Int.J.Curr.Microbiol.App.Sci (2023) *12*(06): 12-25

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 12 Number 6 (2023)**
Journal homepage: http://www.ijcmas.com

Review Article https://doi.org/10.20546/ijcmas.2023.1206.002

A Comprehensive Review of Avicennan Cardiac drug: Saad Kufi (*Cyperus scariosus* R. Br)

Sana Nafees[1]*, Huda Nafees[2] and Kunwar Mohammad Yousuf Amin[1]

[1]*Department of Ilmul Advia,*
[2]*Department of Saidla, Aligarh Muslim University, Aligarh, India*

**Corresponding author*

Keywords

Saad kufi, Cyperus scariosus, traditional system of medicine

Article Info

Received:
02 May 2023
Accepted:
06 June 2023
Available Online:
10 June 2023

A B S T R A C T

Unani System of Medicine (USM) is one of the Traditional System of Medicine (TSM), based on the drugs originated from plants, animals and minerals. Cardioprotective Unani drug, Saad Kufi (*Cyperus scariosus* R. Br.), mentioned by the intellectual colossus Ibn Sina (Avicenna) 1000 years back in his book, "Risala al Adwiya al Qalbiya" and still widely used by Unani physicians. This review, briefly describes the potential benefits and uses of a traditional medicinal plant "Saad Kufi". The database such as PubMed was extensively explored. Additionally, Unani Pharmacopoeia of India was consulted along with the relevant classical documents and textbooks to summarize most of the considerable scientific literature for the review.

Introduction

Saad kufi (*Cyperus scariosus* R. Br) is a hardy grass like perennial plant consisting of 600 species distributed in tropical and warm temperate region of the world. Cyperus is a greek word meaning sedge (Bhattacharjee, 2004). Medicinally, the root of *C. scariosus* is used for the same purpose as those of *Cyperus rotundus* (Dey, 1973; Dymock *et al.*, 1893) and this have long been in use in Hindu medicine and perfumery under the Sanskrit name Nagar mustaka (Dymock *et al.*, 1893). Ibn Sina (Avicenna, 980-1030 CE.), the most significant thinkers and writers of Islamic golden age first time systematized the individual cardiac drugs in "Risala Advia Qalbia", which deals with 63 cardiac drugs which are claimed to be beneficial for heart ailments as well as for psychiatric ailments. He described Saad as a root of a plant which is nodular, long, slender and plants look a wheat plant (IbnSina and Al-Qanoon Fil Tibb, 2014; Ibn Baitar *et al.*, 1999; Ghani N.Khazainul Advia, 2010) as shown in figure 1 (a and b). Roots are thick, elongated, slender, black in colour, aromatic smell with pungent taste (Ibn Baitar *et al.*, 1999; Ghani N.Khazainul Advia, 2010). Stem is of about one hand long and prostrate surrounded by small leaves and nodes (Ibn Baitar *et al.*, 1999). Leafless or leafy shoots are produced

above ground. Infloresence is umbel or head like. Spikelets are one to many flowered (Bhattacharjee, 2004) and are linear straw coloured (Bhattacharjee and De, 2005). Wild and domestic variety of saad are found, domestic variety is small and are found in damp places or near the lodged water or may found in less deep and running water.

Wild variety is present near damp places and sandy region. The Saad found in kufi is of best variety so it is named as Saad Kufi (Ghani N.Khazainul Advia, 2010). Best Saad is one which is solid/hard, thick not easily fractured and have strong aroma (IbnSina and Al-Qanoon Fil Tibb, 2014; Ibn Baitar *et al.,* 1999; Khan A. Muheet-e-Azam, 2014). Ibn Sina named it as Sor Kufi. Inferior to this, is of reddish colour and inner surface is white and have aroma.

Indian Saad is of black colour and colour disappears on rubbing. One variety of Saad is called as "Aadgi"or "Regi"in which is found in Sheeraz,near water, height is small and have aroma. In Egypt called as Saad ansri (Ghani N.Khazainul Advia, 2010).

Vernaculars

Saad Kufi has been known by various other names in different languages and dialects that has been described in Table. 1

Botanical Description

Scientific Classification

Kingdom: Plantae

Phylum: Angiosperm

Class: Magnoliales

Order: Cyperales

Family: Cyperaceae

Genus: Cyperus

Macroscopic Examination

The ovoid tubers of this plant are developed upon a thin underground stem, and are simple or branched, generally about 2 inches long and half inch in diameter, the external surface is marked by a number of annular ridges, and is almost concealed by the remains of leaves; when these are removed, the colour of the tuber is a deep brown, a few wiry rootlets arise from its under surface, and at the lower end is a portion of the underground stem. The substance of the tuber is hard and of a reddish colour. It is divided into a central and cortical portion, the latter being of a darker colour. The odour is strongly aromatic (Dymock *et al.,* 1893; Anonymous, 2016) like Acorus, but somewhat terebinthinate. The plant is aquatic and grows in the concan in ponds and ditches along with *Scirpus subulatus* (Dymock *et al.,* 1893).

Microscopic Structure

The outermost layer of the cortical portion is composed of large bundles of reddish–brown stony cells, separated from one another by interspaces, within it are from 6 to 8 rows of very thick–walled, empty cells, next a tissue of thick-walled cells, most of them full of large starch granules but some containing essential oil and probably resinous matter.

The central portion of the tuber is separated from the cortical by a single row of small yellow stone cells which is composed of thick–walled cells full of starch like those in the cortical portion, but differs from it, in as much as many of the cells contain red colouring matter. Large vascular bundles abound in the root, some of them are surrounded by a layer of stony cells (Dymock *et al.,* 1893; Anonymous, 2016).

