ABSTRACT
The aim of the present paper is to provide information regarding the therapeutic uses and scientific studies carried out on Adiantum capillus-veneris Linn. The key words used for the literature search were Adiantum capillus-veneris, Parsioshan, physico chemical, phytochemical and pharmacological study. The search was carried out through Unani classical books, ethno botanical literature and Google scholar. The drug is popularly known as “Parsiaoshan” in Unani and used to treat a number of diseases. It is traditionally used as a diuretic, resolvent, antipyretic, demulcet, emmenagogue, expectorant and deobstruent. It is also useful in the treatment of hair fall and skin diseases. Chemical analysis of Parsioshan shows that it contains triterpenoids, flavonoids and various other constituents. Research studies have shown that it possesses anti fungal, anti inflammatory, anti bacterial, hypoglycemic and lithotriptic activities. An extensive review of ancient literature of Unani medicine revealed that the drug having numerous therapeutic actions, several of which have been established scientifically which may help the researchers to set their minds for approaching the utility, efficacy and potency of Adiantum capillus-veneris.

INTRODUCTION
As folk medicine, the pteridophytes which constitute ferns and fern allies have been known to man for more than 2000 years and also have been mentioned in ancient literature. It has been observed that pteridophytes are not infected by microbial pathogens, which may be one of the important factors for the evolutionary success of pteridophytes and the fact that they survived for more than 350 million years.
Fern and fern allies, also known as botanical snakes or plant reptiles, have always been in the center stage of attraction to botanist, horticulturists and nature lovers since ancient times. This fascinating group of pteridophytes is distributed in the Himalaya, Western Ghats, and Vindhya, hilly areas of Bihar, Orissa and Madhya Pradesh as well as in the Aravalli, particularly in Mount Abu in Rajasthan. Adiantum capillus-veneris Linn is a graceful delicate fern of damp places, found chiefly in the western Himalayas, ascending to an altitude of 2,400 m, and extending into Manipur. It is common in Punjab, Bihar, Maharashtra, and south India. It grows among rocks and on walls. Theophrastus (327-287B.C.) and Dioscorides (100A.D.) have referred to medicinal attributes of certain ferns. Adiantum capillus-veneris Linn is one such fern whose medicinal values have long been mentioned by Sushrata and Charaka.

Taxonomical Classification
Kingdom : Plantae
PHYSICOCHEMICAL AND BIOLOGICAL PROPERTIES OF ADIANTUM CAPILLUS-VENERIS LINN: AN IMPORTANT DRUG OF UNANI SYSTEM OF MEDICINE

Division: Pteridophyta
Class: Pteridopsida
Order: Pteridales
Family: Adiantaceae
Genus: Adiantum
Species: cappilus-veneris

Vernaculars
Arabic: Shairuljin, Shaar-ul-jibal, Shaar-ul- arz
Ayurvedic: Hansaaraja, hansapadi
English: Maiden hair fern, Maria’s fern, Our Lady’s hair
Gujarati: Hanspadi
Hindi: Hansraj, Mubarakra, Pursha
Kannada: Seruppadai
Persian: Srisiapeshane
Tamil: Seruppadai
Kashmiri: Dumtuli
Urdu: Persia – ushan
Unani: Barsioshan, Kazbaratul Ber

History
As early as in 100 A.C. Dioscorides described Adiantum capillus-veneris by the name of Adiavrov for having leaves serrated at the top like coriander. The Western Arabs, however, appear to use Adiantum capillus-veneris, as they call the plant Kazburat-el bir or “coriander of the wall”, indicating a habitat where A. venestum is not found. Other Arabic names for the genus Adiantum are shaar-el-jinn i.e. “fairies hair”, shaar-el-jibal i.e. “hair of the mountains”; shaar-el-flual i.e. “hair of omens”; sak-el-aswad i.e. “black stem” and Nasif-el-aswad i.e. “black veil,” Ibn Sina and other medical writers describe the drug under the name of Barsiawashan, which is the Arabic form of its Persian name Parsiawashan. It is considered to be deobstruent and resolvent, useful for clearing the primaviae of bile, and phlegmatic humors; also, expectorant, diuretic, emmenagogue, and alexipharmic properties are also ascribed to it. Used as a plaster, it is considered to be discutient, and is applied to chronic tumours of various kinds. Theophrastus mentions two kinds of Adiantum, “white” and “black,” used in making hair oil. Greek synonyms for the plant are polytrichon, calitrichon, trichomenis, and ebinotrichon.

Geographical Distribution
A native of tropical America Adiantum capillus-veneris Linn found throughout the world in moist and shady places. In India it is distributed in Tamil Nadu up to 1800 meter on the mountains, Himalaya and in north India.

Botanical Description
Adiantum capillus-veneris is a delicate graceful fern. Stipes is blackish, 10-23 cm long. Fronds bipinnate with short terminal pinna and numerous erect patent lateral ones on each side, the lowest being slightly branched; segments cuneate, 1.5-2.5 cm broad; sori borne at the roundish sinuses of the crenations, obreniform or rounded.

