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Review Article

Classical Wisdom and Contemporary Science: A Review on Aqaaqia (*Vachellia nilotica* L. Pod Extract)

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Abstract

Aqaaqia, obtained by the mature pod of *Vachellia nilotica* L. (previously *Acacia arabica* L. */Acacia nilotica* L.), has a glorious place in the *Unani* system of medicine as a panacean therapeutic agent. This review is designed to present a comprehensive account of the ethnobotanical characteristics, historical context, pharmacological activities, and documented evidence on *Aqaaqia* as cited in classical *Unani* literature. The material for this review was compiled from classical *Unani* texts, published literature, pharmacological references, and data retrieved from scientific databases. Its pharmacological potential is attributed to the presence of diverse phytoconstituents, including tannins, flavonoids, alkaloids, saponins, carbohydrates, sterols, and glycosides. In USM, *Aqaaqia* has been described to possess several actions such as *Qābiḍ* (Astringent), *Ḥābis-i-Dam*(Hemostyptic), *Mujaffif* (Desiccant),etc. Pharmacological studies further corroborate these traditional claims, reporting antimicrobial, anti-inflammatory, antioxidant, antispasmodic, wound-healing, and analgesic activities. The present study provides a comprehensive evaluation of the pharmacological, phytochemical, and therapeutic properties of *Aqaaqia*. Nevertheless, with significant preclinical data, there is limited clinical data to confirm it, and high-quality human trials are urgently lacking to confirm its safety, efficacy, and therapeutic formulations. *Aqaaqia*, integrating classical Unani knowledge with initial scientific validation, emerges as a promising agent for integrative medicine. However, extensive investigation through rigorous, evidence-based clinical studies is required to confirm its therapeutic potential.

Keywords: *Unani* medicine, *Aqaaqia*, *Vachellia nilotica* L., Babool pods, phytochemistry

Introduction:

Aqaaqia prepared from thorny medium-sized perennial *Babool* tree traditionally belonging to the family Mimosaceae, but recently taxonomically redefined in the Fabaceae as a leguminous plant because of its leguminous characteristics. This is a common species distributed across Africa, the Indian subcontinent and also some parts of the Middle East and in most cases reaches a height of 10-20 meters. Bipinnate leaves, straight spines that are paired, yellow spheric inflorescences (blooming in June-September), and curved, flat seed pods (morphologically distinguishing ones) that function as the main medicinal element distinguish it [1,2,3]. *Vachellia nilotica* L. pods extract, also referred to as *Aqaaqia*, has been historically held in high regard in a variety of traditional medical practices including Ayurveda, Siddha, and especially *Unani* medicine, and has been described by such renowned *Unani* scholars *Ibn Sina*, to exhibit *Qābiḍ* (astringent), *Mujaffif* (desiccant), *Dāfi'-i-ishāl* (anti-diarrhoeal), *Ḥābis-i-dam* (hemostyptic) effects [4,5]. This treatment has been around, for a while. People have been using it to manage health issues. Its been known to calm things down reduce mucous and even help with ulcers in the mouth and throat. Some folks have also used it to deal with bleeding problems. Its even been used as a dressing for wounds. Not everyones on board but plenty of people are convinced it works. The key to its effectiveness of pods, which are packed with a phytoconstituents like tannins, gallic acid, catechins, flavonoids and saponins [6,7]. Recent pharmacological investigations are providing substantial support for many of the traditional claims associated with *Aqaaqia* (*Vachellia nilotica* pods), revealing its antimicrobial, anti-inflammatory, antioxidant, and mucosal protective activities. In view of the increasing global reliance on plant-based therapies and the scientific validation of traditional medicines, an updated

ethnopharmacological assessment of *Aqaaqia* is both relevant and necessary. The objective of this review is to correlate the descriptions found in classical *Unani* literature with contemporary pharmacological evidence, thereby offering a comprehensive account of its origin, preparation method, therapeutic indications, and the scientific perspectives preserved in traditional sources.

Methodology:

The starting point of an extensive analysis of classical *Unani* medical text was carried out to obtain detailed insights on *Aqaaqia* (*Vachellia nilotica* L.*)*, its temperament, therapeutic attributes, modes of action and traditional indications. At the same time, a comprehensive search of the modern scientific databases, i.e., PubMed, Google Scholar, and ScienceDirect was conducted, to compile information on its phytochemical profile, physicochemical characteristics, and pharmacological implications. The analysis of the relevant English-language publications up to 2025 was conducted. Urdu translation of classical doctrine was preserved by reviewing such influential *Unani* compendiums as *Muheeth-e-Azam* by Hakim Muhammad Azam Khan*,* and *Khazainul Adwiya by Najmul Ghani*, *Usool-e-dawasazi* by Prof.ghufran Ahmed, The Standard *Unani* Medical Terminology was used to provide terminological accuracy and conceptual clarity in consultation with the World Health Organization (WHO). Scientific nomenclature was justified in the Glossary of Indian Medicinal Plants and other indexed botanical references.