Powder

Shows fragments of epidermis in surface view with dark brown cell contents; groups of longitudinally cut, dark brown coloured hypodermal sclereids,

oleoeresin cells and simple starch grains scattered as such throughout or embedded in the parenchymatous cells of cortex and stelar tissue; fragments of pitted and spiral tracheidal vessels, thick walled, pitted fibres from the stelar vascular strands (Anonymous, 2016).

Cultivation and Collection

The compost mixture of consisting of one part each of leaf mould and sand, and two parts loamy soil is preferable. Wet and swampy location, margins of lakes and ponds are proper situation for planting these plants. Moderate watering during winter and adequate irrigation in other seasons is suggested. Plants are increased by seeds or by division of roots (Bhattacharjee, 2004).

Unani Description

Part Used (*Hissa –e- Mustamila*)

Roots of Saad kufi as medicine has been used in Unani traditional medicine (Ibn Baitar *et al.,* 1999; Antaki *et al.,*; Nabi *et al.,* 2007; Kabiruddin *et al.,* 2007; Khan A. Muheet-e-Azam, 2014; Hasan *et al.,*)

Temperament/Mizaj

Hot (1^0) and Dry (2^0) (17), Hot (2) and Dry (2) (Gazrooni *et al.,* 1891; Ibn Baitar *et al.,* 1999; Nabi *et al.,* 2007; Kabiruddin *et al.,* 2007) Hot and Dry (III^0 1 Grade) (Gazrooni *et al.,* 1891; Ghani N.Khazainul Advia, 2010; Khan A. Muheet-e-Azam, 2014) Hot and Dry (II^0 Last Grade) (Hussain *et al.,* 1855; Ghani N.Khazainul Advia, 2010; Khan A. Muheet-e-Azam, 2014).

Taste

The taste of this drug is bitter (Hasan *et al.,*; Kabiruddin *et al.,* 2007).

Odour

Aromatic (Hasan *et al.,*; Kabiruddin *et al.,* 2007).

Unani Pharmacological Actions (Af'al)

The Unani drug Saad kufi have been used for innumerable action, some of the actions have been described in table. 2.

Unani Therapeutic uses *(Mahall-e- Istemalat*)

Some of the Unani therapeutic uses of Saad kufi have been listed in table. 3.

Dose(*Miqdar*)

Various doses of Saad Kufiare1g-3g(9) 3.5 g-4.5 g(8)3-6 g(12)3-7 g(22)**,** 6 g (19)9 g(14).

Adverse Effects (*Muzir)*

It may have side effects on throat (Hussain *et al.,* 1855; Kareem *et al.,* 1879; Gazrooni *et al.,* 1891; Khan A. Muheet-e-Azam, 2014) lungs (Hussain *et al.,* 1855; Kareem *et al.,* 1879) vocal sound (Hussain *et al.,* 1855; Kareem *et al.,* 1879; Gazrooni *et al.,* 1891; Nabi *et al.,* 2007).

Corrective *(Musleh*)

Some correctives of Saad Kufi that may reduce its side effects are Sugar (Qand) (Hussain *et al.,* 1855; Kareem *et al.,* 1879; Fazalullah, 1918; Nabi *et al.,* 2007; Khan A. Muheet-e-Azam, 2014) *Pimpinella anisum* (Anisoon) (Nooruddin *et al.,*; Hussain *et al.,* 1855; Gazrooni *et al.,* 1891; Fazalullah, 1918; Nabi *et al.,* 2007) vinegar (Khan A. Muheet-e-Azam, 2014).

Substitute (*Badal*)

Nordostachys jatamansi (Sumbul tib) **(**Fazalullah, 1918; Nabi *et al.,* 2007) ((*Cinnamomum zeylonicum*) Darchini **(**Nooruddin *et al.,*; Gazrooni *et al.,* 1891; Fazalullah, 1918; Nabi *et al.,* 2007; Khan A. Muheet-e-Azam, 2014) *Commiphora myrrha* (Murmakki) (Hasan *et al.,*; Fazalullah, 1918)

Unani Murakkabat

The various Unani formulations with chief ingredient Saad Kufi areAnqarya Sagheer, Jawarish Jalinoos, Dawae Bawaseer (Anonymous, 2008).

Chemical Composition

The tubers of *C. scariosus*yield essential oil has yield percentage of 0.5 and further acidhydrolysis of non-volatile part has 0.5%oil. Numerous volatile compounds are isopatchoul-4(5)-en-3-one (16.5%), cyperine (15.8%), patchoulanol, 7(11)-diene, selina -4(5), I-oxo-selina -4(14),7(11)-dien-12-olhave been reported from the oil(23). Caryophyllene oxide, rotundene, 4-hydroxy-4-methyl-2-pentanone, αandβ-pinenes, limonene, l-fenchone, linalcol, trans-pinocarveol, estragole, copaene, longifoline, α-gurjunene, β-caryophyllene,cis-β-farnesene, aromadendrene, α-humulene, iso-aromandendrene epoxide, allo-aromadendrene, γ-gurjunene, germacreneD, patchoulenone, βselinene, rotundone, (+)-δ-cadinene, eudesma-4(14)-11-diene, spathulenol, guaiazulene, (-)-β-selinene, isopatchoula-3,5-diene, isopatchoul-3ene, cyperenol, patchoulenol, rotudenol, cyperotundone (isopatchoulenone), 2,3-diacetoxy-19-hydroxyurs-12-ene-24-O-β-D-xylopyranoside (Anonymous, 2016).

