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Phytochemistry and pharmacological aspect of *Areva javanica*: A Review

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Abstract

As ethanobotanically and traditionally remedy, *Areva javanica* contains variety of bioactive photochemical that are responsible for treatment of various type of diseases. The present review was aimed to analyze nutritional, phytochemical and pharmacological activities of desert plant *Areva*. The present review regarding desert plant *Areva javanica* is the compilation of data from the previous research works, various published papers, medicinal plant databases etc. This plant possesses anticancer, antioxidant, wound healing, anthelmintic, antiatherosclerotic, hypolipidemic, antifungal, antibacterial, antidiabetic and hepatoprotective activities coupled with other multifarious uses. This review includes the substance of different ethnobotanical uses, phytochemistry and exclusive capability of this plant in the field.

Keywords: *Areva javanica*, desert plant, photochemical, pharmacological activities, ethanobotanical use

1. Introduction

Medicinal desert plants play important role within the treatment of various diseases. There is a good demand for herbal medicines in the cosmopolitan because of their wide biological activities, higher safety index than the synthetic drugs and lower costs. The plants of genus *Aerva* belongs to family *Amaranthaceae* are perennial herb and are found within the North Temperate Zone, especially in the Mediterranean regions and Asia. Decoction of arial parts used to treat hypertension, rheumatism, headache, swelling and as a diuretic (Arbab *et al.*, 2016) [2] and to alleviate kidney stones. Decoction of roots used to relieve toothache and headache, diarrhoea, chronic chest pain, paste is applied on the face to get rid of acne. It is used as purgative and emetic for horses and camels. Additionally, *A. javanica* extract of aerial parts used to heal dysentery, gonorrhoea, hyperglycemia, and cutaneous infections (Khan *et al.*, 2012) [9]. Paste made up of leaves is externally applied for healing of the wounds, inflammation, treatment of granulation tissue.

2. Vernacular names

Gujrati- Bur
Kannad- Dodda
Hindi- Gidda, Gorkhabundi, Kapurijadi
Tamil- Perumpoolai
Telagu- Magavira
Punjabi- Boi kalan
Rajastani- Buida, Bui, kapok bush
Marathi- Kapurmadhura, Kapurimadhuri, Kapurphuti, Kumra

3. Taxonomical classification

Kingdom: Plantae (Plants)
Sub-kingdom: *Tracheobionta* (Vascular plants)
Division: *Magnoliophyta* (Angiospermes, flowering plants)
Class: *Magnoliopsida* (*Dicotylédones*)
Subclass: *Caryophyllidae*
Order: *Caryophyllales*
Family: *Amaranthaceae*
Genus: *Aerva*
Species: *javanica*

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4. Morphology

This Herb is erect or prostrate with an extended tap-root, branched from near the base, branches many, pubescent or woolly-tomentose, striate. Leaves alternate, 2-2 × 1-1.6 cm on the main stem, 6-10 × 5-6 mm on the branches, elliptic or obovate, or suborbicular, more or less white with cottony hairs beneath; petioles 3-6 mm long, often obscure. Flowers greenish white, very small, sessile, often bisexual, in small dense subsessile axillary heads.



Fig 1: Whole plant of *Areva javanica*.

5. Phytochemical constituent

5.1 Flavinoids

Aerva is an excellent source of flavanoids like kaempferol, quercetin, isorhamnetin, isorhamnetin 3-O-β-[4-p-coumaroyl-α-rhamnosyl(1→6)] galactoside and flavanone glucoside persinol, persinosides, 5, 4'-hydroxy-3, 6, 7-trimethoxyflavone, 5-hydroxy-3, 6, 7, 4 tetramethoxyflavone, 5-hydroxy 2', 3, 5', 6, 7-pentamethoxyl flavone, 3,3',5,7-trihydroxy-4'-methoxyflavone, apigenin 7-O-β-D- glucoside and 7-O-β-D-glucopyranoside. Flavanone glycosides like chrysin- 7-O-galactoside and aervanone (8-C -Dgalactosyl-7,4i-dihydroxyflavanone) are also isolated from the roots of genus *Areva*. Kaempferol-3- galactoside, 3-rhamnogalactoside, quercetin-3-galactoside, isorhamnetin-3-galactoside, 3-rhamnosyl-(1→6)-galactoside and 3- (p-coumaroyl)-rhamnogalactoside are isolated from the fresh aerial parts of *A. javanica*. Chrysoeriol and Kaempferol-3-rhamnogalactoside flavonoid constituents have also been isolated from aqueous and ethanolic extracts of *A. javanica*.

