Egyptian Herbal Monograph

Volume 1

Wild Medicinal Plants

Egyptian Drug Authority (EDA)

2025

Egyptian Herbal Monograph

Wild Medicinal Plants

***Anastatica hierochuntica* L.** كف مريم

1. Names & Synonyms (1-3)

***Anastatica hierochuntica* L.**

Family: Cruciferae (Brassicaceae).

Arabic: Kaff Mariam كف مريم .

English: St. Mary's flower, Rose of Jericho, Jericho resurrection plant, Genggam Fatimah (4), Rumput Fatimah (5).

2. Geographical distribution (1- 3)

Uweinat Oasis, all the deserts of the country including that of Sinai, Red Sea coastal strip as well as Gebel Elba and the surrounding mountainous region.

3. Parts used for medicinal purposes (2)

Dry whole plant.

4. Major chemical constituents (3)

-Simple Flavonoids:

Luteolin, luteolin 7-O-glucoside, luteolin 6-C-hexosyl-8-C-pentoside, luteolin6-C-pentosyl-8-C-hexoside, luteolin 8-C-glucoside (orientin), luteolin 6-C-glucoside (isoorientin), luteolin-O-glucuronide, luteolin 6-C-glucosyl-2"-O-glucoside (isoorientin 2"-O-glucoside. Quercetin, rutin, aromadendrin, eriodictyol, diosmetin 8-C-glucoside.

Kaempferol 7-O-glucoside, kaempferol 3-O-glucoside, kaempferol 7-O-rhamnoglucoside, naringenin, Taxifolin, 3-O-methyltaxifolin, epitaxifolin, taxifolin O-hexoside. Apigenin 6-C-glucoside (isovitexin), apigenin 6-C-7-O-diglucoside (isovitexin 7-O-glucoside), apigenin 6-C-arabinosyl-8-C-hexoside (6-11).

-Benzofurano-Flavanones: Anastatin A and anastatin B (12).

-Flavonolignans: Silybin A, silybin B, isosilybin A, isosilybin B, (+)-silychristin and (-) - silychristin (9).

-Lignans: Evofolin B (9).

-Neolignans: Hierochin A, hierochin B and hierochin C, (+)-balanophonin, (+)-dehydrodiconiferyl alcohol and (+)-lariciresinol (12).

-Other Phenolic Compounds: *p*-Hydroxybenzoic acid, *p*-methoxy benzoic acid, 3,4-dihydroxy benzoic acid, 3-methoxy-4-hydroxy benzoic acid, *p*-hydroxy-benzaldehyde, 3,4-dihydroxy benzaldehyde, vanillin, aceto vanillone, 2,4'-dihydroxy-3'-methoxy acetophenone, ω-hydroxy propioguaiacone, (+)-2,3-dihydroxy-1-(4-hydroxy-3-methoxyphenyl)-1-propanone, trans-cinnamic acid, trans-ferulic acid, conifer aldehyde (9), 5-O-caffeoylquinic acid, 3,4-O- dicaffeoylquinic acid and 4,5-O-dicaffeoylquinic acid (11).

Essential oil: The major constituents were cuminic aldehyde, *trans*-β-caryophyllene, linalool, caryophyllene oxide and α-copaen-11-ol and limonene (13).

5. Traditional medicinal uses (14)

*** Oral:**

A. Gynecology:

1. Reduces the pain and facilitates childbirth.
2. Abortifacient.
3. Emmenagogue.

B. GIT disorders

Violent purge for cases of Jaundice.

C. General

1. Fatigue.
2. Epilepsy.
3. Cold.

***External:**

Gynecology: To increase the probability of pregnancy, the dried leaves and flowers are mixed with *Anastatica hierochuntica* L. whole plant, boiled in water and used as pelvic bath**.**

***A hierochuntica* is a traditional medicinal plant for use in the specified indications exclusively based upon long-standing use.**

6. Herbal preparations correlated to medicinal use (14)

1. The crushed dried plant.
2. Infusion of dried whole plant.

***Infusion:** Pour freshly boiled water on 2teaspoonful of *Anastatica hierochuntica* L in a cup, cover the cup with the lid and infuse for 5 minutes. Drink it sweetened if desired.