Pharmacological Actions and Uses in Unani Literature
It has Dafe humma (antipyretic), Mulattif (demulcent), Munaffise balgham (expectorant), Mudire baul (diuretic), Mudirre haiz (emmenagogue), Muhallil (resolvent) and Mujaffif (siccative) properties. The whole herb is used as medicine in various forms like decoction, powder, paste, oil etc. in different aliments. The whole plant is used as a hair tonic. Decoction in wine is given in cases of hard tumors of spleen, liver and other viscera. The fronds are powdered and given with honey against bad cold. It is also useful in splenic pain and jaundice. It expels the stone from the kidneys and bladder. It is therapeutically used to promote diuresis. Due to its mucilaginous, pectoral and expectorant properties, its decoction is used in breathing difficulties, bronchitis, and cough. Along with vinegar and olive oil it is useful in alopecia and with the oil of Habbul Aas it is useful in maintenance of hair
colour and hair loss. It is also useful in insect and dog bite 9, 11, 12, 13, 14.

Ethnomedicinal Uses
It is used as demulcent, expectorant, astringent, antitussive, diuretic, and emmenagogue, febrifuge and also as a hair tonic 5, 15, 16, 17. In Punjab, the fronds are given with pepper as a febrifuge; pounded with honey, they are administered in catarrhinal affections. They are smoked to relieve cold. The dried fronds are used as a substitute for tea. The herb is used as a pectoral, and also in catarrhinal affections. It is reported to be used as a hair tonic. The fern is boiled in wine or mead, and drunk in case of hard tumors in the spleen, liver and other visceras. Its decoction is also used to remove dandruff. Fresh leaves are boiled in water along with sugar; one cup of this decoction is taken orally twice a day for a week to treat jaundice and hepatitis 15. The fronds are chewed for the treatment of mouth blisters. Frond extract mixed with honey is used as an eye ointment 18.

Physico Chemical Studies

Study of the powdered drug
The powder is fine and a bit fluffy in texture. It is dark brownish green in colour and has no taste. The powder after being cleaned in charcoal hydrate, when observed under microscope, showed mostly fragments of leaves and petioles mostly with no distinguishing character. A very few isolated pieces of sporangial wall with characteristic transverse thickening were also visible. Occasional triangular spore tetrads were also present. Reaction of chemicals with crude powdered drug and fluorescence analysis (Table 1) are as follows:

<table>
<thead>
<tr>
<th>Chemicals</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder treated with water</td>
<td>An emulsion formed</td>
</tr>
<tr>
<td>Powder shaken in a test tube with water</td>
<td>No frothing, floats partially</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Powder treated with 5% NaOH</th>
<th>Turns dark chocolate brown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder treated with 66% H2SO4</td>
<td>Turns dark blakish brown</td>
</tr>
<tr>
<td>Powder pressed between two filter papers</td>
<td>No oily stain appears</td>
</tr>
</tbody>
</table>

Identity, purity, strength and assay
Foreign organic matter Nil
Purity 100%

Physico chemical constants (%)
Loss on drying at 105°C 7.36
Solid contents 74.48

Ash values
Total ash 7.81
Acid insoluble ash 4.42
Water soluble ash 0.42

Successive extractive values (%)
Pet. Ether (60-80º) 4.49
Chloroform 3.03
Acetone 4.60
Ethanol 9.27
Distilled water 14.07

Phytochemical Studies
Nine new compounds were identified in the twenty-two isolated triterpenoids, from the fresh fronds of Adiantum capillus-generis Linn collected in Japan. The plant of Chinese and Egyptian origin were also identified with the two new triterpenoids each as 4a-hydroxyfilican-3-one and fern-9 (11)-en-12b-o and oleanane triterpenoids; olean-12-en-3-one and olean-18-en-3-one 19.

Four triterpenoidal compounds belonging to adiantane and filicane groups, isoadiantone; isoadiantol-B; 3-methoxy-4-hydroxyfilicane and 3,4-dihydroxyfilicane, from the hexane fraction and three flavonoids from the ethyl acetate fraction as: quercetin, quercetin-3-O-glucoside and quercetin-3-O-rutinoside (rutin) were identified in Chromatographic fractionation of the alcoholic extract of the dried fronds of Adiantum.
capillus-veneris Linn. The identification of the isolated compounds has been established through their physical, chemical and spectroscopic methods including IR, $^1$H NMR, $^{13}$C NMR, HSQC, HMBC, NOESY and MS.

**Scientific Reports**

**Antifungal Activity**
The water extracts and extracted phenols from gametophytes and different parts of sporophytes of, *Adiantum capillus-veneris* L. was investigated for its antifungal activity and found to be bioactive against *Aspergillus niger* and *Rhizopus stolonifer*. Antifungal activity was found to be higher in gametophytes. Among the different parts of sporophytes, immature pinnule possesses highest fungi static property.