Etymology :[1,2,8]

This name is based on the Greek word of its characteristic thorns, ἀκίς (akis, thorn). It is named after the *ἀkaakiá* (*akakia*), which early Greek botanist-physician Pedanius *Dioscorides* (ca. 40-90) called the medicinal tree *A. nilotica* in his book Materia Medica. Now it is called as *Vachellia nilotica* L. The genus *Vachellia* was named after George H. Vachell (1789 – 1839), chaplain and plant collector in China. Linnaeus designated the species epithet *nilotica* due to its native distribution in the Nile region, where it predominantly grows along the banks of canals and river valleys.

Geographical Source : [1,2,3,6,7,8,9]

The tree belongs to the areas of Sindh, the Deccan plateau and even some parts of Africa, and has very deep ancestral roots there. It is common in northern India and especially Punjab, yet it is also present throughout Pakistan, the Arab world, Myanmar (Burma), Sri Lanka and Bangladesh. It is worth mentioning that Sudan produces around 85 percent of gum acacia in the world.

Taxonomy Hierarchy : [8]

Kingdom	Plantae
Division	Tracheophyta
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Genus	Vachellia
Species	*Vachellia nilotica*

Vernacular Names : [1,2,3,4,5,9,13]

S.NO	LANGUAGE	SYNONYM
1	Unani	Aqaqia,kikar,Mughilan
2	Arabic	Ummughilan
3	Persian	Kharemughilan,mughilan
4	Urdu	Babool, Kikar
5	Hindi	Kikar, Babool, Baboola
6	English	Indian gum arabic, Black babool, Thorn acacia,
7	Kannada	Jaali,Gobbli
8	Tamil	Karuvelam
9	Telugu	Nallatuma, Thumma

Botanical Description : [1,2,3,6,7,9]

Vachellia nilotica L. (also known as *Acacia arabica* L.) is a medium-sized, perennial, evergreen tree of the genus Fabaceae, a family with a thorny, persistent structure. It has stipulate spines at the base of each bipinnate leaf, which are paired and sharp and stipulate and the bark is dark brown to almost black, griped by deep longitudinal fissures. Between June and September, the tree has fragrant, yellow and globose flower heads, which are laid in axillary inflorescence. It then grows special reproductive structures known as fruiting bodies which are indehiscent, curved and cylindrical pods, normally 7-15 cm long and 12 cm wide. These pods are narrowed at the seed, and appear bead-like, each pod normally containing 8 to 12 hard compressed seeds. Macroscopically, the mature pods are slightly flattened, and have a leathery texture and deep ridges on the sutures. On the micro level, the plant has certain characteristic diagnostic features: the leaves have diacytic stomata and the mesophyll is composed mainly of parenchyma cells. The vascular bundles present xylem vessels are spiral and reticulate thickening and phloem tissues are full of sieve tube elements and companion cells. The grains of pollen are tricolpate and spheroid in form, and the seeds are covered by a smooth and compressed testa embedded in sclerenchymatous tissue. The pod walls are of several histological layers, an outer epidermis, a layer of collenchyma beneath, and sclerenchyma, which provides it with mechanical strength and protective capacity.

Collection and Cultivation: [7]

Seedlings and young *Vachellia nilotica* L. (*Babool*) need a lot of sunlight, well drained but regularly moist soil and a weed free environment with no signs of invasive grasses to develop healthy growth. In such ideal circumstances, plants will reach heights of 5 to 6 feet in a period of one to two years. Although adapted naturally to dry and semi-arid environments, *V. nilotica* is positively affected by

additional irrigation in hyper-arid environments. In the wild, shade temperatures are 105-122oF (40-50oC), and low temperatures are 30-60oC (-1 to 16oC). The species can survive a broad spectrum of annual rainfall (75-1200 mm or 3-50 inches) however, the most successful vegetative and reproductive growth is seen with rainfall over 600 mm. The pods, the main medicinal part, are mature after anthesis- usually in mid June in Indian conditions.