Phytochemical Studies

Phytochemical studies revealed that *C. scariosus* that chief chemical components are alkaloid, glycoside, cardiac glycosides, polyphenol, flavonol, saponins, sesquiterpenes and essential oil. Cyperene, cyperotundone, Cyperone, patchulenone, selinene, isokobusone and kobusone and sesquiterpene (monoterpene) derivatives of sesquiterpenes such as cyperone, cyperol and isocyperol are among the primary sesquiterpenes isolated from the rhizome of Cyperus. The volatile oil present in the rhizome of cyperus is 0.51 percent and it contain several active components. Some of these constituents will be lost if the herb is cooked for a long time. Pinene, patchoulane, cyperenelongifolene oxide, citral, aristolene, isopatchoulenone, cyperenone, cyperenol, patchoulenol, and scariodone are the primary chemical elements of *Cyperus scariosus*. patcholenone, mustakone, cyperotandone, cyperene-I (a trycyclicsesquiterpene hydrocarbon), cyperene-II (a bicylclicsesquiterpene hydrocarbon), cyperene-II (a bicylclicsesquiterpene hydrocarbon), cyperene-II (a bicylclicsesquiterpene hydrocarbon) (cyperenone), -selinene, cypertone, copadieneepoxyguainene, rotundone, eugenol, cyperol, isocyperol, -rotundol, -rutonol, kobusone, isokubusol-selinene, -cyperone caryophyllene6,7-oxide,caryophyllene-6-one and caryophyllene. The sesquiterpene, ketone and alcohols constitute about half of the essential oil.

Chowdhary and Gupta (24) investigated the constituents present in essential oil and discovered the following major hydrocarbons: myrcene (0.5 percent), -pinene (1.2 percent), -pinene (14.18 percent), patchoulone (9.27 percent), cyperene (17.17 percent), -selinene (4.26 percent), isopatchoulene (2.7 percent), longifolene oxide (24.61 percent), alcohol: spathulenol (4.85%), patchoulanol (1.8%), cyperol (2.0%), sesquiterpene alcohol (M)+220, Aldehyde: citral (6.14%), Ketone: aristolone (7.29%), cyperolone (0.05%) were reported. Garg *et al.*, discovered the volatile components of the essential oil of *Cyperus scariosus* tubers. Three novel sesquiterpenoids have been isolated, their structures were explained using spectroscopic methods, and their chemical transformations completed by using distinct spectroscopic approaches like mass spectroscopy (MS), NMR and infrared spectroscopy (IR) (Garg *et al.*, 1988). Bicyclic and tricyclic sesquiterpenes were discovered in the essential oil (Naves and Ardizio, 1954). The essential oil of *C. scariosus* comprises a bicyclic ketone, a tricyclic tertiary alcohol, and a tricyclic sesquiterpene hydrocarbon. Nerali *et al.*, (1965) reported the isolation of isopatchoulenone (I), a novel sesquiterpene ketone structurally related to patchoulenone. Nigam (1965) isolated cyperenone (I), a sesquiterpene ketone from the same plant. Hikino and his colleagues (1967) discovered a sesquiterpene ketone called

cyperotundone (I) from three Cyperus species (*C. rotundus, C. Scariosus* and *C. articulatus*). Neville *et al.,* (1968) obtained a ketone and determined that the ketones isolated by the previous investigators were the identical, proposing the name isopatchoul-4 (5)-en-3-one as a new nomenclature (I). From the alcoholic fractions of the essential oils of the tubers, Nerali *et al.,* (1967) isolated two sesquiterpene alcohols, cyperenol (II) and patchoulenol (III).

Scariodione was discovered in the oil of *Cyperus scariosus* by Nerali and Chakravarti and determined its structure and stereochemistry (1969). The essential oil of C. scariosus rhizome yielded two sesquiterpenoids: hydrocarbon (-)-beta-selinene (VI) and the novel substance isopatchoula-3,5-diene (VII) (Gopichand *et al.,* 1978). Uppal *et al.,* (1984) identified a novel hydrocarbon, isopatchoul-3-ene (VIII), which was discovered to be a tricyclic compound with an isopatchoulane type carbon backbone after spectral analysis. By using a solvent-solvent partitioning and chromatographic approach, longiverbenone (IX), a naturally occurring sesquiterpene, was extracted from an ethanolic extract of *C. scariosus* rhizome (Rahman and Anwar, 2008). From the tubers of *C. scariosus*, Sahu *et al.,* (2010) identified a novel chemical, 2, 3-diacetoxy-19-hydroxy-urs-12-ene-24-O—D-xylopyranoside (X). The identification of stigmasterol (XI), -sitosterol (XII), and lupeol (XIII) as main constituents of hexane and chloroform extracts of *C. scariosus* rhizomes chromatographed on silica gel led to the preliminary phytochemical research (Kakarla *et al.,* 2015). Bhatt *et al.,* (1981) investigated the phytoconstituents of *C. scariosus* leaves and extracted a phenolic glycoside, which when acidically hydrolyzed yielded an aglycone containing glucose and rhamnose. The new glycoside's structure was given as leptosidin 6-O—D-glucopyranosyl-O—Lrhamnopyranoside after the aglycone was discovered as leptosidin. Leptosidin-6-O-(-Dxylopyranosyl (14)—D-arabinoside (Garg *et al.,* 1989) and stigmasta-5, 24 (28)-diene-3 -O—L-rhamnopyranosyl-O—D--glucopyranosyl-O-α-Lrhamnopyranoside (Yusuf *et al.,* 1994). Several workers tentatively recognised alcohol, aldehyde, ester, terpenes, hydrocarbon, ketone, and other chemicals. Yusuf *et al.,* (1994) reported pinene (8.84 percent), camphene (11.40 percent), trans pinocarveol (10.53 percent), myrtenol (3.54 percent), verbenone (2.25), cyperene (2.47 percent), spathulenol (5.99 percent), cryophyllene oxide (7.15 percent), myrtenal (6.41 percent), lim (10.02 percent) (Srivastava *et al.,* 2014). However, according to Vazefafaij-Hury, cyperene (24.42%), alfa-copaene (3.22%), -selinene (2.22%), -selinene (1.33%), iso-patchoulenone (2.29%), and corymbolone (2.29%) were found (11.91 percent). Various writers have reported over 100 substances while examining the chemical components of essential oils from the rhizome (Alam *et al.,* 2011).

