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A Comprehensive Review Of Unani Drug: Abhal (*Juniperus Communis)* With Special Reference Of Its Uses.

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Abstract

Herbal plants have been used for centuries in various disease conditions due to their medicinal properties. Abhal (Juniperus communis) is one of the important medicinal plant berries, which is blackish-red in color with impressive therapeutic benefits and has been in use for thousands of years in Unani as a diuretic, antiseptic, migraine treatment, rheumatic arthritis treatment, gout treatment, gastrointestinal problem treatment, and female contraceptive. Juniperus communis L. belongs to the Cupressaceae family and is an evergreen aromatic shrub. The berries of Abhal include numerous chemical components, including a wide range of phenolic compounds, monoterpenes, sesquiterpenes, and essential and volatile oils. There are lots of researches performed to evaluate its chemical constituents and pharmacological activities like analgesic, diuretic, antimicrobial, antioxidant, cytotoxic, hepatoprotective, antidiabetic, antihyperlipidemic, antiparkinsonian, etc. The objective is to report Abhal in classical Unani literature, pharmacology, and Unani formulation and to make an effort to prove the strengths of Abhal mentioned in classical Unani literature.

Key words: Juniperus communis, chemical constituent, pharmacology, Unani classical literature

Introduction:

Juniperus communis is a long-lived, perennial, medicinal, aromatic plant belonging to the family Cupressaceae and is well known as Abhal in the Unani system of medicine. The description of Abhal is mentioned in various classical Unani books. Containing 70 to 80 species, it ranks as the second largest genus within the conifers[1]. The berries of this plant have much medicinal value in USM. According to renowned Unani scholars like Avicenna, Ibn Baitaar, and Hkm Azam Khan, Abhal has two types. (i) Short and spherical, having a greater diameter than length. It has many branches and thorns. The leaves are similar to cypress leaves. (ii) The plant is small. The seed is slightly larger, plum-like. Inside which many seeds are hidden by a thin membrane. The taste is sweet, slightly astringent, and strongly aromatic.[8,9,12] Currently, numerous species have been identified that possess various pharmacological activities.[2] Juniper has a history of medicinal use dating as far back as 1550 B.C. A remedy to treat tapeworm was found in `The Papyrus of Ani` from ancient Egypt, 240 B.C.[25] *Juniperus communis* is not only a valuable nutritional resource but also a rich source of aromatic oils, whose concentrations differ across various plant parts—including the berries, leaves, aerial portions, and roots. The fruit (berries) contains essential oils (0.5% in fresh and up to 2.5% in dried form), invert sugars (15–30%), resins (10%), catechins (3–5%), organic and terpenic acids, leucoanthocyanidins, and a bitter compound known

as juniperine. In addition, it is composed of flavonoids, tannins, gums, lignins, waxes, and other phytochemicals. A variety of flavonoids, such as biflavonoids (amentoflavone), flavones (apigenin), flavonols (quercetin, isoquercetin), and vitamin C, are also present in the berries.[28]

Material and Methods

In the present review, Unani classical literature like Khazain ul Advia, Kmil us Sana, Beyaz e Kabir, Makhzan ul Mufradat, and Al Qanoon fit Tib were explored for morphology, types, dosages, substitutes, action, and compound formulations of Abhal. Computerized databases such as Google, PubMed, and Google Scholar were used to get the most recent research accessible for the thorough analysis. All relevant articles were referred to, including 13 classical Unani and English books and 21 research papers and review papers.

Synonym

The plant is known by different names in different languages and areas: Unani-*Arqula*,[8] *Barasi* [8,12], Turki-*Aarooj* [8], Arbi-*Jauz-abhal*,[8] Persian-*Aurab, Tukhm-rehl, Aeras, Berghuncha*,[8] Hindi-*Habura, Ara`ar* ,[8] English-*Juniper berry*,[12] Sanskrit-*Aparajita, Habusha*,[5]

Description and habitat:

Abhal (Juniperus communis) is a dioecious species, i.e., male and female cones develop on separate plants and are pollinated by wind. Male juniper plants often exhibit a tree-like form, occasionally growing up to 10 meters tall, while female plants tend to be more sprawling and shrub-like in appearance. The plant typically flowers during April and May, but its cones take time to mature—reaching full ripeness in the late autumn of the second year. As a result, it's common to find both unripe second-year and ripe third-year berries coexisting on the same plant.[1] Leaves 5-13 mm long in a whorl of 3, linear, sharply pointed, spreading nearly at right angles from the branchlets. Fruit 7.5-10 mm long, sub-globose, black glanous, with the tip of the scale visible at the apex. Seed 1-3.[5] This plant grows in many cold places in the cold Northern Hemisphere, like Europe, Asia, and North America. In India, *Juniperus communis* is predominantly found in Himachal Pradesh at elevations ranging from 3,000 to 4,200 meters. Its primary distribution includes regions such as Manimahesh in Chamba, Kullu, Churdhar in Sirmour, Chhota and Bara Bhangal in Kangra, as well as Kinnaur and the Pattan Valley of the Lahaul-Spiti district. It has been grouped into three different sections as *Juniperus, Caryocedrus,* and *Sabina*.[1]

Taxonomical classification of Juniperus communis:
Kingdom-*Plantae,*
Sub kingdom-*Virdiplantae,*
Infra kingdom-*Streptophtae,*
Super Divison- *Eubryophytae,*
Division- *Tracheophytae,*
Sub division- *Spermalophytina,*
Class- *Pinopsida,*
Sub class-*Pinidae,*
Order-*Pinales,*
Family- *Cupressaccea,*
Genus- *Juniperus,*
Species- *Communis*.[3]

Mizaj (Temperament)
There is controversy between the Unani physician for its temperament, some says it is Hot & Dry in second degree of temperament,[4,8,10,11] while some says it is Hot & Dry in third degree of temperament.[4,9,8]

Action (as per Unani Classics)

In Unani classical literature the action of *Abha*l is mentioned as mohallil (anti-inflammatory), mujaffif (desiccative), mulattif (demulcent), jali (detergent), mudir e haiz (emmenagogue), mudir e bol (diuretic), qabiz (astringent),[8,9,10,11,12] moqawimeda (stomachic), kasirreyah (carminative),[13] and katilkarm-e-shikam (antihelminthic).[10,12]

Therapeutic uses

In the Unani system of medicine, Abhal is used as a medicine in various forms, like powder, ear drops, oil, ointment, and gargle, for different ailments.[8,9] The berries, aerial part, fruit, and bark of the Abhal pose different pharmacological activities and hence are being used as carminatives, antiseptics, diuretics, emmenagogues, digestives, and anti-inflammatories. So Abhal is used in acute and chronic cystitis, renal suppression, albuminuria, leucorrhoea, amenorrhoea, infantile tuberculosis, piles, asthma, gonorrhoea, cough, and skin infections.[2]

External and Internal uses According To Unani literature

EXTERNAL USES

	Disease	Doses form	Used along	Reffrences
1.	*Bakhr al-Fam* (Halitosis) *Awrām-i-Litha* (Gingivitis)	Gargle	Honey	10, 8, 12
2.	*Isqāṭ* (Abortion)	Liquor, pessary		8, 9, 12
3.	*Waja' al-Udhun* (otalgia) *Tarash*(Deafness)	Nuts of Abhal	Sesame oil	9, 10, 12
4.	*Dā' al-Tha'lab* (Alopacia errata)	Paste	Vineger	8,12
5.	*Qarḥa Sā'iyya* (Spreading ulcer), *Muzmin quruh* (Malignant ulcer)	Powder	Honey	8,10,11,12
6.	*Sarsām* (Meningitis)	Powder of leaf	Water	8,10
7.	Surkhbadahn(Erycepalous)	Powder		8,12
8.	*Jamood*(Tightness of skin)	Paste	Anjeer	8,12
9.	*Jamra*(Carbuncle)	Powder		12