Actions : [1,2,3,6,7,9]

Fresh plant parts of *Vachellia nilotica* L. are considered as astringent, demulcent, aphrodisiac, anthelmintic, antimicrobial, antidiarrheal.

Stem Bark - Astringent, Spasmolytic, Hypoglycaemic

Pods -in Urogenital Disorders, Diarrhoea, Dysentery, Expectorant.

Seeds – Hypoglycaemic

Flowers - Diarrhoea, Dysentery

Gum – Demulcent, Diarrhoea, Dysentery, Styptic, Tonic, Astringent

Standard : [7]

Crude protein - 15.8%

Ether extract - 0.8%

N-free extract - 65.5%

Crude fiber - 12.4%

Total Ash - 15.5%

Unani Description :

Taareekh (History) : [4,5]

Historical evidence indicates that *Unani* physicians were acquainted with the *Kikar* (*Vachellia*/*Acacia* spp.) tree nearly three centuries prior to the time of Prophet Jesus (ʿĪsā, peace be upon him). The earliest documented reference is found in the writings of *Theophrastus* (370 BCE), often regarded as the "Father of Botany," who provided a systematic description of the plant in *Historia Plantarum* . In classical *Unani* literature, the tree is designated as "*Akakia*", a term that was later transliterated into Greek and subsequently adopted into English as "*Acacia*."

Mahiyat (Morphology) : [5,10,11,13]

Ibn Sīnā (Avicenna) described *Aqaaqia* (*Vachellia nilotica* L.) as a concentrated extract obtained from "*Qarz*" which, after drying, is usually compressed into *qurṣ* (tablets).

Gilani characterised it as a thickened extract derived from the fruit of a thorn-bearing tree. *Razi*, in *kitaab- ul-Ḥāwī*, quoting *Jalinoos* (Galen) reported that *Aqaaqia* represents the fruit of *Qarẓ*.

Conversely, *Fulus* identified *Aqaaqia* as the expressed juice of *Qarẓ*.

While all the aforementioned opinions are noteworthy, the more reliable is that *Aqaaqia* is extract of *Ummghilaan.* It is synonym of *Babool.*

Babool (Vachellia nilotica L.) is a medium-to-large tree that occurs in two distinct types: Black *Babool* and Brown *Babool*. Both types can grow up to 50 feet in height, with erect stems measuring 10–50 feet in length and a diameter of 5–12 feet, bearing widely spreading branches.

1. Black Babool Tree : The black type is recognised by its dark, robust, and rounded stem, which is relatively thicker and stronger. It bears fewer thorns compared to the brown type but has a greater number of branches. The stem is often blackish in appearance, giving this morphotype its name.

2. Brown Babool Tree : The brown type produces more numerous thorns, which are smooth, shiny, straight, and usually arranged in pairs along the branches. As the tree ages, its wood develops a reddish-black coloration, serving as a distinguishing characteristic.

General Morphology (Common to Both Types)

Bark: Thick, scaly, and coarse.

Leaves: Bipinnately compound, usually 10–20 pairs per branchlet.

Flowers: Golden-yellow, globose heads with a pleasant fragrance; flowering mainly occurs during the spring season.

Pods: Flat and elongated (≈6 inches long), typically divided into 9–21 segments, each enclosing one seed. On average, pods contain 9–11 seeds, though occasionally up to 31 seeds.

Seeds: Small, flat, green when immature, turning dark upon drying; each separated by a thin, white fibrous septum.

Resin/Gum: The pod exude a sticky, resinous substance, while in March–April, the tree yields gum ranging from white to reddish, valued for medicinal and commercial purposes. It is known as *Samagh-i-arabi*.

Mahiyat of *Aqaaqia* (Morphology): [4,5,12,13,14,15]

Figure:1

The extract prepared from fresh pods / legumes is *Aqaaqia* in the *Unani* system of medicine. When it is prepared from unripe fruit it is referred to as as *Qurz*. This drug, prepared from the pods and leaves of the babool tree (*Vachellia nilotica* L.), is called as *Aqaaqia* They are coined shaped (figure:1) unique in their colour palette, which ranges between black and greenish-red,

and is identified by a rather distinct bitter flavour. They are dense and hard, and in conventional division their temperament has been characterised as possessing both *hiddat* (harshness) and *tezi* (biting potency). It is traditionally thought that these strong properties are greatly diminished or destroyed by washing them prior to use. *Dioscorides* says the substance comes of the fruit extract of a species of thorny *babool*, whose pods look like *Turmus* (*Lupinus polyphyllus* Lindl.). Upon full maturity the extract turns to a deep black, extracts of unripe fruit have a *Yaqooti* tint - a bright garnet-red, like ruby.

