic, were found to be ineffective in inhibiting all of the studied bacterial strains. Nair et al found similar findings with *Mirabilis Jalapa* stem and leaf extracts in their analysis. The ethanolic extract can contain the majority of the bioactive compounds responsible for bactericidal action. Antimicrobial peptides and other bioactive substances that are not soluble in water can be the cause of bacterial insensitivity to aqueous extract. Finally, owing to *Xanthomonas campestris*, it is believed to be contaminated with a bacterial blight. [2,3,7,11,13]

7. Anti-tubercular drugs induced hepatotoxicity:

Mirabilis Jalapa has been studied for its anti-tubercular properties. Mirabilis Jalapa Linn leaves have been shown to guard against hepatotoxicity caused by anti-tubercular medications. [2,3,5]

II. ACKNOWLEDGEMENT:

I would like to express my gratitude to my key boss, Dr. Himanshu Solanki (Assistant Professor of Pharmaceutics, SSR College of Pharmacy, Silvassa), who led and inspired me during this Review article and provided me with a deep inside look into the research, as well as assisting me in finalising my review article. I wish to acknowledge the assistance offered by the support staff in the department of SSR college of pharmacy, Silvassa.

III. CONCLUSION:

Mirabilis Jalapa Linn is a historically commonly used medicinal herb, according to my study. It is a common weed that is grown for both medicinal and decorative uses. It demonstrates a broad variety of biological activities that aid in the use of this plant's medicinal benefits. However, there is still a lot of need for further study of this species, and scientists need to pay attention to it if it is to reach its full potential.

REFERENCE:

- [1]. Manjit Singh, Akash, Sanjiv Kumar Mittal and Ajudhia Nath Kalia (2012) Mirabilis Jalapa A Review, International Journal of Pharmaceutical, Medical and Applied Sciences Volume 1 Issue 3, 22-43. (https://www.researchgate.net/publication/261570303_Mirabilis_Jalapa-A_Review)
- [2]. Rozina Rozina (2016) Pharmacological and biological activities of Mirabilis Jalapa L. International Journal of Pharmacological Research, Volume 6 issue 05, 160-168. (<https://doi.org/10.7439/ijpr.v6i5.2725>)
- [3]. Soumya Saha, Jhuma Deb and NilipKanti Deb (2020) Review on Mirabilis jalapa L. (Nyctaginaceae), A medicinal plant, International journal of herbal Medicine 8(2), 14-18 [7-4-71-436.pdf](https://www.florajournal.com/archives/2020/vol8issue2/PartA/7-4-71-436.pdf) ([florajournal.com](https://www.florajournal.com/archives/2020/vol8issue2/PartA/7-4-71-436.pdf))<https://www.florajournal.com/archives/2020/vol8issue2/PartA/7-4-71-436.pdf>
- [4]. Ramesh B. Nidvani, Mahalakshmi AM (2014) AN Ethnopharmacological Review of four o' clock flower plant ,Journal of biological and scientific opinion, volume 2 Issue 6, 344-348.<http://dx.doi.org/10.7897/2321-6328.02679>
- [5]. BasiniJyothi , S. Mohanalakshami, Anitha k(2013) Protective effect of mirabilis jalpa leaves on Anti-tubercular drugs induced hepatotoxicity ,Asian Journal of Pharmaceutical and Clinical Research , Vol 6, issue 3, 221-224.<https://innovareacademics.in/journals/index.php/ajpcr/article/view/312>
- [6]. Mas'udEneji Sadiq (2016) Isolation and Spectroscopic Identification of Some Constituents of Bioactive Fractions of Aerial Parts of Mirabilis Jalapa, IOSR Journal of Applied Chemistry Volume 9, Issue 4 , PP <http://www.iosrjournals.org/iosr-jac/papers/vol9-issue4/Version-2/B0904021217.pdf>
- [7]. Mas'udEneji Sadiq, HajiaMairoInuwa, Mujeeb-ur-Rehman and Khalid Ahmad (2016) In silico physico-chemical evaluation anti-inflammatory and mcf-7 breast cancer cell line growth inhibition effects of trolline isolated from Mirabilis jalapa, Journal of Medicinal Plants Research, Vol. 10(42), pp. 783-789. <https://doi.org/10.5897/JMPR2016.6187>.
- [8]. Farjana Islam Liya, Mt. Farzana Yasim (2021), Mirabilis Jalapa: A review of Ethno and pharmacological activities, Advancement in Medicinal Plant Research VOI.9(1), pp. 1-10.<http://www.netjournals.org/pdf/AMPR/2021/1/20-041.pdf>
- [9]. Deepthi D. Kodical, Jennifer Fernandes and Deepthi K (2020) In vitro Anti-inflammatory activity of mirabilis jalapa flower extract, Plant Archives Volume 20 No. 2, pp. 8997-9000. [http://www.plantarchives.org/20-2/8997-9000%20\(6462\).pdf](http://www.plantarchives.org/20-2/8997-9000%20(6462).pdf)
- [10]. JyotchnaGogoi a, b, KhonamaiSewaNakhurua,Rudragoud S. Policegoudra (2014), Isolation and characterization of bioactive components from Mirabilis jalapa L. radix, Journal of Traditional and Complementary Medicine 1-7<https://doi.org/10.1016/j.jtcm.2014.11.028>
- [12]. KumthekarShrutika and Pius Jessy 2016, Antifungal activity of Mirabilis jalapa. L against selected fungi, Int. J. of Life