3. Decoction of the whole plant

7. Posology and method of administration correlated to medicinal use (14)

Preparation 1
Indication B
The dried plant crushed with sugar is taken as violent purge, followed by milk as diet.

Method of administration: Oral use.

Preparation 2
Indication A
The dried plant is soaked in water and the solution drunk by women at childbirth (2).

Indication C
The dried plant is soaked in water and the solution drunk by women at childbirth (2).

Method of administration: Oral use.

Preparation 3
Indication A
Boiled in water and used as pelvic bath**.**

Method of administration: External use.

8. Contraindications

Hypersensitivity to active substances and to other plants of the same family.

9. Special warnings and precautions for use

- Monitoring of blood pressure and blood glucose level should be done regularly.

- If the symptoms worsen during the use of the medicinal product, a doctor or a pharmacist should be consulted.

10. Interactions with other medicinal products and other forms of interaction

None reported.

11. Fertility, pregnancy and lactation

- Avoided during pregnancy.
- Safety during lactation has not been established. In the absence of sufficient data, the use during lactation is not recommended.
- No fertility data available.

12. Effects on ability to drive and use machines

No studies on the effect on the ability to drive and use machines have been performed.

13. Undesirable effects

- None reported.
- If adverse reactions occur, a doctor or a pharmacist should be consulted.

14. Overdose

No case of overdose has been reported.

15. Relevant biological activities (3)

- The effect of *A. hierochuntica* L. extract on the histology of myometrial cells and prostaglandin levels (PGE2 and PGF2α) of pregnant mice was investigated. It was found that a daily dose of 100 mg/kg b.wt./day of the 96% ethanolic extract of *A. hierochuntica* L. had a greater effect on the histology of myometrial cells in pregnant mice and prostaglandin levels in both PGE2 and PGF2α compared to that of 150 mg/kg/day dose. These results provide new scientific evidence for the activity of *A. hierochuntica* L. as a facilitator of labor during childbirth (15).
- In silico study of *A. hierochuntica* L. estrogenic activities and its potential as phytoestrogens was conducted using computer simulation methods (16). The prediction of estrogenic active compounds and its potential as a phytoestrogen with target agonists to the estrogen receptor were determined. It was found that active compounds in *A. hierochuntica* L. had low activity against estrogen receptor agonists because the average value of activity obtained was low (<0.3). In addition, Isopimaric acid was found to be one of the estrogen receptor ligands which provided the greatest affinity and good potential as phytoestrogens.
- Both aqueous extract of *A. hierochuntica* (whole plant) and the chloroform fraction of the ethanolic extract possessed potential central and peripheral antinociceptive and antiinflammatory activities in Swiss albino mice and Wistar rats (17).

