

Egyptian Herbal Monograph

Volume 1

Wild Medicinal Plants

Egyptian Drug Authority (EDA)

2026



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***Adiantum capillus-veneris* L.**

كزبرة البئر، شعر البنات

1. Names & Synonyms (1-3)

***Adiantum capillus-veneris* L.**

Family: Adiantaceae.

Arabic: Kuzbarat el-bir كزبرة البئر

(2) شعر الأرض، شعر البنات و شعر الخنزير

(4) عشبة قرى Eshbet gerri

English: Maidenhair, Venus's hair, Capillaire.

2. Geographical distribution (1-3)

Distributed in all the phytogeographical regions of the country.

3. Parts used for medicinal purpose

The whole plant above the ground which is represented by fronds (2).

Dried herb that collected at late summer (3).

4. Major chemical constituents

-Triterpenes: Adiantone, isoadiantone, adiantoxide, 21-hydroxy adiantone, adiantoxide, isoglaucanone, isoadiantol, hydroxyadiantone, 4- α -hydroxyfilican-3-one, fernadiene, 7-fernene (diploptene), hydroxyhopane (hopanol), neohop-12-ene (neohopene), trisnorhopane isoglaucanone (5-10).

-Flavonoids: Quercetin, quercetin 3-glucoside, rutin, isoquercitrin, quercetin 3-O-(6"-malonyl)-D-galactoside, quercituron, astragalin, nicotiflorin, naringin, populin, procyanidin, prodelphinidin, kaempferol 3,7-diglucoside, kaempferol 3-glucuronide, kaempferol 3-O-rutinoside sulphate, kaempferol 3-sulphate; Kaempferol-3-sophorotrioside, and daphnoretin.

-Phenolic acids and derivatives: 4-Hydroxybenzoic, chlorogenic, caftaric, rosmarinic, 5-O-caffeoylquinic, *p*-coumaric acids, and their derivatives; 1-caffeoylglucose, 1-caffeoylgalactose 3-sulphate, 1-caffeoylgalactose 6-sulphate, 1-*p*-coumaroyl glucose, 1-*p*-coumaroylglucose 2-sulphate, 1-*p*-coumaroylglucose 6-sulphate, and 1-*p*-coumaroyl galactose 6-sulphate (11, 12).

-Carotenoids and chlorophylls pigments: Lutein, chlorophyll b', chlorophyll a, 9'-Z-neoxanthin and all-*E*-violaxanthin (12).

-Essential Oil: Carvone, carvacrol hexadecanoic acid, thymol, hexahydrofarnesyl acetone and n-nonanal (13).

-Oxygenated hydrocarbons: Dodecanoic acid ethyl ester; 3,7,11,15-tetramethyl-2-hexadecen-1-ol; butyloctyl ester; hexadecanoic acid, 9-octadecenoic acid, octadecenoic acid ethyl ester (14).

-Others: Phlobatannins (10, 11, 15), β -sitosterol, stigmasterol, campesterol, (*E*)-2-decanal, a saponin (on hydrolysis yields hydroxyhopanone aglycone, galactose, xylose and rhamnose) (10, 15), alicyclic acids; quinic acid and shikimic acid, phthalic acid and di-n-octylphthalate, diacylglycerol-O-4'-(*N,N,N*-trimethyl)-homoserine (containing palmitic, linoleic, linolenic and arachidonic acids) (10), mucilage and betaine lipid, alkaloids and cardiac glycosides (16).

5. Traditional medicinal uses (4)

A. Respiratory disorders

- Asthma
- Chest problems
- Cough
- Catarrh
- Cold
- Diaphoretic

B. Gastrointestinal disorders

- Hepatitis
- Dropsy
- Gall stones
- Splenitis
- Sour stomach

C. Diuretic and urinary disorders

D. Others

- Menstrual problems and emmenagogue
- Hair loss
- Treatment of snake and spider bites

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

6. Herbal preparations correlated to medicinal use

1. Herbal tea

Prepared from 1 tablespoonful of finely cut leaves to 1-2 cups of water or hot milk (2).

2. Infusion (17)

Pour freshly boiled water on 2 teaspoonful of the finely ground or powdered drug in a cup; cover the cup with the lid, infuse for 5 minutes and Drink it sweetened if desired (4).

3. Decoction (2)

Add 2 teaspoonful of the finely ground or powdered drug in a pot, pour cold water, boil and simmer for 10 minutes then pour into a cup and drink it sweetened if desired (4).

7. Posology and method of administration correlated to medicinal use

Preparation 1,2: A tea prepared from 1.5g of the drug to 1 cup of liquid (17).

Preparation 3: Concentrated decoction of the fronds is used as emmenagogue (2).

Dose: 3cups/day (4).

Method of administration: Oral use.

8. Contraindications

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

9. Special warnings and precautions for use

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 (18,19)

- The use during pregnancy should be avoided.
- 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 known.
- If adverse reactions occur, a doctor or a pharmacist should be consulted.

14. Overdose (18,19)

Large amount of *A. capillus-veneris* may cause vomiting in some people.