Pharmacological Studies

Anti-nociceptive activity

Alam *et al.,* (2011) investigated anti-nociceptive effect of a methanol extract of *Cyperus scariosus* leaves. Results showed the highest inhibition of writhing (46.62%) was obtained with methanol extract of leaves at a dose of 200mg extract/kg body weight ($p<0.01$), whereas the standard aspirin induced 56.74%, ($p<0.001$) writhing inhibition at the same dose (Alam *et al.,* 2011).

Hypotensive and Spasmolytic activity

Intravenous injection of *Cyperus scariosus* hydro-methanolic extract in a dose of 3-10mg/kg resulted in hypotension and bradycardia. These effects were unaffected in atropinized mice, demonstrating that the plant extracts cardiovascular effects are not mediated by muscarinic receptor activation. It reduced spontaneous contractions of guinea-pig paired atria, rat uterus, and rabbit jejunum in a concentration dependent (0.1-1 mg/ml) way in *invitro* investigations. It also inhibited acetylcholine or histamine induced ileum contractions in guinea pigs, demonstrating that it has a non-specific spasmolytic effect. It reduced nor epinephrine (10Pm) and K^+(80Mm) induced contractions in rabbit aorta at equal dosages (0.1-1 mg/ml). These

findings suggest that *Cyperus scariosus* contains $Ca2^{+}$ channel blocker like constituents which could explain the plants hypotensive impact *in vivo* as well as its folklore use in diarrhoea (Gilani *et al.,* 1994). Nafees et investigated antihypertensive effect of 50% ethanolic extract of Saad Kufi (*Cyperus scariosus* R.Br) (EESK) in adrenaline-induced hypertension in Wistar albino rats. The induction of systolic blood pressure (SBP) and the percentage of inhibition was measured in EESK (15 and 25 mg/100 g, orally) with standard as Metoprolol (0.5 mg/100 g) orally, using tail-cuff apparatus with AD instrument power lab to evaluate the antihypertensive effect. Results showed that EESK significantly decreased the induction in SBP as compared to disease control rats ($p < 0.05$), and there is a significant increase in the percentage of inhibition in SBP in EESK and metoprolol-treated rats as compared to the disease control group ($p < 0.05$). The study concluded that *Cyperus scariosus* significant antihypertensive activity in adrenaline-induced hypertensive rats (Nafees *et al.,* 2020).

Hepatoprotective activity

The hepatoprotective effect of an aqueous methanolic extract of *Cyperus scariosus* against acetaminophen and CCl4 induced liver injury was examined. In mice treated with acetaminophen, complete mortality was found at a dose of 1g/kg, but pre-treatment with plant extract (500mg/kg) lowered the death rate to 30%. In rats, a dose 640mg/kg dose of acetaminophen caused an increase in serum levels of alkaline phosphatase (ALP) glutamate oxaloacetate transaminase (GOT), and glutamate pyruvate transaminase, as well as liver damage. The serum ALP, GOT and GPT levels in rats pre-treated with plant extract at a dose of 500mg/kg were significantly reduced ($P < 0.05$) (Gilani and Janbaz, 1995).

Hypersentivity

The chloroform extract of *C. scariosus* inhibited the response of Tcell in Balb/c mice in both the type of immune responses i.e humoral and cell mediated significantly**(**$p<0.01$) by suppression of secondary (29.7%) and primary (26.8%) antibody titres and it also inhibited the cell mediated delayed type of hypersensitivity immune response (45.9%) at 600mg/kg dose. It significantly suppresses CD8+/CD4+T cell surface markers 14.0/25.3% and intracellular Th1 cytokines namely IL-2 and IFN-γ upto 34.4% and 34.7% respectively when compared with standard drug cyclosporine A, and standard T cell inhibition upto 53.6% at a dose of 200mg/kg dose to Balb/c mice while C. s*cariosus* did not show suppression of Th2(IL-4) system (Bhagwat *et al.*, 2009).

Antidepressant activity

The antidepressant effect was tested in mice at two doses i.e., 100 and 200 mg/kg respectively by using the forced swim test and tail suspension test, results were compared with a standard drug imipramine at 15 mg/kg dose. The results showed, n hexane extract oil of *C. scariosus* significantly reduced the immobility time in mice with significant value $p<0.001$ at both the dose levels in both tests forced swim test as well as in tail suspension test when compared with the standard drug. Therefore, the results suggest that the n hexane extract oil of C. scariosus having antidepressant activity due to the increase in the levels of nor epinephrine (Ramesh *et al.*, 2012).

Anti-hyperglycaemic activity

In a study the glucose tolerance property of the leaves of *C. scariosus* has been determined on mice. The results of the study revealed that the methanolic extract of the drug exhibited anti hyperglycaemic activity in dose dependent manner.

The extract showed significant effect at higher dose and at 400 mg extract/kg body weight the maximum effects was found which was almost similar to the effect of the standard drug i.e., glibenclamide (Alam *et al.*, 2011).