- The potential toxicity effects of *A. hierochuntica* (whole plant aqueous extract) in pregnant Sprague-Dawley (SD) rats and their developing fetuses was investigated. Animals received daily 250, 500, and 1000 mg/kg *A. hierochuntica* aqueous extracts, respectively. The results suggested that exposure to the plant aqueous extract during implantation and period of organogenesis is potentially toxic to the pregnant rats as well as the developing fetuses (18).
- The aqueous extract of *A. hierochuntica* L. aerial parts; when used as an alternative of conjugated estrogen (Premarin) in rabbit females, increased the level of estrogen hormone (19).
- One month administration of the aqueous extract of *A. hierochuntica* (at a dose of 1g/day) significantly increased the levels of LH, FSH, PRL, and PRO hormones in female micromys minutus, compared to control group (20).
- A lyophilized extract of the plant was administered to pregnant mice (plug=day 0) for 3 consecutive but separate gestation days (GD) 8-9, 10-12, and 12-14, at oral doses of 0.25, 1, and 4g/kg; and controls received saline only. Results showed that resorption and exencephaly were the main developmental defects resulting from treatment with the extract. The incidence of exencephaly depended on both the dose and the developmental stage. In addition, the doses also induced incidence of fetal resorption. The resorption rates were stage dependent. Therefore, the plant, at the doses used may be considered teratogenic and embryolethal (21).
- The hepatoprotective activity of methanolic extract of *A. hierochuntica* whole plant using carbon tetra chloride (CCl_4)-induced hepatotoxicity in rats, was investigated. The levels of liver enzymes, protein, bilirubin, in addition to total antioxidant status levels were evaluated in experimental rats (with or without CCl_4- induced hepatotoxicity) following intake of 100 mg/kg p.o plant extract compared with standard silymarin at a dose of 100 mg/kg p.o. Histopathology of a liver tissue of the animals treated with the extract was also studied to monitor the liver status. Results showed that methanolic extract at a dose level of 100 mg/kg offered protective effect against CCl_4-induced hepatotoxicity in experimental rats. The liver biopsy of all experimental rat groups treated with the methanolic *A. hierochuntica* extract showed significant restoration of the normal histomorphologic pattern of liver cells (22).
- The gastro protective activity of "Kaff-e-Maryam" extract was evaluated in rats while toxicity studies were done in Brine shrimp and mice. Ethanol extract of the whole plant was prepared and animals were treated with the standard necrotizing agents. Different doses of the extract were used for pharmacological and toxicity evaluation. Pretreatment with *A. hierochuntica* extract offered protection against toxic damage to stomach wall. The extract was found to exert its defensive role through its free radical scavenging and prostaglandin inducing activities. The

toxicity studies revealed that the plant extract in the given dose range, was not toxic (23).

- The histological effects of *A. hierochuntica* in mice female liver tissues was evaluated. The administration of daily oral doses of (0.1g/ml)of the plant aqueous extract for more than one month produced significant changes (P≤0.05) on mice females liver tissues that included lymphocyte infiltration, necrosis, liver tissue fatty degeneration and congestion and dilatation of the hepatic vein. The prolonged use of the aqueous extract of the plant for more than one month is associated with significant side effects on mice liver (24).
- The antibacterial activity of the plant extracts was evaluated using agar well-diffusion method, The results indicated that plant extracts were more active against Gram-negative bacteria than Gram-positive bacteria, and that alcoholic extract has antibacterial activity stronger than hexane and aqueous extracts (25).
- The antiproliferative activities of *A. hierochuntica* whole plant extracts (ethanol, methanol, ethyl acetate, chloroform and water) were determined against a panel of cancer cells and normal primary dermal fibroblasts. The genotoxic effect of *A. hierochuntica* ethyl acetate on mice bone marrow cells was also evaluated. *A. hierochuntica* exhibited antiproliferative activity against leukemia (K-562) and melanoma (A-375) cells. *A. hierochuntica* ethyl acetate extract found to be the most cytotoxic of all extracts. Furthermore, the chloroform extract showed notable anti-proliferative effects against most cancer cell lines tested. The extracts proved to be highly safe on human normal skin fibroblasts. Furthermore, *A. hierochuntica* ethyl acetate extract was also found to have limited genotoxic effects, with these changes seen at very high doses only. The results indicate that *A. hierochuntica* extracts have significant selective anticancer activity and that genotoxicity is only observed at very high concentrations (26).
- The effect of ethanolic (KEE), and aqueous (KAE) extracts of Kaffe-Maryam (*Anastatica hierochuntica*) on CCl4 -induced oxidative stress and nephrotoxicity in rats was evaluated using the biochemical markers for renal functions and antioxidant status as well as histopathological examinations of kidney tissue *A. hierochuntica* presented superior antioxidant activity by inhibiting linoleic acid radicals and chelating oxidation metals. The HPLC analysis resulted in 9 and 21 phenolic acids and 6 and 2 flavonoids in KEE and KAE. *A. hierochuntica*, especially KAE, has the potential capability to restore oxidative stability and improve kidney function after CCl4 acute kidney injury better than KEE. Therefore, *A. hierochuntica* has the potential to be a useful therapeutic agent in the treatment of drug-induced nephrotoxicity (27).
- The dose-related relationship and selectivity of the toxic effects of *A. hierchuntica* extracts (AHE) on melanoma cells were investigated as well as providing a new option that can be used in the future treatment of melanoma. B16F10 Mus