15. Relevant biological activities

- Both the aqueous extract and hydroalcoholic extract of *A. capillus-veneris* had dose-related beneficial effects on acetic acid-induced colitis on acetic acid-induced colitis in a rat model. The results showed that both extracts and these effects could be attributed to the anti-inflammatory, ulcer healing and antioxidant activities of the extracts (20).
- The ethyl acetate fraction of the ethanolic extract displayed significant anti-inflammatory activity when assessed through lipopolysaccharide-induced prostaglandin E2 generation in RAW 264.7 macrophage and interleukin 6 and tumor necrosis factor generation in the human monocyte model. This effect is possibly mediated through inhibition of nitric oxide release and reduction of the TNF- α level (21, 22).
- The 80% aqueous methanolic extract of the dried leaves of *A. capillus-veneris* was found to produce antidiarrheal and antispasmodic activities in castor oil-induced diarrhea in mice model. These activities are mediated possibly through ATP-dependent K⁺ channels activation (23).
- The anti-asthmatic activity of *A. capillus-veneris* ethanolic extracts was evaluated in histamine aerosol-induced asthma in guinea pig. Animals treated with the extract showed significantly prolonged latent period of convulsions (PCT) as compared to control animals following the exposure of histamine aerosol. The histamine produced bronchial constriction in animal model in histamine chamber. The study concluded that ethanolic extract of *A. capillus-veneris* possess anti-asthmatic activity, thus justifying to some extent the traditional use of the plant in asthma (24).
- The effect of supplementation of *A. capillus-veneris* (ACV) extract on Bax/B-cell lymphoma 2 (Bcl-2) ratio apoptotic index and remodeling of pulmonary alveolar epithelial cells in lung tissue of healthy Wistar rats during stressful conditions (hypoxia) was evaluated.

Supplementation of the ethanolic extract of *A. capillus-veneris* (fresh plant) modulates alveolar apoptosis under hypoxia condition in Wistar rats exposed to exercise. Interestingly, consuming the extract may modulate this state by reducing the Bax/Bcl-2 ration and increasing the pneumocytes I in the population of rats (25).

- The potential nephroprotective activity of 250mg/kg and 500mg/kg ethanolic extract of *A. capillus-veneris* dried fronds against Cisplatin induced oxidative stress in male Wistar rats, was investigated. Acute nephrotoxicity was induced by *i.p.* injection of Cisplatin (7mg/kg of body weight (b.w.)). Administration of ethanol extract at dose level of 500 and 250mg/kg (b.w.) to Cisplatin intoxicated rats (toxic control) for 14 days attenuated the biochemical and histological signs of nephrotoxicity of Cisplatin in a dose-dependent fashion. The ethanol extract at 500mg/kg (b.w.) exhibited significant and comparable nephroprotective potential (26).
- The *in vitro* and *in vivo* antimicrobial and diuretic effects of *A. capillus-veneris* L. were investigated. Double-fold dilution method was employed to observe the bacteriostatic action of the drug *in vitro*. Systemic *Candida albicans* infection model were established in mice to evaluate the protective effects of *A. capillus-veneris* L. in terms of survival rate, splenic bacteriuria counts and renal pathological characteristics. The water extract had *in vitro* and *in vivo* antimicrobial and diuretic effects, which provided strong pharmacologic proofs for its further treatment of urinary tract infections (UTI) (27).
- The oral administration of hydroalcoholic extract of *A. capillus-veneris* was evaluated for anti-calcium oxalate urolithiasic property in male Sprague Dawley rats. The test groups were treated with 127.6 mg/kg and 255.2mg/kg of test drug and standard control with Cystone (750mg/kg) for 21 days. The results revealed significant decrease in the number of crystals and reduction in the serum level of calcium, phosphorous and blood urea. In addition, the histopathology of kidney showed almost normal kidney architecture in treated groups (28). They also confirmed this effect during an *in vitro* study. The plant restrained the crystallization, crystal aggregation and reduction in the number and the sizes of crystals (29).
- The healing potential of *A. capillus-veneris* against bisphenol-induced hepatic toxicity in rats was evaluated. It was found that simultaneous exposure of *A. capillus-veneris* and bisphenol led to decline in serum biomarker levels and normal histopathological structures. It was concluded that the *A. capillus-veneris*, as antioxidant, can reduce the bisphenol-induced toxicity (30).
- The analgesic effect of the ethyl acetate fraction of the ethanolic extract from *A. capillus-veneris* L. (whole plant) has been confirmed through tail-flick and writhing methods (31). Similar investigation confirmed powerful analgesic effect

of the fraction through hot plate and tail immersion tests in mice (32). In addition, 4- α - hydroxyfilican-3-on, isolated from ethanolic extract of the plant, showed significant anti nociceptive activity in writhing test (22).

- The methanolic extract of *A. capillus-veneris* (whole plant) was tested for its antimicrobial effect against five gram positive, six gram negative (including multi-resistant bacteria *Staphylococcus aureus*) and eight fungal strains using standard microdilution assay. It exhibited good activity and very low MIC value (0.48 g/ml) against *Escherichia coli* (33).
- The hair growth-promoting effect of ethanolic extract of *A. capillus-veneris* (aerial parts) was evaluated through testosterone-induced alopecia model in mice. The results revealed considerable increase in follicular density and anagen/ telogen ratio (34).
- Different extracts of *A. capillus-veneris* were screened on different groups of female albino rats by intraperitoneal route. The petroleum ether extract of *A. capillus-veneris* showed significant anti-implantation activity (83%) at a dose level of 100mg/kg dry extract. the alcoholic extract showed a slight activity, but was found to be toxic (35).

16. Additional information

Solid contents: 74.48%; ash values (total ash: 7.81%, acid insoluble ash: 4.42%, and water soluble ash: 0.42%); and successive extractive values (petroleum ether: 60-80°: 4.49%, chloroform: 3.03%, acetone: 4.60%, ethanol: 9.27% and distilled water: 14.07%) (36).

Mineral content: Ten elements; Mg, Ca, K, Mn, Fe, Co, Na, Ni, Cu, and Zn were detected in *Adiantum* leaves. Among which Ca, Mg and K were found to be at significantly high concentration (37).

17. Date of compilation/last revision

28/07/2022.

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