- Sciences, Special Issue, A7 61-65. <http://oaji.net/articles/2017/736-1518518257.pdf>
- [13]. Mahajan Niranjan Shishir, Jadhav Rahul Laxman 2008, Use of *Mirabilis jalapa* L flower extract as a natural indicator in acid base titration, journal of Pharmacy Research vol.1 Issue 2, 159-162. <http://jprsolutions.info/files/final-file-56908681c43f62.57428615.pdf>
- [14]. Ullah Naveed, Ahmad Habib, Asif Afzal Haq, Abdul Qadar Khan, Anwar Rabial (2010), Antibacterial activities of genetic variants of *Mirabilis jalapa* PHCOG, Vol 2 Issue 7 Pp 181-184. <http://phcogfirst.com/sites/default/files/Antibacterial%20activities%20of%20genetic%20variants%20of%20Mirabilis%20jalapa.pdf>
- [15]. Lekshmi. R. Nath, K. P. Manjunath, R. V. Savadi and K. S. Akki (2010) ANTI-INFLAMMATORY ACTIVITY OF *MIRABILIS JALAPA* LINN. LEAVES, Journal of Basic and Clinical Pharmacy Vol 001 issue 002 Pp 93-96.
- [16]. Endang Hanani, Rini Prastiwi, Lina Karlina (2017), Indonesian *Mirabilis jalapa* Linn.: A Pharmacognostical and Preliminary Phytochemical Investigations, Pharmacognosy Journal, Vol 9, Issue 5 pp 683-688. <https://pubmed.ncbi.nlm.nih.gov/24825972/>
- [17]. Deepshika Bharali, Dipankar Saha (2017) PRELIMINARY PHYTOCHEMICAL SCREENING AND EVALUATION OF ANALGESIC AND MUSCLE RELAXANT ACTIVITY OF THE ETHANOLIC EXTRACT OF THE LEAVES OF *MIRABILIS JALAPA*, International Journal of Current Pharmaceutical Research vol 9 issue 5, Pp 81-84. <https://innovareacademics.in/journals/index.php/ijcpr/article/view/22144/12493>
- [18]. Akanji Olufunke Christy, Cyril Olutayo C. Mojisola, Elufioye O. Taiwo and Ogunsusi Omowumi Ola (2016) The antimalaria effect of *Momordica charantia* L. and *Mirabilis jalapa* leaf extracts using animal model, Journal of Medicinal Plants Research, Vol. 10 issue 24, pp. 344-350. <https://doi.org/10.5897/JMPR2016.6046>
- [19]. Aher A.N., Bhagure Kavita, Malode Sunanda, Bodile Shubhangi (2016) Pharmacognostic, Phytochemical and Pharmacological Investigation on Leaf and Root of *Mirabilis jalapa* Linn (Nyctaginaceae), International Journal of Pharmaceutical Sciences Review and Research vol 40 issue 2 pp 132-136. https://www.researchgate.net/publication/310477646_Pharmacognostic_phytochemical_and_pharmacological_investigation_on_leaf_and_root_of_Mirabilis_jalapa_linn_Nyctaginaceae