Table.1 Vernaculars of Saad Kufi

Language	Vernacular	Reference
Unani	Fiqaras	(Ibn Baitar *et al.*, 1999)
Latin	*Cyperus scariosus*	(Kabiruddin *et al.*, 2007)
Arabic	Saad	(Ibn Baitar *et al.*, 1999)
Persian	Mushk zer zamin	(Ibn Baitar *et al.*, 1999, Nooruddin *et al.*,; Hussain *et al.*, 1855)
Hindi	Nagar- motha	(Dymock *et al.*, 1893, Anonymous, 2016)
Sanskrit	Nagar-mustaka	(Dymock *et al.*, 1893)
Gujrati	Nagar –motha	(Dymock *et al.*, 1893)
Bengali	Nagar –mutha	(Dymock *et al.*, 1893, Anonymous, 2016)
Marathi	Lavala	(Dymock *et al.*, 1893, Anonymous, 2016)
Telugu	kola -tunga –muste	(Dymock *et al.*, 1893, Anonymous, 2016)
Cannar	Konnani	(Dymock *et al.*, 1893)
Tamil	Muttah –kach	(Dymock *et al.*, 1893)

Table.2 Unani Pharmacological Actions

Unani Traditional Action	Traditional Unani Terminology	Reference
Exhilarant	*Muffarah*	(Hasan *et al.*,; Ghani N.Khazainul, 2010)
Cardiotonic	*Muqawwi Qalb*	(IbnSina, 2014; Kabiruddin *et al.*, 2007)
Nervine Tonic	*Muqawwi Asaab*	(Hussain *et al.*, 1855; Kareem *et al.*, 1879; Kabiruddin *et al.*, 2007; Harwi Y.Ainul Hayat, 2008; Khan A. Muheet-e-Azam, 2014
Strengthens urinary bladder	*Muqawwi Masana*	(Ibn Baitar *et al.*, 1999; Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014)
Liver Tonic	*Muqawwi maida wa jigar,*	Hussain *et al.*, 1855; Kareem *et al.*, 1879; Ibn Baitar *et al.*, 1999; Khan A. Muheet-e-Azam, 2014)
Carminative	*Kaasir riyah*	(Hussain *et al.*, 1855; Kareem *et al.*, 1879; Ibn Baitar *et al.*, 1999; Khan A. Muheet-e-Azam, 2014)

Appetizer	*Mushtahi*	(Nabi *et al.,* 2007; Kareem *et al.,* 1879)
Aphrodisiac	*Muqawwi Bah*	(Hasan *et al.,*; Nabi *et al.,* 2007; Kareem *et al.,* 1879).
Astringent	*Qabiz*	(IbnSina, 2014; Fazalullah, 1918; Hasan *et al.,*),
Dessicant	*Mujaffif*	(Nooruddin *et al.,*; Antaki *et al.,*; Hussain *et al.,* 1855; Attar *et al.,* 1888; Hasan *et al.,*; Nabi *et al.,* 2007)
Diuretic	*MudirBoul*	(Nooruddin *et al.,*; Antaki *et al.,*; Hussain *et al.,* 1855; Kareem *et al.,* 1879; Gazrooni *et al.,* 1891; Ibn Baitar *et al.,* 1999; Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014)
Lithotriptic	*Mufattit hisat*	(Nooruddin *et al.,*; Antaki *et al.,*; Hussain *et al.,* 1855; Fazalullah, 1918; Ibn Baitar *et al.,* 1999; Ghani N.Khazainul, 2010; IbnSina, 2014; Khan A. Muheet-e-Azam, 2014)
Emenogouge	*Mudir Haiz*	(Antaki *et al.,*; Kareem *et al.,* 1879; Hussain *et al.,* 1855; Gazrooni *et al.,* 1891; Attar *et al.,* 1888; Ibn Baitar *et al.,* 1999; IbnSina, 2014; Ghani N.Khazainul, 2010; Nabi *et al.,* 2007; Khan A. Muheet-e-Azam, 2014)
Mouth Freshner		(Hussain *et al.,* 1855; Attar *et al.,* 1888; Kareem *et al.,* 1879; Gazrooni *et al.,* 1891; Harwi Y.Ainul Hayat, 2008; Fazalullah, 1918; Ibn Baitar *et al.,* 1999; Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014)
Complexion enhancer		(Hussain *et al.,* 1855; Kareem *et al.,* 1879; Ibn Baitar *et al.,* 1999; Harwi Y.Ainul Hayat, 2008; Ghani N.Khazainul, 2010)
Hair Removar	*Haaliq*	(Ibn Baitar *et al.,* 1999)
Antidote	*Dafe* sumoom	(Antaki *et al.,*).

Table.3 Unani Pharmacological uses

Unani Traditional Uses	Traditional Unani Terminology	Reference
Weakness of heart,brain and stomach	*Zoaf Qalb, Dimagh wa Maidah*	(Kabiruddin *et al.*, 2007; Anonymous, 1997)
Paralysis, palsy, tremor	*Falij, laqwa, Rasha*	(Gazrooni *et al.*, 1891; Antaki *et al.*,)
Chronic ulcer	*Qarha muzzamina*	(Ibn Baitar *et al.*, 1999)
Ascites	*Istisqa*	(Ibn Baitar *et al.*, 1999)
Chronic fever	*Humma muzmina*	(Hussain *et al.*, 1855; Kareem *et al.*, 1879; Ibn Baitar *et al.*, 1999; Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014)
Scorpion poisoning		(Kareem *et al.*, 1879; Gazrooni *et al.*, 1891; Ibn Baitar, 1999; Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014
Bleeding Gums		(Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014)
Mouth ulcer	Qarooh lassa	(Gazrooni *et al.*, 1891; Harwi Y.Ainul Hayat, 2008; IbnSina, 2014)
Haemorrhoids	*Bwaseer*	(Harwi Y.Ainul Hayat, 2008; Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014; IbnSina, 2014)
Jaundice	*Yarqaan*	(Antaki *et al.*,, Hussain *et al.*, 1855; Kareem *et al.*, 1879; Gazrooni *et al.*, 1891; Nabi *et al.*, 2007; Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014)
Palpitation	*Khafqan*	(Antaki *et al.*, ; Hussain *et al.*, 1855; Kareem *et al.*, 1879; Gazrooni *et al.*, 1891; Nabi *et al.*, 2007; Ghani N.Khazainul, 2010; Khan A. Muheet-e-Azam, 2014)
Urinary bladder stone	*Hisat –e-Masana*	(Gazrooni *et al.*, 1891; Khan A. Muheet-e-Azam, 2014)
kidney stone	*Hisat –e-Kulliya*	(Gazrooni *et al.*, 1891; Khan A. Muheet-e-Azam, 2014).

