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HANSRAJ (*Adiantum capillus-veneris*): A REVIEW

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ABSTRACT

Hansraj *(Adiantum capillus-veneris)* is an herbal plant used in Unani system of medicine since ancient time. Leaves, roots, stem of the plant are mainly used in the treatment of kidney stone, diabetes, fungal infection, thyroid and respiratory disorder. This review article is presented to compose all the new information on its phytochemical and pharmacological activities. Studies indicate Hansraj *(Adiantum capillus-veneris)* possesses antioxidant, wound healing action, anti-microbial and anti-fungal, anti-diabetic, antipyretic activity, it is contraindicated in pregnancy due to its anti-implantation effect. Most common use of Hansraj (*Adiantum capillus-veneris*) in hair problem because it prevent from alopecia and dandruff. These results are very motivating and indicate this herb should be more explore to confirm these results and reveal other potential and protective effect. Clinical trials using Hansraj (*Adiantum capillus-veneris)* for a variety of conditions should also be conducted.

Keywords: Hansraj, antioxidant, wound healing, anti-implantation

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INTRODUCTION

Hansraj also known as Parsiaoshan, Shaer-ulArz, khuzbaratul Ber, Shaer-ul-jinn, Hanspadi etc. It has been an important herb in Unani and indigenous system of medicine. The plant of Hansraj grows in light (sandy), medium (loamy) and heavy (clay) soils and requires well-drained soil.

In neutral and basic (alkaline) soils the plant thrives best [1.] It is more effective in fresh condition other than dry however it can also be collected in the summer and dried for later use [23]**.** It is effective with female conditions and is used to regulate menstruation, dysmenorrhea, and facilitate childbirth by speeding up the labor. The pastes of leaves are applied on forehead for relieving headache, and it can also relieve in chest pain [4]**.** The whole plant are used as medicine, which are promote the kidney health and mainly used as hair tonic, increase the capability fight against type two diabetes mellitus, testosterone induce alopecia [5]. Some species of *Adiantum capillus-veneris* have been used in traditional Chinese medicine to cure all mammalian disease like pyrexia, oliguria, removal of kidney stone, and relief in productive and non-productive cough[6]**.** According to Unani literature this drug is very beneficial in renal stone due to its diuretic activity [7]. It is used for a long time for all age group and both sexes but it is not suggest during pregnancy due to its anti- implantation property. It is also beneficial in Alcoholic toxicity, and it is used for deworming [28] Hansraj *(Adiantum capillus-veneris)* is one of the more usual species medicinal importance and nutritional purpose.

TAXONOMICAL CLASSIFICATION

Kingdome	:	Plantae
Sub-Kingdome	:	Traciobionta
Division	:	Pteridophyta
Class	:	Filicopsida
Order	:	Polypodials
Family	:	Pteridaceae
Genus	:	adiantum. L.

VERNECULAR NAMES: [9,10,11, 12, 13]

Arabic; Shaer-ul-Arz, KhuzbaratulBer, Shar-ul-jibal, Shaer-ul-jin, Bengali; Gopayelata, English; Black Maiden hair Fern, Venus hair, Gujrati; Kalu Hansraj, Gwalior; Hownsraj, Hindi Hansraj, Kalujhap, Kalijhant, Kashmiri; Dumtulli, Latin; Adiantum capillus-veneris, Marathi Mubaraka, Persian; Paresiyanwashan; Sumbulfarsi, Punjab; Kohbooti, Sanskrit Hanspadi. Tamil; Mayisikki, Urdu; Mubarakha, Parsiaunshan, Unani; Barsiaonshan, KhazbaratulBer

HABITAT

Hansraj is the native plant of America but also grows all over the world. It grows in moist and shady places[9]. In India it grows in the western Himalayas and extending up to Manipur. Also grows in Punjab, Bihar Maharashtra, South India, Kashmir, Shimla, Nainital, Dulhossy and Mussorie[14, 15]. It is rarely found in Afghanistan and Baluchistan way to Arabia, Syberia, Southern and Central Europe, Ireland and south west England [16]