5.2 Alkaloids

Plant contains biological active alkaloids like 10-hydroxycanthin-6-one (ervine), 10-methoxycanthin-6-one (methylervine), 10-β-D-glucopyranosyloxycanthin-6-one (ervoside), aervine (10-hydroxycanthin-6-one), 10-methoxycanthin-6-one, 10-hydroxy-canthin-6-one, 10-O-β-D-glucopyranosyloxycanthin-6-one, methylaervine (10-methoxycanthin-6-one) and aervoside (10-β-D-glucopyranosyloxycanthin-6-one). Plant also contains alkaloids like β-carboline-1 -propionic acid, 6-methoxy-β-carboline-1-propionic acid, 6-methoxy-β-carboline-1-ylpropionic acid (ervolanine), and aervolanine (3-(6-methoxy-β-carboline-1-yl) propionic acid).

5.3 Sterols

Many biological active sterol includes campesterol, sitosterol, 7- ergosterol, spinasterol, 7-stigmastenol, campestanol and stigmastenol have been reported in *A. javanica*. β- Sitosterol, triterpenoid α- and β-amyrin and pentadecanoic acid have also been reported in unsaponifiable fraction of *A. javanica*.

5.4 Other constituents

In *A. javanica*, arabinose, rhamnose, xylose, galactose,

glucose, mannose and mannitol have also been isolated. Glycine betaine (0.59%) and trigonelline (0.005%) has been isolated from the aerial parts of *A. javanica*.

6. Pharmacological studies

6.1 Anti-inflammatory activities

Leaves of genus *Areva* plant are reported to used as anti-inflammatory and antioxidant agent. Alcoholic and benzene extract of *Areva* are reported to have shown anti-inflammatory activity in carageenan-induced rat paw edema model (Hussain *et al.*, 2017) [8]. It is believed that Alcoholic extract of *Areva* inhibit the synthesis of pro-inflammatory cytokines (Singh *et al.*, 2010) [6]. Qualitative and quantitative phytochemical investigation (TPC, TFC) revealed that extract contain fair amount of flavonoids and phenolic compounds. It is reported that the flavonoids that present in extract of plant, have anti-inflammatory characteristics (Chawala *et al.*, 2012). Therefore, the anti-inflammatory activities of *Aerva javanica* might be because of these flavonoids. *Aerva javanica* contains flavonoids like chrysoeriol, isohemnetin-3-o-rutinoside and kaempferol in aerial parts of the plant (Saleh *et al.*, 1990) [11]. It is also believed that anti-inflammatory effect of extract of genus *Areva* could also be attributed to its antioxidant potential, due to the presence of rutin and other phenolics. The HPTLC analysis revealed the presence of rutin, a widely known antioxidant flavinoid within the extract of *Areva* (Arbab *et al.*, 2016) [2]. Rutin demonstrated anti-inflammatory effect in rats by preventing oedema formation induced by histamine and serotonin similarly as found extremely effective in acute and chronic phase of inflammation in adjuvant-induced arthritis by reducing oedema, nodule and ankylosis (Borissova *et al.*, 1994; Guardia *et al.*, 2001) [3, 11]. Additionally, it has been reported for strong antioxidant capacity and as a possible candidate for inhibition of cyclooxygenase (COX-2) enzymes, phospholipase A2 activity and neutrophil chemotaxis (Lindahl and Tagesson, 1997) [10]. Therefore, extract of *Areva* used as potent anti-inflammatory agent.

6.2 Wound healing

Extract of plants accelerated the wound healing by cell migration and proliferation, reducing wound contraction and wound half closure time. *A. javanica* total extract reported to promote HepG2 cell proliferation and recovery in a dose-dependent manner. To further confirm the *ex-vivo* cell proliferative effects, the in-vivo hepatoprotective potential activity of *A. javanica* total extract was examined in CCl4-injured rats (Arbab *et al.*, 2016) [2]. *A. javanica* total extract showed the presence of alkaloids, flavonoids, tannins, sterols, and saponins that involve in wound healing and re-epithelization. *Aerva javanica* is reported for the treatment of proud flesh (Granulation tissue) (Dedar *et al.*, 2020a) [5] and non-healing wounds of habronemiasis (Dedar *et al.*, 2020b) [6].

6.3 Antioxidant activity

It could be significantly correlated with its total phenolic and flavonoid constituents of plant. Owing to its good antioxidant activity, *A. javanica* has been reported to be accustomed to treat chronic and degenerative ailments that come from oxidative damage caused by free radicals (Arbab *et al.*, 2016) [2]. It is thought that *A. javanica* extract has antioxidant and radical scavenging phytochemical constituents that are

responsible for its antioxidant activity.

Resulting from *in vitro* studies of *Areva* extract, there is evidence of their free-radical scavenging capacity because of the presence of alkaloids, flavonoids, tannins, sterols, and saponins, including rutin, a widely known antioxidant flavonoid, was identified. Due to the presence of phenolic rings and free hydroxyl groups within the chemical structure, rutin has remarkable potential to donate electrons to reactive free radicals, thus quenching the chain reaction of free radicals (Yang *et al.*, 2008) [13].