**Antioxidant activity**
Antioxidant potential of leaf extract of *Adiantum capillus-veneris* Linn was studied in vitro by Anil Kumar, against H$_2$O$_2$ induced oxidative damage in peripheral blood lymphocytes. Pre treatment with plant leaf extract for 18 hours could effectively inhibited lipid peroxidation and enhanced the activities of antioxidant enzymes and glutathione content significantly. The results indicate that it might be due to its direct action in scavenging free radicals and thereby modulating the antioxidant defence system.

**Antibacterial activity**
Pradeep investigated the *in vitro* antibacterial activity of twelve important pteridophytes plants by disc diffusion method. The aqueous and alcoholic leaves extract of *Adiantum capillus-veneris* Linn were found to be effective against *Agrobacterium tumefaciens*, *Escherichia coli*, *Salmonella arizonae*, *Salmonella typhi* and *Staphylococcus aureus* strains of Bacteria.

**Anti inflammatory activity**
Alcoholic extract of *A. capillus-veneris* and its hexane fraction showed a significant anti-inflammatory activity against formalin induced inflammation. The hexane fraction and compounds 3, 4 showed topical anti-inflammatory activity after 6 h and continued for 30 h in croton oil-induced inflammation.

The ethyl acetate fraction of the ethanolic extract of *A. capillus-veneris* showed significant inhibition of hind paw oedema induced by carrageenan when evaluated for its anti-inflammatory activity.

**Analgesic activity**
The analgesic activity of the ethanolic extract of *A. capillus-veneris* and its fraction has been carried out by tail flick method and writhing test result showed significant analgesic activity with insignificant ulceration as compared to the standard drug.

**Hypoglycemic activity**
The alcoholic extract of *A. capillus-veneris* showed a significant hypoglycaemic effect in OGTT using rabbit model. Started after 30 min and continued for 4 hours.

**Lithotriptic activity**
*In vitro* antilithiasic activity of hydro alcoholic extract of *Adiantum capillus-veneris* was evaluated by crystallization, aggregation and nucleation assays. The result showed significant inhibition of crystallization and aggregation which was further confirmed by *in vivo* study against Ethylene glycol (0.75%) and ammonium chloride (1%) induced Urolithiasis in male Sprague Dawley rats. Urine microscopy showed significant reduction in the number of crystals in test groups.

**DISCUSSION**
The present review reveals that *Adiantum capillus-veneris* Linn is used in treating various ailments. Recent ethno botanical, phytochemical and pharmacological studies have reported the medicinal values of *Adiantum capillus* and its active constituents. This review provides evidence based scientific validation to some of the therapeutic uses and actions described for Parsioshan in classical texts of Unani medicine. It is popularly used as diuretic and for the treatment of various complaints.
of kidney stone in Unani system of medicine since long. Its pharmacological activities like anti oxidant\textsuperscript{21}, anti bacterial\textsuperscript{22}, anti-inflammatory\textsuperscript{24}, lithotriptic activities\textsuperscript{25} clearly justify its therapeutic efficacy in nephrolithiasis. It is further suggested that phytochemical and pharmacological studies on some of the less known or controversial Unani drugs may be taken up on priority basis not only to scientifically validate therapeutic uses, but revive the faith and confidence of Unani practitioners in its actions to serve the large strata of the rural society.

CONCLUSION
This article briefly reviews the traditional knowledge and ethno medicinal reports on therapeutic activities of the plant \textit{Adiantum capillus-veneris} Linn. The physicochemical, phytochemical and pharmacological studies of this plant provide a scientific basis for its therapeutic use.

ACKNOWLEDGEMENT
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Table 1: Fluorescence analysis of the powdered drug

<table>
<thead>
<tr>
<th>Powder as such</th>
<th>Ordinary light</th>
<th>Ultra violet light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder treated with 1N NaOH in methanol</td>
<td>Dark brown</td>
<td>colourless</td>
</tr>
<tr>
<td>Powder treated with 1N NaOH in water</td>
<td>Dark brown</td>
<td>colourless</td>
</tr>
<tr>
<td>Powder treated with 1N HCl</td>
<td>Brown</td>
<td>colourless</td>
</tr>
<tr>
<td>Powder treated with 50% HNO&lt;sub&gt;3&lt;/sub&gt;</td>
<td>Dark cherry brown</td>
<td>colourless</td>
</tr>
<tr>
<td>Powder treated with 50% H&lt;sub&gt;2&lt;/sub&gt;SO&lt;sub&gt;4&lt;/sub&gt;</td>
<td>Dark brownish green</td>
<td>colourless</td>
</tr>
<tr>
<td>Powder mounted in nitro cellulose in amyl acetate</td>
<td>Almost black</td>
<td>colourless</td>
</tr>
<tr>
<td>Powder treated with 1N NaOH in methanol, dried and then mounted in nitrocellulose in amyl acetate</td>
<td>Dark chocolate brown</td>
<td>colourless</td>
</tr>
<tr>
<td>Powder treated with 1N NaOH in water, dried and then mounted in nitrocellulose in amyl acetate</td>
<td>Dark brown</td>
<td>colourless</td>
</tr>
</tbody>
</table>