musculus malign melanoma cells and L929 Mus musculus healthy fibroblast cells were treated with root and leaf AHEs in a dose-dependent manner. The results showed that when looking at melanoma-specific, AHE could be a source of inspiration as an active ingredient in future treatment protocols and can be recommended as potential nutraceuticals in the prevention of human melanoma cancer (28).

- The anticancer potential of the methanolic and aqueous extracts of different parts of *Anastatica hierochuntica* (seeds, stems and leaves) were assessed and explored their mechanisms of action using the human breast cancer cell line, MCF-7. The results indicate that the methanolic and aqueous extracts decreased MCF-7 cell viability in a dose-dependent manner. The aqueous and methanolic extracts of *A. hierochuntica* plant parts exerting antiproliferative effects through the induction of apoptosis in breast cancer MCF-7 cells. The aqueous seed and the methanolic leaves extracts were the most promising natural-based drugs for the treatment of breast cancer (29).
- The aqueous extracts of *Anastatica hierochuntica* L. (AHAE) were evaluated for mutagenic potential via in vitro and in vivo assays. The in vitro bacterial reverse mutation assay demonstrates that AHAE is mutagenic at 0.04 and 0.2 mg/ml., either through base-pair substitution or frameshift mutation in the bacteria. However, further evaluation of the mutagenic potential through in vivo mammalian erythrocyte micronucleus testing demonstrated that up to 2000 mg/kg of AHAE did not induce significant mutagenicity in rats. Although the in vivo results were negative, it does not represent a definite absence of mutagenic potential of AHAE in vivo at higher doses. Chronic in vivo toxicity studies may be required to draw pertinent conclusion on the safety aspect of *A. hierochuntica* aqueous extracts consumption (30).
- The aqueous extract of *Anastatica hierochuntica* L. was investigate for its effect on the cancer cell lines AMN-3. Twelve concentrations (0.04, 0.09, 0.195, 0.39, 0.78, 1.56, 3.125, 6.25, 12.5, 25, 50, 100) mg/mL were investigated for the anticancer activity against AMN-3 cell line in comparison with negative control. The aqueous extract of the plant *Anastatica hierochuntica* is effective in inhibiting the growth of cancer cells as well as its importance in the treatment of other diseases (31).
- The present research highlights the chemical composition and properties of A. hierochuntica L. that may be related to its beneficial effect. The plant was found to be a rich source of Mg, Ca, Mn, and phenolic compounds, and had potential antioxidant and free radical scavenging activities. The findings of the study indicated that the chemical properties of the plant may rationalize its use for the treatment of menstrual cramps, asthma, depression, headache, fatigue, depression, high blood pressure, and infertility problems, and to ease childbirth, as it is used in traditional medicine (32).

16. Additional Information

-

17. Date of compilation/last revision

13/10/2022.

