

Norqulova Maftuna Farhod qizi

Jizzakh State Pedagogical University

Calendula officinalis L. (Marigold) is globally known for its medicinal importance containing various phyto-chemicals including carbohydrates, amino acids, lipids, fatty acids, carotenoids, terpenoids, flavonoids, quinones, coumarins and other constituents, showing some important biological activities like wound healing, immuno-stimulant, spasmogenic and spasmolytic, hepatoprotective, genotoxic and antigenotoxic, anti-amylase, anti-inflammatory, anti-oedematous, anti-bacterial and anti-fungal, antioxidant, antidiabetic, anti-HIV and anti-cancerous, nephron-protective, prevention of oropharyngeal mucositis, hypoglycemic and gastroprotective activities with no toxic effect. In this review, a detailed account of different phytochemicals and their medicinal properties of *C. officinalis* have been addressed.

Keywords: *Calendula officinalis*; Asteraceae; Marigold; Phytochemicals

Introduction In India, over 6,000 plants are used in herbal, folk and traditional medicine. Approximately, amongst 1500 identified medicinal plants 500 are commonly in use (Chidambaram et al., 2014). *Calendula officinalis* L. (pot marigold) is one of the commonly used medicinal plants in India, China, Europe and US (Muley et al., 2009). *Calendula* was known as "gold's" in old English was associated with Virgin Mary and Queen Mary, hence the name marigold (Grieve 1931; Kemper 1999; Mills 1991). The name of this plant comes from a Latin word 'Calend' meaning the first day of each month, because of the long flowering period of plant. As flowers move in the direction of the sun's radiation, it has become an astronomical sun sign "Leo" (Dinda and Craker, 1998). *Calendula* is an annual herb growing about 80 cm tall, having corymbosely branched stem; a long tap root with numerous secondary roots; hispid, acute, oblanceolate, alternate and sessile leaves; flower head inflorescence (surrounded by two rows of hairy bracts). The plant has yellow to orange flowers with female ray florets and hermaphrodite, tridentate, tubular, disc florets; and curved, sickle-shaped and ringed achenes (Bisset, 1994) (Fig. 1). The plant species has been reported to contain a variety of phyto-chemicals, including carbohydrates, phenolic compounds, lipids, steroids, tocopherols, terpenoids, quinones and carotenoids (Kishimoto et al., 2005; Re et al., 2009; Shahrababaki et al., 2013; Wojciak-Kosior et al., 2003) with different health benefits (Miliauskas et al., 2004; Muley et al., 2009; Vodnar, 2012). The major active constituents of plant include triterpenoid esters, saponins, and flavonoids including rutin and hyperoside. The orange flower contains a high content of carotenoids including auroxanthin and flavoxanthin (Braun and Cohen, 2005; Neukiron et al., 2004; Roopashree et al., 2008).

The pot marigold extracts possess a wide range of pharmacological effects (Pintea et al., 2003) and are used as antiseptic, stimulant, diaphoretic, antispasmodic and anti-pyretic agents (Kirtikar and Basu, 1993; Weiner, 1990). The flower extracts of the plant have anti-viral effects on HIV (Kalvatchev et al., 1997). In-vitro, *Calendula officinalis* (CO) plant extracts show anti-cancerous activity on various tumor cell lines derived from



leukemias, fibrosarcomas, melanomas, breast, cervix, prostate, pancreas and lung (Medina et al., 2006). It has also been internally used for the treatment of gastritis, colitis and bleeding of duodenal ulcers (Bone et al., 2003).

Due to significant biological activity of *C. officinalis* and its constituents it is imperative that the plant be given attention and developed as a medicine. Important Phytochemicals Various phyto-chemical studies have revealed the presence of different chemical compounds including carbohydrates, amino acids, lipids, carotenoids, terpenoids, flavonoids, volatile oil, quinines, coumarins and other constituents.

Carbohydrates The water soluble polysaccharides of *C. officinalis* inflorescence contain 9.25 % moisture, 25.77 % acidic sugar, 29.25 % ash, 31.25 % reducing sugars and 84.58 % pectic substances and various monosaccharides including glucose, arabinose, rhamnose, xylose, galactose and galacturonic acid (Lim, 2013).

The ethanolic extract of *C. officinalis* inflorescence was reported to contain monosaccharides along with polysaccharides, PS-I, II, -III with (1→3)-β-Dgalactam backbone and a side chain at C-6 consisting of α-L-rhamnan-(1→3)-araban and α-araban-(1→3)-araban form (Varlijen, 1989; Wanger et al., 1985).

Amino Acids The *C. officinalis* flower extract showed the presence of 15 free amino acids including proline, phenylalanine, histidine, lysine, leucine, serine, alanine, valine, arginine, tyrosine, asparagine, threonine, glutamate, methionine and aspartate and amino acid content, being highest in the flower (4.5%) (Abajova, 1994). **Lipids and Fatty Acids** The fatty acids present in the *C. officinalis* flowers are myristic acid, lauric acid, stearic acid, palmitic acid, oleic acid, linoleic acid and linolenic acid. The lipids present in the seeds of *C. officinalis* are phospholipids, glycolipids and neutral lipids. Seeds also contain 9-hydroxy-18:2(trans-9, cis-11) acid dimorphelic acid and 18:3 conjugated trienic (trans-8, trans-10, cis-12) acid (Vlchenko, 1998; Wilkomirski and Kasprzyk, 1979). The seed oil contains D-(+)-9-hydroxy-10, 12-octadecadienoic acid (oxygenated fatty acid) (Badami and Morris, 1965).