BOTANICAL DESCRIPTION

Hansraj is belongs to family Pteridaceae it is a type of wooden herb commonly known as fern. It is very delicate and soft fern. It is 35 cm high and blackish brown in color[17.] It is glabrous and shiny in appearance. It have Bi-pinnate fronds having short and terminal pinnae and many lateral on each side. It is also having cuneate segments which are 1.5-2.5 cm broad. Rounded sinuses of crenation have sori born[18]. It is described in following manner- Frond 3-4 pinnate, pinnules firm, membranous- chartaceous, glaborous, rarely subrhomboid – acuminate, striated, the superior margin rounded, finely dentate- serrate, fertile lobes with 2 notches or rarely 3 notches each notch submembranceous , stripes, glossy and glabrous. [12]**.** It is a plant which possess leaves like coriander but are smaller. Its branches are thin and reddish black in colour. It grows in shady and damp areas near the pounds and walls [19]**.**Several varieties of Hansraj in which two types are commonly seen. One variety possess dark green leaves having appearance of bird's feathers. There is a stalk in between the leaves, branches are soft. There are small black seeds on the leaves which fall down on the soil and propagate to grow into a plant. It is 1-11/2 inch in height. This plant does not bear flower and fruit. Another variety of Hansraj have small, delicate and beautiful leaves. It attends the height of 9 inches 20. It is mentioned that the best quality of Hansraj is that which resembles to *Karafas* and its branches are hard [12, 21.]

Mizaj (Temperament)

Moatadil [19, 21, 22, 23.]

Dry and Hot [19]

Maza (Taste)

Bitter [12]

Tasteless and somehow bitter [21.]

Muzir (Toxic): In spleen diseases[19,24,25]

Musleh (Correctives): Mastaghi (*Pistacialentiscum)*, Gul-e-Banafsha (*Violoodorata Linn*) [19]

Badal (Substitutes): Zoofa(*Hyssopusofficinalis Linn*) in equal quantity[14,26]

Banafsha (*Violoodorata Linn*)[19,] Asl-us-soos (*Glycyrrhizaglabra Linn*) in half dose

Miqdar-E-Khuraq (Dose): 5- 7 gm [19]

Nafa-E-Khas (Important Function): Dafa-e-Nazla, Mushil-e-sauda, safra, balgham[19]

AFAA'L (Pharmacological Actions

1) Qabiz(Astringent**)** [16,18,12,27]
2) Aromatic[16, 12]
3) Tiryaq (Antidote)[12,21,22,27]
4) Fa'adzahar (Alexipharmic)[16,26,22]
5) Daf-e-Humma(Antipyretic)[9,16]
6) Muqawwi-e-Baah (Aphrodisiac)[16,12]
7) Nashif(Absorbent)[19,22]
8) Munzij (Concoctive)[26,19,21,22]
9) Jali (Detergent) [19,22,27]
10) Mulattif (Demulcent) [26,9,16,18,12,19,13,22]
11) Mufatteh **(**Deobstruent)[26,16,12,21]
12) Mudir-e-Baul (Diuretic)[26,9,18,12,19,13]
13) Muallid-e-Laban(Emmenogogue) [26,9,18,12,19,13,22]
14) Munaffis (Expectorant)[9,16,18,12,10,13,28]
15) Muqi(Emetic)[16,12,21,27]
16) Musakkin-e-Hararat (Febrifuge)[16,18,27]
17) Muqawwi e Sha'ar (Hair tonic)[16,18,21]
18) Hypoglycaemic [9]
19) Mughrri (Mucilaginous)[16]
20) Mushil (Purgative)[16,12]
21) Muqata'aa (Resolvent)[26,9,12,19,13]
22) Muqawwi (Tonic)[12,10,27]

Mawaq-E-Istemal (Medicinal Uses)

Hansraj has been used as a medicine since ancient times, in various abnormal condition. It is useful in the following conditions such as biliousness, phlegmatic humors, inflammations, and diseases of the chest, colds, headache, tumors, ophthalmic and hydrophobia. Oil obtained from Hansraj is applied on piles, tubercular glands and wounds. Chronic tumors can be treated by the application of leaves of Hansraj. A vapor from the leaves are useful in fever.it is also used in bruises.