References

1	Boulos, L. (2000). Flora of Egypt, Al Hadara Publishing, Cairo, Egypt.
2	Batanouny, K. H. (1999). Wild Medicinal Plants in Egypt. (with contribution: Aboutabl, E., Shabana, M. and Soliman, F.). Academy of Scientific Research and Technology, Egypt. The World Conservation Union (IUCN).
3	Fahem, A. A., Ibrahim A. E. and Abdel-Fattah M. R. (2017). *Anastatica hierochuntica* L. In: Egyptian Encyclopedia of Wild Medicinal Plants, **2**, 193-208. Academy of Scientific Research and Technology, Cairo, Egypt.
4	Saleh, J. and Machado, L. (2012). Rose of Jericho: a word of caution. *Oman Med. J*., **27**, 338.
5	Heny, A., Budi, S. and Mangestuti, A. b. (2019). In silico study of Rumput Fatimah (*Anastatica hierochuntica* L.) estrogenic activities and its potential as phytoestrogens. *Drug Invention Today*, **11**(8).
6	Khalifa, T. I. and Ahmed, M. A. (1980). A pharmacognostic study of certain species of *Anastatica*. Ph. D. Thesis, Fac. Pharm., Cairo Univ.
7	Rizk, A. M. (1986). The Phytochemistry of the Flora of Qatar. Kingprint of Richmond, U. K., on behalf of the Scientific and Applied Research Centre, Qatar Univ., Doha, Qatar.
8	Rizk, A. M., Hammouda, F. M., Ismail, S. I., Hassan, N. M. and Ahmed, F. A. (1993). Constituents of plants growing in Qatar XX. Phytochemical investigation of *Anastatica hierochuntica*. *Int. J. Pharmacog*., **31**(4), 327-329.
9	Nakashima, S., Matsuda, H., Oda, Y., Nakamura, S., Xu, F. and Yoshikawa, M. (2010). Melanogenesis inhibitors from the desert plant *Anastatica hierochuntica* in B16 melanoma cells*. Bioorg. Med. Chem*., **18**(6), 2337-2345.
10	Marzouk, M. M., Al-Nowaihi, A. S. M., Kawashty, S. A. and Saleh, N. A. M. (2010). Chemosystematic studies on certain species of the family Brassicaceae (Cruciferae) in Egypt. *Biochem. Syst. Ecol*., **38**(4), 680-685.
11	Al-Gamdi, N., Mullen, W. and Crozier, A. (2011). Tea prepared from *Anastatica hirerochuntica* seeds contains a diversity of antioxidant flavonoids, chlorogenic acids and phenolic compounds. *Phytochemistry*, **72**(2-3), 248-254.
12	Yoshikawa, M., Xu, F., Morikawa, T., Ninomiya, K. and Matsuda, H. (2003). Anastatins A and B, new skeletal flavonoids with hepato-protective activities from the desert plant *Anastatica hierochuntica. Bioorg. Med. Chem. Lett*., **13**(6), 1045-1049.
13	Abd El-Gaber, A. S., El Gendy, A. G., Elkhateeb, A., Saleh, I. A. and El-Seedi, H. E. (2018). Microwave extraction of essential oil from *Anastatica hierochuntica* (L): Comparison with conventional hydro-distillation and steam distillation. *TEOP,* **21**(4), 1003–1010.
14	Conservation and Sustainable Use of Medicinal Plants in Egypt, National Surveys. (2016). UNDP, GEF, ASRT and NRC, Volumes **1-5**.