Fig.1 (a) Whole plant image of Saad Kufi (b) Roots of Saad kufi

Hypolipidemic activity

Chawda et.al studied the antioxidant and lipid lowering effects of the hydroalcoholic extract of root of *C. scariosus* on guinea pigs fed with high cholesterol diet. Results showed decrease in levels of serum lipid profile and also atherogenic indices at both the doses of hydroalcoholic extract of the drug with significant values of $P < 0.05$. The serum levels of ALP, LDH and AST also decreased at higher doses of hydroalcoholic extract. Histology of liver shows decrease accumulation of lipid and hepatocytes improvement and this effect might be due to the phenolic compounds present in the drug that exhibits antioxidant activity (Chawda *et al.*, 2014).

Acute toxicity study

Various doses of methanolic extract of leaves of *C. scariosus* (100, 200, 300, 600, 800, 1000, 2000 and 3000 mg/kg of body weight) were administered in animals. Results showed that no mortality was observed till the end of 14 days. Another toxicity study was done on albino rats. The essential oils of the drug in different doses upto 5000mg/kg p.o were administered in overnight fasted rats. Results showed that no mortality was found (Alam *et al.*, 2011).

Antioxidant activity

The 50% methanolic extracts of *C. scariosus* obtained from different plant parts contained significant amounts of polyphenols with superior antioxidant activity as evidenced by the scavenging of DPPH·, ABTS·+, NO, ·OH, O2.- and ONOO-. It showed significant potential for preventing oxidative DNA damage and radical scavenging activity. The extracts showed significantly high total phenolic content and total flavonoid contents which contribute to their antioxidant activities (Kalim *et al.*, 2010).

Antifungal activity

Essential oils from leaves of 14 plants were tested for their antifungal properties against 6 dermatophytes (Keratinomycesajelloi, *Microsporum gypseum*, *Trichophyton equinum*, *T. mentagrophytes*, *T. rubrum* and *T. terrestre*). Essential oil from *Cyperus scariosus* showed high

activity against all the dermatophytes, while oils from *Murraya koenigii, Thuj aorientalis, Mimusops elengi* and *Cymbopogon martini* var.motia were active against some of the fungi (Deshmukh *et al.,* 1986). Dubey *et al.,* (2011) carried out the antifungal activity of steam distilled essential oil, hexane extract of fresh and distilled *C. scariosus* rhizome from Uttar Pradesh (India) and Madhya Pradesh (India) against the phyto-pathogenic fungus *Rhizoctonia solani.*

The ED50 of steam distilled oil of U.P. and M.P. was recorded as 512 and 517 µg/ml respectively, while fresh rhizomes from U.P. and M.P. showed the highest fungitoxicity with ED50 of 448 and 478 µg/ml respectively. The oil obtained from distilled rhizomes showed least activity with ED50 of 1007 µg/ml in case of up oil and 1032 µg/ml in case of M.P. oil (Deshmukh *et al.,* 1986).

Antibacterial activity

Longiverbenone is a naturally occurring sesquiterpene isolated from ethanolic extract of *Cyperus scariosus* rhizome by solvent-solvent portioning and chromatographic technique. The antibacterial activity of longiverbenone was evaluated against eleven potential human pathogenic bacteria using disc diffusion method.

Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) were determined by broth macrodilution method It showed moderate to good antibacterial activity against the organisms tested. It exhibited the lowest MIC (20 µg/ml) and MBC (80 µg/ml) against Vibrio cholerae (Dubey *et al.,* 2011).

Cytotoxic activity

Cytotoxic activity (lethal concentration 50%, LC50) of longiverbenone was determined on new borne brine shrimp (*Artemia salina*). The LC50 of the isolated sesquiterpene was found to be 14.38 µg/mlagainst new borne brine shrimp (Elumalai *et al.,* 2010).

Larvicidal and ovicidal activity

The larvicidal and ovicidal effects of *Cyperus scariosus* essential oil was investigated against the fourth-instar larvae of *S.litura*. The essential oil showed moderate toxic effect on lepidopteran agricultural pest of armyworm after 24hr of exposure. The shoot of *C. Scariosus* showed good larvicidal activity (LC50 = 27.3, 29, 30.6, 31.2, LC95 = 43.6, 48.2, 56 and 51.4 ppm) and moderate ovicidal effect (Elumalai *et al.,* 2010).

Clinical studies

Obesity

Mehul Barai conducted a comparative clinical trial of Motha (*Cyprus rotundus* Linn.) and Nagarmotha (*Cyprus scariosus*) in Sthaulya (obesity) in randomly divided patients. Results were highly significant (<0.001) and showed the reduction in weight was 6.49% while BMI was reduced by 7.60%. The study concluded that both drugs are effective in reducing the classical Sign and symptoms of obesity in subjective criteria as well as a reduction in weight as well as BMI in objective criteria (Mehul Barai and Rajesh M. Thakkar, 2017).

Musculoskeletal

In a single-blind, placebo-controlled, prospective, randomized trial,the efficacy of combination of *Boswellia serrata* L resin and the root of *Cyperus scariosus* L. were assessed in stress urinary incontinence (SUI) women of reproductive age by plus pelvic floor muscle training (PFMT). The outcome was one hour pad test. The results were analyzed using parametric and non-parametric test. The improvement in the test and control group was 60% and 37% respectively. Between the group comparison was statistically significant (P=0.035). The intra group comparison of one hour pad test was statistically significant in both groups (P<0.001). No adverse effects were noted. The test group was more effective than control group in women with SUI (Arshia sultana, 2015).