Internal uses

	Disease	Refrences
1.	*Deedan e Ama* (Worm infestation)	8,10,11,12
2.	*Bawaseer* (Piles), pain abdomen due to piles	8,10,12
3.	*Amrad e safrawiya* (Bilous ailments)	8,10
4.	*Istisqā' Ziqqī* (Ascites)	8,11
5.	*Muzminsuzak* (Chronic Gonorrhoea)	10
6.	*Masqat e Janeen wamashima*(Abortion)	8,9,10,11
7.	*Ehtebas e haiz* (Ammenorrhoea)	8,10,11,12
8.	*Waja us sadar* (Chest pain)	8,10
9.	*Zaiqunnafs*(Asthma)	8,12
10.	*Falij*(Paralysis)	8,10,11
11.	*Istirkha* (Flacidity)	8,10,11
12.	*Qaraqar e shikam* (Flatulance)	8,10,11
13.	*Sangrehni* (Dysentry)	8.10,11
14	*Usr e baul* (Dysuria)	10
15	*Sara`a* (Epilepsy)	8,10
16	*Selan urreham* (Leucorrhoea)	10

Specific indication
The chief use of juniper is an adjuvent to diuretics in dropsy depending on heart, liver or kidney disease.[13]

Muzarrat(Adverse effect and toxicity)
Abhal is contraindicated in pregnancy due to Musqit-i- janin (abortifacient).[11]

Miqdarkhurak (Therapeutic dose)
Unani physician have recommended that the therapeutic dose of Abhal may be**3-5** gm,[11] **3 ½-10** ½ gm,[10] and **7-10gm**.[4]

Badal (Substitute)
Berge-e-Sudab (*Ruta graveolens*) for Idrarhaiz,[11]
Half quantity ofAbhal dose of Darchini(*Cinnamon verum*) in ishal,[8]
Sleeqa, Jauzusaru is used as substitute for Idrar-e-Bawl (Diuresis).[8,9]

Musleh(Corrective)
Gil e armani, zarishk(Berberis vulgaris) is used as corrective for the complication of liver,heamaturia and abortion,[10]
Roghan-i- Zard(ghee), shehad(Honey) is coregent for the throat and stomach coplicaton.[9,10]

Murakkabat (Compound formulation):

1.	**LaooqAbhal**		Tanfeesbalgham, Dafa e tasshannuj	15
2.	**Safoofmoya**		Zahir mujmin (Chronic diarrhoea)	6,14
3.	**Sunoonmulk**		Toothache	22
4.	**Dawa e mudir haiz**		Amenorrhoea, for regulation of mensuration	16
5.	**Majoon Jograj gogle**		Falij, laqwa, moqawwiaasab, wajaulmufasil	17
6.	**Safoof mudir haiz**		Amenorrhoea, Dysmenorrhoea	18
7.	**Tiryaqafyun**		Afyun (Opium)poisining	19, 20
8.	**Majoon Suhag sonth**		Uterine weakness,Pain in abdomen due to uterus, leucorrhoea,	21

Chemical Constituents: It has many chemical constituents including flavonoids, volatile oil, and coumarins.[2]

1.	Flavonoids	Berries	They contain apigenin, rutin, luteolin, quercetin-3-O-arabinosyl-glucoside, quercetin-3-o-rhamnoside quercitrin, scutellarein, nepetin, amentoflavone, and bilobetin
		Leaves	They contain the cupressuflavone, hinokiflavone, biflavones, isocryptomerin amentoflavone, and sciadopitysin. The seeds contain haemagglutinin. Plant also contains several labdane diterpenes and diterpenoids (methanolic extract)
2.	Volatile oil	Berry oil largely contain monoterpene hydrocarbons such as β-pinene (5.0%), α-pinene (51.4%), sabinene (5.8%), myrcene (8.3%), and limonene (5.1%). The seeds and fruits of the plant contain d-α-pinene, camphene, pectins, glycolic acid, malic acid, formic acid, acetic acid, cyclohexitol, terpene, proteins, fermentable sugars, wax, gum, ascorbic acid, dihydrojunene, β-pinene, hydrocarbon-junene, cadinene, juniper, and camphor	
3.	Coumarins	They contain umbelliferone	
4.	Bicyclic Diterpenes	They contain imbricatolic acid, Junicedral, trans-Communic acid, diterpenes,isocupressic acid, aryltetralin, and lignan deoxypodophyllotoxin. Three new diterpene acids have been identified as 15-dien-18-oic acid, 7-oxo-13-epi-pimara-8, 7α-hydroxysandaracopimaric acid.	