6.4 Antitumor activity

Plant extracts have been used to treatment cancer or suppress tumor growth. They have also been used as natural chemoprevention agents. Scientifically supported study has been reported that leaf extract of *Areva* exhibited remarkable antiproliferative activity against the prostate and breast cell lines (Al-Shehri and Moustafa, 2019) [11]. Leaf extract of *Aerva javanica* has been described for the treatment of clinical case of melanoma in the horses. Additionally to the present, more purified leaf extracts of another species of *A. lanata* also showed anticancer, furthermore as apoptotic activities against different cancer cell lines (Chawla *et al.*, 2012) [4].

6.5 Antimicrobial

Solvent extracts from *A. javanica* plants have antimicrobial activity due to structural differences among precipitated bioactive phytochemicals. Solvent extracts from leaves of *A. javanica* were found to have antibacterial activity against *M. luteus*, *S. aureus*, *P. aeruginosa*, and *S. flexneri* (Sharif *et al.*, 2011) [4]. Furthermore, methanol extracts and chloroform extracts were found to be the most effective against Gram-positive bacteria (*Micrococcus luteus* and *Staphylococcus aureus*) and Gram-negative bacteria (*Pseudomonas aeruginosa* and *Shigella flexneri*), respectively. In general, fresh *A. javanica* extracts had a better antibacterial activity than dried extracts in terms of inhibiting zone (Al-Shehri and Moustafa, 2019) [12].

7. Conclusion

Areva javanica has been most useful therapeutic agent for variety of disease. There are many phytochemicals present in *Areva* desert plant responsible for its pharmacological activities. This species possesses antifungal, antibacterial, anticancer, antioxidant, wound healing activities coupled with other multifarious uses. Present review is just a glimpse to attract the scientists to divert their attention towards deserts and particularly to further develop the existing remedial potential of *Areva javanica* for the development of modern medicine in future.

8. References

1. Al-Shehri M, Moustafa M. Anticancer, antibacterial, and phytochemicals derived from extract of *Aerva javanica* (Burm. f.) Juss. ex Schult. grown naturally in Saudi Arabia. *Tropical Conservation Science*. 2019;12:1940082919864262.
2. Arbab AH, Parvez MK, Al-Dosari MS, Al-Rehaily AJ, Ibrahim KE, Alam P, *et al.* Therapeutic efficacy of ethanolic extract of *Aerva javanica* aerial parts in the amelioration of CCl₄-induced hepatotoxicity and oxidative damage in rats. *Food & Nutrition Research*. 2016;60(1):30864.
3. Borissova P, Valcheva S, Belcheva A. Antiinflammatory effect of flavonoids in the natural juice from *Aronia melanocarpa*, rutin and rutin-magnesium complex on an experimental model of inflammation induced by histamine and serotonin. *Acta physiologica et pharmacologica Bulgarica*. 1994;20(1):25-30.
4. Chawla P, Chawla AMIT, Vasudeva NEERU, Sharma SK. A review of chemistry and biological activities of the genus *Aerva*—a desert plant. *Acta Pol Pharm*. 2012;69(2):171-177.
5. Dedar RK, Kumar N, Narnaware SD, Tripathi BN. Leaf extract of *Aerva javanica* suppresses excessive growth of granulation tissue in horses. *Journal of Equine Veterinary Science*. 2020a;93:103193.
6. Dedar RK, Kumar N, Narnaware SD, Singh J, Legha RA, Pal Y. Treatment of habronemiasis using *Aerva javanica* Extract in donkeys. *Indian Journal of Comparative Microbiology, Immunology and Infectious Diseases*. 2020b;41(2):112-116.
7. Guardia T, Rotelli AE, Juarez AO, Pelzer LE. Anti-inflammatory properties of plant flavonoids. Effects of rutin, quercetin and hesperidin on adjuvant arthritis in rat. *Il farmaco*. 2001;56(9):683-687.
8. Hussain L, Abbas K, Ahmed B, Baber M, Muhammad SA, Qadir MI. Analgesic and anti-inflammatory activity of aqueous-methanolic extract of *Aerva javanica*. *Pak. J Pharm. Sci*. 2017;30(1):213-215.
9. Khan AW, Jan S, Parveen S, Khan RA, Saeed A, Tanveer AJ, *et al.* Phytochemical analysis and enzyme inhibition assay of *Aerva javanica* for ulcer. *Chemistry Central Journal*. 2012;6(1):1-6.
10. Lindahl M, Tagesson C. Flavonoids as phospholipase A2 inhibitors: importance of their structure for selective inhibition of group II phospholipase A2. *Inflammation*. 1997;21(3):347-356.
11. Saleh NA, Mansour RM, Markham KR. An acylated isorhamnetin glycoside from *Aerva javanica*. *Phytochemistry*. 1990;29(4):1344-1345.
12. Sharif A, Ahmed E, Hussain MU, Malik A, Ashraf M. Antimicrobial constituents from *Aerva javanica*. *Journal of the Chemical Society of Pakistan*. 2011;33(3):439-443.
13. Yang J, Guo J, Yuan J. *In vitro* antioxidant properties of rutin. *LWT-Food Science and Technology*. 2008;41(6):1060-1066.