References

Alam M A, Jahan R, Rahman S, Das A K, Rahmatullah M. Antinociceptive and anti-hyperglycemic activity of methanol extract of *Cyperus scariosus*. Pakistan journal Pharmaceutical Science. 2011; 24(1):53-56.

Anonymous. Quality Standards of Indian Medicinal Plants. Medicinal Plants Unit, Indian Council of Medical Research, New Delhi. 2016;14:153-161

Anonymous. Standardization of Single Drugs of Unani Medicine. Central Council for Research in Unani Medicine, New Delhi. 1997;3:124-130.

Anonymous. The Wealth of India- A Dictionary of Indian Raw Materials and Industrial Product. National Institute of Science Communication, Council of Scientific & Industrial Research New Delhi. 2001;II: Cl-Cy:334

Anonymous. The Unani Pharmacopoeia of India. Central council for Research in Unani Medicine, New Delhi. 2008;1(V):76-77

Antaki D Z. Tazkiraul ul Albaab. Matba Al Aamira Al Sharfia Bi SharaiAlharNafsh Bi Misr. 1317H.; 61183

Arshia sultana.National Institute of Unani Medicine, India Efficacy of *Boswellia serrata* L and *Cyperus scariosus* L plus pelvic floor muscle training in stress urinary incontinence women of reproductive age ;3rd Indo-Global Summit & Expo on Healthcare October 05-07, New Delhi, India. 2015

Attar H Z. Ikhtiyarat-e-Badiyee. Munshi Nawal Kishore, Lucknow. 1888;247,248

Bhagwat D, Kharya M D, Bani S, Pandey A, Chauhan P S, Kour K *et al.*, *Cyperus scariosus* Chloroform Fraction Inhibits Tcell Responses in Balb/C Mice. Tropical Journal of Pharmaceutical Research. 2009; 8:399-408 https://doi.org/10.4314/tjpr.v8i5.48083

Bhatt S K, Saxena V K, Singh K V. A leptosidin glycoside from leaves of *Cyperus scariosus*. Phytochemistry. 1981; 20:2605. https://doi.org/10.1016/0031-9422(81)83111-1

Bhattacharjee S K.Handbook of Aromatic Plants. Pointer publishers, Jaipur, India. 2004;166

Bhattacharjee S K and De L C. Medicinal Herbs and Flowers. Aavishkar Publishers, Distributors Jaipur, India. 2005; 206

Chawda H M, Mandavia D R, Parmar P H, Baxi S N, Tripathi C R. Hypolipidemic activity of a hydroalcoholic extract of *Cyperus scariosus* Linn. root in guinea pigs fed with a high cholesterol diet. Chinese Journal of Natural Medicines. 2014; 12(11):819-826. https://doi.org/10.1016/S1875-5364(14)60123-0

Deshmukh S K, Jain P C, Agrawal S K. A note on mycotoxicity of some essential oils. Fitoterapia. 1986;57(4):295-297

Dey K L. The Indigenous Drugs of India. 2nd Edi. PamaPrimlane, The ChronicaBotanica, New Delhi. 1973;101

Dubey N, Gupta R L, Raghav C S. Study of yield, quality and fungicidal properties of Nagarmotha oil. Pesticide Research Journal. 2011; 23(2):185-189

Dymock W, Warden C J H, Hooper D. *Pharmacographia indica*. The Institute of Health and Tibbi Research, Hamdard National Foundation, Pakistan,1893; III:554-555

Elumalai K, Krishnappa K, Anandan A, Govindarajan M, Mathivanan T. Larvicidal and ovicidal activity of seven essential oil against lepidopteran pest S. litura (lepidoptera: noctuidae). International Journal of Recent Scientific Research. 2010; 1(1):18-14.

Fazalullah M M. Makhzanul Mufridatmaroof-ba-JameulAdvia. Matba-AamMufeed Press, Lucknow. 1918;242

Garg N, Misra L N, Siddique M S, Agarwal S K. Volatile constituents of the essential oil of *Cyperus scariosus* tubers. In: Bhattacharyya S C, Sen N and Sethi K L (ed) Proc International congress of essential oils, fragrances and flavours. New Delhi, India. 1989;161-165.

Garg S N, Mishra L N, Siddiqui M S and Agarwal S K. Volatile constituents of the essential oil of *C. scariosus* tubers 11th Int. Congress of Essential Oil Fragrances & Flavours. 1988;4:161

Gazrooni M S. Al-Sadeedi-Fit-Tib. Matba Munshi Nawal Kishore, Lucknow. 1891;152, 195.

Ghani N.Khazainul Advia, CCRUM, New Delhi. 2010; IV: 364-366

Gilani A H, Janbaz K H, Zaman M, Lateef A, Tariq S R, Ahmed H R. Hypotensive and spasmolytic activities of crude extract of *Cyperus scariosus*. Achieves of Pharmacal Research. 1994; 30:145-49. https://doi.org/10.1007/BF02974249

Gilani A U, Janbaz K H. Studies on protective effect of *Cyperus scariosus* extract on acetaminophen and CCl4-induced hepatoxicity. General Pharmacology. 1995;26(3):627-631 https://doi.org/10.1016/0306-3623(94)00200-7

Gopichand Y, Pednekar P R, Chakravarti K K. Isolation and characterization of (-)-β-selinene and isopatchoula-3, 5-diene from *Cyperus scariosus* oil. Indian Journal of Chemistry. 1978; 16:148-149

Harwi Y.Ainul Hayat. Urdu Translation Ibn sina Academy, Aligarh. 2008;198

Hasan M A. MukhzanulMufradatKhawasulAdvia. Abuloulai Steem Press, Agra, pp. 252

Hikino H, Aota K, Takemoto T. Identification of ketones in Cyperus. Tetrahedron. 1967; 23:2169-2172 https://doi.org/10.1016/0040-4020(67)80050-4

Hussain M M. Tohfatul Momineen. Matbah Husaini Publicaion, Delhi. 1855; 144

Ibn Baitar. Al-Jameul Mufridat al Adviawa Al-Aghzia. Urdu Translation, CCRUM, New Delhi. 1999; III: 46,47

IbnSina. Al-Qanoon Fil Tibb. Urdu translation by Ghulam Hussain Kantoori, IdaraKitab-us-Shifa, Delhi. 2014; 753-760.