CLINICAL BOTTOM LINE/EFFECTIVENESS Brief Background

- Calendula (*Calendula officinalis*), also known as marigold, has been widely used topically to treat minor skin wounds, skin infections, burns, bee stings, sunburn, warts and cancer. Most scientific evidence regarding its efficacy as a wound-healing agent is based on animal and in vitro studies.

- Preliminary evidence suggesting efficacy of topical calendula ointment in the prevention of dermatitis related to radiation therapy is reported in one open phase III trial (randomized, non-blinded, comparison; no placebo arm), conducted in breast cancer patients.

- Grades reflect the level of available scientific evidence in support of the efficacy of a given therapy for a specific indication.

- Expert opinion and folkloric precedent are not included in this assessment, and are reflected in a separate section of each review ("Strength of Expert Opinion and Historic/Folkloric Precedent").

● Evidence of harm is considered separately; the below grades apply only to evidence of benefit . Historical or Theoretical Indications Which Lack Sufficient Evidence

● Abscesses, acne, amenorrhea, analgesia, anemia, antibacterial, antifungal, anti-inflammatory, antioxidant, anti-viral, anxiety, appetite stimulant, atherosclerosis, athlete's foot, bacterial infections, benign prostatic hypertrophy, bladder irritation, blood purification, blood clots, bowel irritation, bruises, burns, cardiac disease, cholera, circulation, colitis, conjunctivitis, constipation, cosmetic, cough, cramps, diaper rash, dizziness, diuresis, dystrophic nervous disturbances, eczema, edema, epididymitis, epistaxis, eye inflammation, fatigue, fever, frostbite, gastrointestinal tract disorders, gastritis, gingivitis, gout, headache, heart disease, hemorrhoids, herpes simplex, herpes keratitis, HIV, indigestion, immunostimulant, influenza , insomnia, jaundice, liver cancer, liver-gallbladder function stimulator, menstrual period abnormalities, metabolic disorders, mouth and throat infections, muscular atrophy, nausea, nosebleed, pain, peptic ulcer disease, periodontal prophylaxis, proctitis, prostatitis, purging agent, skin cancer, sore throat, spasms, spleen disorders, stomach ulcers, stones, syphilis, thrombophlebitis, tinnitus, toothache, tuberculosis, ulcerative colitis, urinary retention, uterine tonic, varicose ulcers, warts, yeast infections. Expert Opinion and Folkloric Precedent

● Traditionally, calendula has been used topically for treating minor wounds, burns and other skin problems. Multiple references are made to calendula as a wound-healing aid and topical anti-infective agent. However, no strong scientific evidence supports these properties.

● Powder from the plant's petals is occasionally used as an inexpensive alternative to saffron for coloring and flavoring foods.

REFERENCES:

Abajova R L, Aslanov S M and Mamedova M E (1994) Amino acids of *Calendula officinalis*.

ChemNat Compd 30 614- 641 Abd El-Gawad H M and Khalifa A E (2001) Quercetin, coenzyme Q10, and L-canavanine as protective agents against lipid peroxidation and nitric oxide generation in endotoxin-induced shock in rat brain Pharmacol Res 43 257-63

Hamburger M, Adler S, Baumann D, et al. Preparative purification of the major anti-inflammatory triterpenoid esters from Marigold (*Calendula officinalis*). *Fitoterapia* 2003;74(4):328-338.

Cordova CA, Siqueira IR, Netto CA, et al. Protective properties of butanolic extract of the *Calendula officinalis* L. (marigold) against lipid peroxidation of rat liver microsomes and action as free radical scavenger. *Redox Rep* 2002;7(2):95-102.

Chaparzadeh N, D'Amico ML, Khavari-Nejad RA, et al. Antioxidative responses of *Calendula officinalis* under salinity conditions. *Plant Physiol Biochem* 2004;42(9): 695-701.

Chakurski I, Matev M, Stefanov G, et al. [Treatment of duodenal ulcers and gastroduodenitis with a herbal combination of *Symphitum officinalis* and *Calendula officinalis* with and without antacids]. *Vutr Boles* 1981;20(6):44-47. 5. Chakurski I, Matev M, Koichev A, et al. [Treatment of chronic colitis with an herbal combination of *Taraxacum*

officinale, *Hipericum perforatum*, *Melissa officinalis*, *Calendula officinalis* and *Foeniculum vulgare*]. *Vutr Boles* 1981; 20(6): 51-54.

Calendula officinalis - An Important Medicinal Plant with Potential Biological Properties NELOFER JANI , KHURSHID IQBAL ANDRABI² and RIFFAT JOHN*,¹ ¹Plant Molecular Biology Lab., Department of Botany, University of Kashmir, Srinagar 190 006, India ²Department of Biotechnology, University of Kashmir, Srinagar 190 006, India (Received on 18 April 2017; Revised on 08 July 2017; Accepted on 01 August 2017)

Marigold (*Calendula officinalis* L.): An Evidence-Based Systematic Review by the Natural Standard Research Collaboration Ethan Basch, MD, MPhil Steve Bent, MD Ivo Foppa, MD, ScD Sadaf Haskmi, MD, MPH David Kroll, PhD Michelle Mele, PharmD Philippe Szapary, MD Catherine Ulbricht, PharmD Mamta Vora, PharmD Sophanna Yong, PharmD for the Natural Standard Research Collaboration