Ointment which is made from it is prevented the hair fall. The plant's ashes with olive oil and vinegar are useful in the hairs growth and ring worm infestation of the scalp. It is used as tonic in convalescence from fevers[16, 12]**.**The plant is one of the ingredient in Sushruta's Vidaryadi-gana recommended for the treatment of scorpion sting[18]**.** It is used in catarrhal infections. Hard tumors of the spleen, liver and other viscera can be resolved by given the decoction of Hansraj boiled with wine [18]. It is also given in the treatment of pneumonia, pleurisy, cough cold and coryza. Its oil of Hansraj makes the hair black, soft and long. Kidney and bladder stones can be removed by the use of its decoction. Rose flower paste with decoction of fresh juice of Hansraj is an anti-mark and clear off the skin scars. Its ash mixed with wine or decoction of

Hansraj is used as a remedy for dandruff. Decoction of Hansraj is used in anuria, dysuria, asthma and jaundice. Hansraj extract is act as cardio tonic and cardiac stimulant. Hansraj in the form of sharbat act as emmenagogue so it is given in amenorrhea, oligomenorrhea and also useful for the expulsion of placenta. The water of Hansraj is antipyretic and given to the children in fever. In case of dog biting Hansraj is also very much helpful. Hansraj is also given in mouth ulcers and in stomatitis[26]. Its juice with pepper is very much important medicine in all types of fever. Leaves syrup is useful in chronic cough [13]

CHEMICAL CONSTITUENT

Terpenoids

The genus Adiantum have almost 85 triterpenoids [3-5, 15-52]. Triterpenoids mostly are the pentacyclic and belong to the hopane and migrated hopane or closely related groups such as isohopane, neohopene, fernane, isofernene, filicane, pteronane and adiane types. Genus adiantum also have a large number of nor-compound[30,31,32]. **Hopanetype of triterpinoides** are such as Hop-22(29)-ene (= Diploptene)[33,34,35,36,37]**.** 17, 29-Epoxyhopane, Hopan-28, 22-olide [34]**Isohopane** and **Neohopane type of triterpenoids** Neohop-12-ene (= Neohopene)[34,33,35,36]**. Norhopane-type triterpenoids** Trisnorhopane34**.**Isoglaucanone (= 17αH-Trisnorhopan-21-one)[33,34]**,**Isoadiantone[34,33,36,38] Adiantone[39,40]

Flavinoids

Genus Adiantum also have Flavonoids. Quercetin, keampferol and their glycosides are the most common flavonols of this genus. Quercetin 3-*O*-(6"-malonyl)-D-galactoside, rutin, isoquercetin, querciturone, kaempferol 3-glucuronide, astragalin, keampferol 3-sulphate, kaempferol 3,7diglucoside, nicotiflorin and kaempferol 3-*O*-rutinoside sulfate were isolated from *A. capillus-veneris.*[29,41,42]

Phenyl propanoids

Phenyl propanoids, 1-*p*-coumarylglucose 6-sulphate, l-*p*-coumarylglucose 2-sulphate, lcaffeylglucose 3-sulphate, 1-caffeylgalactose 6-sulphate and 1-caffeylglucose were isolated from *A. capillus-veneris.*[41]