Kabiruddin M. Makhzanul Mufridat yaani Kitabul Advia. Idara Kitabul Shifa. 2007; 400

Kakarla L, Katragadda S L, Botlagunta M. Morphological and chemoprofile (liquid chromatography-mass spectroscopy and gas chromatography-mass spectroscopy) comparisons of *Cyperus scariosus* R. Br and *Cyperus rotundus* L. Pharmacogonosy Magazine. 2015; 11(44):439-447. https://doi.org/10.4103/0973-1296.168975

Kalim M D, Bhattacharyya D, Banerjee A, Chattopadhyay S. Oxidative DNA damage preventive activity and antioxidant potential of plants used in Unani system of medicine. BMC Complementary and Alternative Medicine. 2010;10:77-87. https://doi.org/10.1186/1472-6882-10-77

Kareem H M. Tarjuma Makhzanul Advia-ba-zaban urdu. Munshi Nawal Kishore, Lucknow. 1879;635-636

Khan A. Muheet-e-Azam, CCRUM, New Delhi. 2014; III: 95-97

Mehul Barai, Rajesh M. Thakkar. A comparative clinical study of two source plant Motha (*Cyprus rotundus* Linn) and Nagarmotha (*Cyprus scariousus*) in Sthaulya (Obesity). Journal of Ayurveda and Integrated Medical Sciences. 2017;2(2). https://doi.org/10.21760/jaims.v2i02.137

Nabi M G .MakhzanulMufridat-wa-MurakkabatMaroof-ba-KhawasulAdvia. CCRUM, New Delhi. 2007;237.

Nafees *et al.*, Future Journal of Pharmaceutical Sciences (2020) 6:124 https://doi.org/10.1186/s43094-020-00142-x

Naves Y R, Ardizio P. Volatile plant substances. CXXIX. The essential oil of Cyperus scarosius R Br. Bulletin of Chemical Society of France. 1954;332-334.

Nerali S B, Chakravarti K K. Terpenoids CXXXV. Structure and stereochemistry of scariodione, a new sesquiterpene enedione from the oil of *Cyperus scariosus*. Science and Culture. 1969;35:110

Nerali S B, Chakravarti K K.Terpenoids CXVII. Structures of cyperenol and patchoulenol. Two new sesquiterpene alcohols from the oil of *Cyperus scariosus*. Tetrahedron Letter. 1967;8:2447-2449.

https://doi.org/10.1016/S0040-4039(00)90829-3

Nerali S B, Kalsi P S, Chakravarti K K, Bhattacharyya S C. Terpenoids LXXVII. Structure of isopatchoulenone, a new sesquiterpene ketone from the oil of *Cyperus scariosus*. Tetrahedron Letter. 1965; 6:4053-4056 https://doi.org/10.1016/S0040-4039(01)99613-3

Neville G A, Nigam I C, Holmes J L. Identification of ketones in Cyperus. NMR and mass spectral examination of the 2, 4-dinitrophenylhydrazones. Tetrahedron. 1968;24:3891-3897 https://doi.org/10.1016/S0040-4020(01)92597-9

Nigam I C. Essential oils and their constituents. XXXI. Cyperenone. A new sesquiterpene ketone from oil of *Cyperus scariosus*. Journal of Pharmaceutical Science. 1965;54:1823-1825 https://doi.org/10.1002/JPS.2600541233

Nooruddin. Alfaazul Advia. Matba Munshi Nawal Kishore. 1239H; 154

Rahman M S, Anwar M N. Antibacterial and cytotoxic activity of longiverbenone isolated from the rhizome of *Cyperus scariosus*. Bangladesh Journal of Microbiology. 2008; 25(1):82-84 https://doi.org/10.3329/bjm.v25i1.4866

Ramesh S, Maruthirao B, Mahesh V, Prabhakar T, Swamy P, Nagaraju P. Pharmacological study of antidepressant like activity of *Cyperus scariosus* oil in mice. International Research Journal of Pharmaceutical Applied Sciences. 2012; 2:139-142

Sahu S, Singh J, Kumar S. New terpenoid from the rhizomes of *Cyperus scariosus*. International Journal of Chemical Engineering and Applications. 2010;1:25-30. https://doi.org/10.7763/IJCEA.2010.V1.5

Srivastava R K, Singh A, Srivastava G P, Lehri A, Niranjan A, Tiwari S K, Kumari K and Kumar S. Chemical constituents and biological activities of promising aromatic plant Nagarmotha (*Cyperus scariosus* R.Br.): A Review, Proc Indian Natn Sci Acad. 2014;80 (9):525-536 https://doi.org/10.16943/ptinsa/2014/v80i3/55127

Uppal S K, Chhabra B R, Kalsi P S. A biogenetically important hydrocarbons from *Cyperus scariosus*. Phytochemistry. 1984; 23:2367-23

Yusuf, M., J. U. Chowdhury, M. A. Wahab and J. Begum. Medicinal Plants of Bangladesh. Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka, Bangladesh. 1994;1-340

How to cite this article:

Sana Nafees, Huda Nafees and Kunwar Mohammad Yousuf Amin. 2023. A Comprehensive Review of Avicennan Cardiac drug: Saad Kufi (*Cyperus scariosus* R. Br). *Int.J.Curr.Microbiol.App.Sci.* 12(06): 12-25. **doi:** https://doi.org/10.20546/ijcmas.2023.1206.002