Pharmacological Studies:

A number of studies have been carried out on Juniperus communis in recent years showing that it possesses diverse pharmacological action; some of the important pharmacological actions are as follows:

Analgesic activity:

This study shows that the methanolic extract of JC had a significant impact on the pain response, depending on the dose. The effective dose for performing the analgesic study was fixed at 100 mg/kg and 200 mg/kg body weight. The extract was analyzed by tests like the formalin test, the acetic acid-induced writhing test, and the tail flick test. The extract caused inhibition of this pain, which is thought to be due to inhibition of release of prostaglandin, the mechanism being quite similar to aspirin and other NSAIDs.[23]

Anti-inflammatory activity:

The experiment was carried out using a Biologically Multiplexed Activity Profiling system (Bio MAP), a cell culture system of human dermal fibroblast (HDF3CGF), which is purposed to provide a reliable and repeatable model of chronic inflammation and fibrosis. Primary human neonatal fibroblasts were cultured under low-serum conditions for 24 hours in preparation for stimulation using a combination of interleukin (IL)-1β, tumor necrosis factor (TNF)-α, interferon-γ, epidermal growth factor, basic fibroblast growth factor, and platelet-derived growth factor. The biomarker levels of cell-associated and cell membrane targets were determined using the direct ELISA test. JEO has strong anti-proliferative qualities and dramatically reduced the rise in Collagen I, Collagen III, I-TAC, IP-10, M-CSF, and PAI-I synthesis. JEO affected gene expression, according to genome-wide gene expression studies.[24]

Antimicrobial activity:

The essential oil underwent GC/MS analysis along with antibacterial activity testing. Thirty compounds were identified in the JCO, in which α-pinene (46.63%), α-cedrol (12.36%), and DETA. 3-Carene (9.85%), α-terpinolene (4.64%), and terpineol-4 (2.86%) were the major compounds. Both Gram-negative and Gram-positive bacterial species were selected as test organisms. The JEO exhibited antibacterial activity against the bacterial species *Staphylococcus, E. coli, and Sodomunas* bacteria tested. The essential oil from this plant shows antibacterial activity due to the presence of its chemical components.[25]

Neuroprotective effect:

The CPZ-induced Parkinson's rat model shows neuroprotective activity of Juniperus communis. Two doses of M.E.J.C. (100 and 200 mg/kg, i.p.) were applied; both doses were reported to be beneficial in decreasing catalepsy, increasing locomotor activity, and elevating muscle activity (rotarod test) in the CPZ-induced Parkinson rat model. According to several animal models, the results imply that J.C. could have a potential modulatory effect on Parkinson's disease symptoms.[26]

Anti-hypercholesterolemic activity:

This study showed that J.C. oil, which is administered in 50, 100, and 200 mg/kg doses, could be effective in hypercholesterolemia. There was no anaemic effect observed in all groups; only a distinct, focal damage in the tubular cast structure in the kidneys of the group in which 200 mg/kg J.C. was administered was observed.[27]

Diuretic effect:

Among other effects of the juniper plant in folk medicine, it is also known for urinary antiseptics and diuretics. Several scientific studies have supported these traditional uses to some extent. In experimental trials involving rats, the daily administration of a 10% aqueous infusion of juniper, a 0.1% aqueous solution of juniper oil (using 0.2% Tween 20 as a solubilizer), and 0.01% terpinol-4-ol—an active constituent of its essential oil—initiated diuretic activity from the second day onwards. Notably, the most significant diuretic response was observed with the 10% aqueous infusion, indicating that both the essential oil and water-soluble components contribute to the plant's diuretic effects. Additionally, terpinen-4-ol has been reported to irritate the kidneys, which may play a role in its diuretic activity. However, prolonged or excessive use of juniper's active constituents can lead to renal irritation, especially in cases where the urinary tract is already inflamed. As a

result, the therapeutic use of juniper for managing renal disorders is no longer advised, particularly in patients with pre-existing kidney conditions.[28]