Steroids

β –Sitosterol[43,44],Stigmasteroland campesterol[45]**.**

Alicyclic acids

Alicyclic acids,Shikimic acid and Quinic acid[46]**.**

Lipids

The betaine lipid diacylglyceryl-*O*-4'-(*N, N, N,* -Trimethyl)homoserine was isolated from *A.capillus-veneris*[47]

OTHER PHYTOCHEMICAL CONSTITUENTS

A.capillus-veneris contains asaponin glycoside. On studying the hydrolyticproducts of the saponin revealed atriterpenoidhydroxyhopanoneaglycon andthe sugar components: galactose, xylose andrhamnose. *A. capillus-veneris* was alsocontained protein.[48]

PHARMACOLOGICAL STUDIES

1) Wound healing action

Nilforoushzadeh et al has been prove the wound healing property of *A. capillus-veneris* this study revealed that the use of *A. capillus-veneris* locally it is effective in the treatment of chronic wounds which made after taking radiation therapy and also used in the healing of external wounds which are resemble to the bedsores and burns [49]**.**

2) Antioxidant property

A) The essential oil obtained from A.*Capillus-ven*eris by GC-Mass method have high amount of carvone, carvacrol and thymol due to this *A.Capillus-ven*eris have antioxidant properties which is responsible for radical scavenging activity.[50]

B) The leaves of *Adiantum capillus-veneris* are rich in free radical scavenging molecules like terpenoids, flavonoids, saponins, tannins and reducing sugar ("Evaluation of phytochemicals, antioxidant activity and elemental content of Adiantum capillus-veneris leaves") due to this A.*Capillus-ven*eris contain antioxidant properties.[51]

3) Anti-microbial and anti-fungal activity

Hussein et al conducted antifungal studies against fungi and yeast (In vitro). Methanolic extract of the plant is used for this study the phyto-constituents which are present in this extract are responsible for antifungal activity against fungi (*Aspergillus niger, Aspergillus terreus, Aspergillus flavus, Aspergillus fumigatus, Candida albicans, Saccharomyces cerevisiae, Fusariumsp etc.).* These phyto-constituents also have antimicrobial activities.[52]

4) Anti-diabetic activity

Aqueous and methanol extracts of whole plant of *Adiantum capillus-veneris* Linn have anti-daibetic activity against streptozotocin induced diabetes in rats. This study determined that methanol extract at high dose (400 mg/kg b.wt) and aqueous extract at low dose (100 mg/kg b.wt) has expedient effects on blood glucose level.[53]

5) Anti-inflammatory activity

Ethanol extract of *Adiantum capillus-veneris* Linn have chronic anti-inflammatory activity. This activity has been carried out by carrageen-induced paw edema method. The results, at the two dose levels tested in rats, indicate significant anti-inflammatory activity. [54]

6) Anti-implantation activity

Murthey et al was reported that post coital implantation in rats **is** inhibited by Petroleum ether extracts of *A. capillus* and is oadiantone[55]

7) Insect-molting hormone activity

Leaf material of ferns has insect molting hormone activity. This experiment is done on housefly larvae for bioassay [56]

8) Anticancer activity of *Adiantum capillus-veneris*

The methanol extract and gold nanoparticles of ACV and PQ were tested for their anticancer activities in MCF7 and BT47 cell lines by GC–MS methods in this study. 23 and 28 bioactive compounds are present in ACV and PQ respectively. This study shows that the effects of ACV and PQ nanoparticles on various proteins involved in cell cycle and apoptosis using western blotting and PCR. The study shows that both the crude extract and nanoparticles have anti-proliferative and apoptosis inducing properties against MCF7 and BT47 cell lines.

CONCLUSION

Hansraj *(Adiantum capillus-veneris)* was found to contain various properties. It is one of the oldest medicinal plant mentioned in Unani literature. The phytochemical components of this plant suggest that is possessing antioxidant, anticancer and anti-diabetic effect with other pharmacological activities. It is recommended that preclinical and clinical studies should be conducted in order to prove its other actions which are still scientifically unexplored.

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