15	Heny, A., Budi, S. and Mangestuti, A. (2019). The effect of *Anastatica hierochuntica* L. extract on the histology of myometrial cells and prostaglandin levels (PGE2, PGF2α) in pregnant mice. *Advances in Health Sciences Research*, **22**, 4th International Symposium on Health Research (ISHR), 81-86.
16	Heny, A., Budi, S. and Mangestuti, A. b. (2019). In silico study of Rumput Fatimah (*Anastatica hierochuntica* L.) estrogenic activities and its potential as phytoestrogens. *Drug Invention Today*, **11**(8), 1964-1970.
17	Alatshan, E. Q., Wedyan, M., Bseiso, Y., Elham, A., Rihan, B. and Alkhateeb, H (2018). Antinociceptive and antiinflammatory activities of *Anastatica hierochuntica* and possible mechanism of action. *Indian J. Pharm. Sci.*, **80**(4), 637-646.
18	Siti, R. M. Z., Normadiah, M., Kassim, Zahurin, M., Abdulmannan H. F., Mohammed A. A. (2019). Potential toxicity effects of *Anastatica hierochuntica* aqueous extract on prenatal development of Sprague-Dawley rats. *Journal of Ethnopharmacology*, **245**, 112180, doi.org/10.1016/j.jep.2019.112180.
19	Bushra, H. A., Rajaa, K. B., Taghreed U. M. and Huda A. H. (2014). *Anastatica hierochuntica* L. used as an alternative of conjugated estrogen (Premarin) in rabbit females. *Journal of Advances in Chemistry*, **9**(1), 1783-1786.
20	Baker, R. K., Mohammd, U. T., Ali, H. B., Jameel, M. N. (2013). The effect of aqueous extract of *Anastatica hierochuntica* on some hormones in mouse females. *Ibn Al-Haitham Jour. for Pure & Appl. Sci*., **26** (2), 198-205.
21	Rasheed, R. A., Bashir, A. K., and Ali, B. H. (1997). Fetal toxicity of *Anastatica hierochuntica* L. in mice. *FASEB Journal*, **11**(3), A417.
22	Hasan, F. A. (2011). Anti-hepatotoxic effect of the methanolic *Anstatica hierochuntica* extract in CCl 4- treated rats. *Eng. & Tech. Journal*, **29**(2), 413-423.
23	Arif, H. S., Bhandari, M. P., Naif, O. A. and Riyadh, M. A. (2014). Kaff-E-Maryam (*Anastatica hierochuntica* L.): Evaluation of gastro-protective activity and toxicity in different eExperimental models. *Biology and Medicine*, **6**(1), 197. doi: 10.4172/0974-8369.1000197.
24	Asal, A. T. (2016). Histological effects of *Anastatica hierochuntica* aqueous extract in female mice livers. *The Pharmaceutical and Chemical Journal*, **3**(3), 31-37.
25	Arwa, H. M., AL-Saeed and Newres, N. J. (2013). Chemical content and antibacterial activity of some extracts of *Anastatica hierochuntica* leaves. *J. Thi-Qar Sci*., **4**(1), 84-90.
26	Zaynab, E., Salim, M. A., Yasmin, A. M. S., Reem, A. and Yasser, B. K. (2022). *Anastatica hierochuntica* extracts: Promising, safe and selective anticancer agents. *The Natural Products Journal,* **12**(1), 78-87.
27	Tariq, I. A.,Yousef, M. A., Hassan, A. A. and Hassan, B. (2021). Antioxidant activity, phenolic profile, and nephroprotective potential of *Anastatica hierochuntica* ethanolic and aqueous extracts against CCl_4-induced nephrotoxicity in rats. *Nutrients*, **13**(9), 2973.
28	Mustafa, G. M. and Gulerbc, E. A. (2021). *Anastatica hierochuntica* extract exacerbates genotoxic, cytotoxic, apoptotic and oxidant effects in B16F10 melanoma cells. *Toxicon*, **198**, 73-79.

29	Rameshbabu, S., Messaoudi, S. A., Alehaideb, Z. I., Ali, M. S., Venktraman, A., Alajmi, H., Al-Eidi, H. and Matou-Nasri, S. (2020). *Anastatica hierochuntica* L. methanolic and aqueous extracts exert antiproliferative effects through the induction of apoptosis in MCF-7 breast cancer cells. *Saudi Pharmaceutical Journal*, **28**, 985–993.
30	Siti, R. Zin, M. d., Mohamed, Z., Alshawsh, M. A., Wong, F. W. and Kassim, M. N. (2018). Mutagenicity evaluation of *Anastatica hierochuntica* L. aqueous extract *in vitro* and *in vivo*. *Experimental Biology and Medicine*, **243**(4), 375–385.
31	Mohammd, T. U., Baker, R. K., Al-Ameri, K. A. H. and Abd-Ulrazzaq, S. S. (2015). Cytotoxic effect of aqueous extract of *Anastatica hierochuntica* L. on AMN-3 cell line *in vitro*. *Advances in Life Science and Technology*, **31**, 59-64.
32	Ihsanullah, D. (2012). Chemical properties of the medicinal herb Kaff Maryam (*Anastatica hierochuntica* L.) and its relation to folk medicine use. *African Journal of Microbiology Research*, **6**(23), 5048-5051.