Antifungal activity:

The antifungal activity was evaluated using the disc diffusion method and tested against Aspergillus niger and Penicillium hirsutum fungal strains. The hydro-alcoholic extract of J.C. was reported to be efficacious as an antifungal, and this action is mostly associated with its phytochemical concentration of polyphenols.[29]

Antioxidant activity:

J. Berries are rich in phenolic compounds, polyphenols, flavonoids, and bioflavonoids that show antioxidant activities. The antioxidant potential of the extract was evaluated using the commonly employed assays DPPH, FRAP, and ABTS. To identify and characterize phenolic compounds, LC-QTOF/MS analysis was performed. Phenolic acid, flavonoids, stilbenes, lignans, and other polyphenols are among the various major polyphenol classes into which a total of 148 phenolic compounds have been assigned. Fifteen individual polyphenols were identified using HPLC-PDA by matching their UV spectral patterns and retention times against reference standards.[30] After isolating amentoflavone from J.C., its antioxidant capacity was examined in relation to H_2O_2-induced oxidative damage in human leukocytes and erythrocytes. The antioxidant potential of the extract was measured by using different parameters like GPX, SOD, LPO, GSH, and CAT. The result had shown that amentoflavone is a potential source of natural antioxidants, which can be further used in the prevention and treatment of diseases caused by oxidative stress.[31]

Hepatoprotective activity:

The hepatoprotective activity of EAF (ethyl acetate fraction) of ethanolic extract of leaves of J. communis was evaluated against PCM (paracetamol)-induced hepatic damage in Wistar albino rats. It was found that EAF at doses of 50, 100, 150, and 200 mg/kg body wt. oral significantly reduced the increased level of ALT, AST, and ALP in PCM-induced liver damage in rats. The EAF showed maximum hepatoprotective potential at 200 mg/kg body weight and is comparable to the standard drug Silymarin. EAF of J. communis leaves is found to be hepatoprotective and antioxidant without any cytotoxicity.[32]

Antidiabetic effect:

Regular administration of J. communis decoction for a period of 24 days resulted in notable hypoglycemia in diabetic rats induced by streptozocin. This effect could be due to the high insulin-like activity of the decoction, which improved peripheral absorption of glucose, independent of plasma insulin levels. The methanolic extract of JC also induces dose-dependent significant reduction in total cholesterol, LDL, VLDL, and triglycerides with the elevation of HDL levels in diabetic rats.[33]

Anthelmintic activity:

The in vitro ovicidal potential of Juniperus communis was evaluated using the egg hatch assay method. 24 well plates were utilized to hold an aqueous solution containing approximately 150 eggs per well. Six different JEO concentrations (50, 12.5, 3.125, 0.178, 0.195, and 0.49) were combined in Tween 80 (3% v/v), and the mixture was finished with distilled water at a final volume of 0.5 ml/well. Following a 48-hour incubation period, the number of eggs and first-stage larvae was counted. The experiment was done two times with two replicates each. This study showed high activity of J. communis EO against GIN eggs. The inhibitory effect on hatchability varied from 81% to 96.75%. All concentrations tested showed a significantly higher efficacy compared to the negative control ($p < 0.05$).[34]

JCO has shown anticancer effects against breast cancer, lung cancer, liver cancer, neuroblastoma, and colon cancer.[35]

Anti-cancer effect on oral cancer cells:

It has been found that JCO effectively inhibits the growth of oral cancer cells while having no impact on normal cells. JCO did this by causing cell cycle arrest and apoptosis. Furthermore, JCo and 5-FU worked synergistically to cure oral cancer. It reduces cytotoxicity in normal cells and increases the inhibitory effect on cancer cells. The results showed that, with a combination index of less than 1, JCo and 5-FU had a powerful synergistic impact. Consequently, JCo offered a viable option for chemotherapy-assisted treatment of oral cancer and might offer a novel therapeutic approach.[36]

Anti-cancer effect on hepatic cell:

Cell lines, including HepG2 and Mahlavu (HCC cells), as well as MDCK and SVEC (normal cells), were cultured under standard conditions. They were treated for 24, 48, and 72 hr with JCO extract and etoposide (VP-16) following 50–60% confluence. The MTT assay was then used to assess the cell's viability. For the study of the anti-cancer effect on animals, HepG2 cancer cells (1 × 106) were injected (S.C.) into the right flank of female BALB/c nude mice, and they were randomly divided into two groups after five days. All groups received subcutaneous administration of the vehicle (mineral oil at 100 µg/ml), whereas only the experimental group was additionally treated with JCO extract at a dose of 200 mg/kg. After tumor size reached approx. 1500 mm^3, the mice were sacrificed and immunohistochemical staining was performed. The results of the study indicate that JCO extract may be used as adjuvant agents since it inhibited HCC cells and enhanced inhibition when combined with VP-16 in vitro. Also, the results demonstrated that the induction of cell cycle arrest through p53/p21 pathway activation determined the anticancer potential of JCO extract. Therefore, J. communis plant extracts exhibited antiproliferative effects by causing cell cycle arrest and death in HepG2 cells, suggesting that they could be a promising anticancer treatment for HCC. When administering JCO extract in vivo by s.c. injection. The data showed that JCO extract inhibits the growth of tumors in vivo, increases the survival rate, and prolongs the life duration of mice that harbor tumors. It suggests that JCO extract might be used as chemopreventive agents for preventing HCC progression.[37]

Colorectal adenocarcinoma in vivo and in vitro:

HT-29 (human colorectal adenocarcinoma), SVEC (mouse vascular endothelial), and MDCK cells were cultured. Cytotoxicity was analyzed using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. HT-29 cells were treated with a combination of JCo extract (0, 20, 40, 60, and 80 µg/mL) and 0.25 µg/mL 5-FU, or a combination of 5-FU (0, 0.125, 0.25, 0.5, and 1 µg/mL) and 40 µg/mL JCo extract for 72 h. Cell viability was then determined by the MTT assay. The female BALB/c mice (CRC model) were established by injecting 1×106 CT-26 cells *sc* into the flanks. The mice were randomized into the vehicle control (n=4) and JCo extract treatment (n=6) groups. After 7 days of injection, the tumor volumes exceeded 15 mm. The tumor-bearing mice were treated with 200 mg/kg JCo extract once every 2 days for 40 days, and The tumor masses and organs were collected for immunohistochemical (IHC) and hematoxylin-eosin (HE) staining. At day 25, the mice treated with JCo extract had a considerably smaller tumor volume (703±192.80 mm^3) than the vehicle group (1459.84±144.14 mm^3), according to the results. The findings demonstrate that JCo extract inhibited the proliferation of CRC cells both in vitro and in vivo and that it also had a synergistic impact when combined with 5-FU. As a result, JCo extract might be used as a therapeutic agent to treat colorectal cancer.[38]

Toxicity of Juniperus communis:

JC is at large and nontoxic, yet excessive consumption of it may result in low toxicity and the occurrence of diarrhea. The JCO is also considered a renal irritant, gastrointestinal irritant, and abortifacient, and an overdose resulted in pain in the kidney, strong diuresis, albuminuria, purplish urine, hematuria, tachycardia, hypertension, and, on rare occasions, convulsions, menorrhagia, and abortion. As per the European Chemicals Agency, the LD50 of Juniperus communis essential oil is 5000 mg/kg of body weight. Podophyllotoxin, a naturally occurring lignan present in Juniperus communis, has demonstrated toxic effects on the nervous system, gastrointestinal tract, and liver.[39]

Conclusion:

Juniperus communis fruits and their leaves have been used in the Unani system of medicine for a long period of time for the treatment of various ailments like antiseptics, diuretics, emmenagogues, digestives, anti-inflammatories, etc. The scientific studies have proved most claims of traditional medicines. Experimental studies have demonstrated its antioxidant activity, neuroprotective effects, antidiabetic effects, hepatoprotective effects, antibacterial effects, antifungal activity, anti-inflammatory activity, analgesic activity, etc. Although some activities are yet to be evaluated. It is recommended that preclinical and clinical studies should be conducted in order to prove its other actions, which are still scientifically unexplored, to establish it as a standard drug.

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