Preparation of *Aqaaqia* : [5,12,13,15,16,17]

Figure:2

Figure:3

Aqaaqia is traditionally prepared during March and April, coinciding with the availability of fresh, latex-containing pods of *Vachellia nilotica* (*babool*). The pods are harvested at this stage, pulverised using a mortar and pestle (figure:2), and soaked in water at eight times the weight of the crude drug for 2–3 days. It is then subjected to boiling until the volume of water is reduced to half, followed by filtration through a cloth. The filtrate is concentrated further by boiling (figure:3) until a viscous mass is obtained, which is subsequently poured into shallow dishes and dried under direct sunlight for 2–3 days until it attains a black, solid consistency. The dried mass is obtained in coin shaped (figure:1) for storage and therapeutic use.

***Mizāj* (Temperament) :** [4,12,13,14]

Gair Maghsool (Unwashed) : Cold1°-Dry2°

Maghsool (Washed) : Cold 2°-Dry 2°

***Nafa-e-Khas* (Main Action) :** [4,13,14,15]

Hābis (Styptic)

Qābiḍ (Astringent)

***Af'al* (Functions) :** [4,12,13,14,15]

Qābiḍ (Astringent),

Ḥābis-i-Dam(Hemostyptic),

Mujaffif (Desiccant),

Mudammil (Cicatrizant)

Rādi' (Repellent),

Muḥallil (Anti-Inflammatory),

Muqawwī-i-Mi'da (Stomachic),

Muqawwī-i-Jigar (Hepato Tonic),

Khiḍāb (Hair Dye)

***Iste'mālāt* (Therapeutic Uses) :** [4,12,13,14,15]

Qurūḥ-i-Dahan (Mouth Sores)

Ṣafrāwī Ishāl (Bilious Diarrhoea)

Ishāl-i-damawi (Bloody Diarrhoea)

Sahaj (Erosion)

Qurūḥ-i-Maq'ad (Rectal Ulcer)

Waram-I-Raḥim (Metritis)

Sayalan al-Raḥim (Leucorrhea)

Iltihāb-e-chashm (Conjunctivitis)

***Tarkeeb Istemaal* (Method of Usage) :** [4,12,13,14,15]

The extract derived from the mature pods of *Aqaaqia* is useful in reducing biliary-induced intestinal irritation, managing excessive gastric secretions.

Oral intake , by enema, or applying on the abdomen as a paste, diarrhoea can be treated.

Intravaginal administration produces significant vaginal constriction, and increases tissue tonicity.

Topical application with egg white will offer therapeutic relief and healing in thermal burn wounds.

In cases of skin fissures caused by cold exposure, it should be applied topically in combination with wax and oil and It exhibits anti-inflammatory activity by promoting the resolution of heat-induced swellings.

Topical application of a paste prepared from Aas *(Myrtus communis* L.) leaves and Gulaab (*Rosa* spp.) petals has been reported to exhibit an anhidrotic effect, thereby reducing excessive perspiration and when applied to the face, it enhances the complexion.

It dyes the hair & washing the hair with is also beneficial.

***Maḍarrat* (Harmful Effects) :** [13,14]

Headache

Lungs

***Musl'eh* (Corrective) :** [13,14]

Roghan-i-Badam

***Badal* (Substitute) :** [13,14]

Rasuat (Berberis aristata DC)

Sandal Safaid (Santalum album L.)

Dammul Akhwain, (Dracaena cinnabari Balf.f.)

Kharnoob ka *Usaara* (*Ceratonia siliqua* L.)

***Miqdār Khūrāk* (Dose) :** [13,14]

1.75 – 3.5 GM

***Mashūr Murakkabāt* (Important Formulations) :** [18,19,20,21]

Qurṣ-e-Aqaaqia

Qurṣ-e-Tabasheer Qābiḍ

Qurṣ-e-Anjabar

Qurṣ-e-Gulnaar

Qurṣ-e-Gulnaar Faarsi

Qurṣ-e-Ziabates Sada

Majun-e-Masik-ul-Bowl

Sufoof-e-kishneezi

Phytochemistry : [1,2,6,7,8]

Vachellia nilotica pods are endowed with a variety of natural compounds which provide them with nutritional as well as medicinal properties. The pods of *Vachellia nilotica* L. are particularly enriched with tannins (Table:1), which impart their characteristic astringent properties and contribute significantly to their pharmacological activity. Quantitative phytochemical studies report that the tannin concentration in whole pods ranges from 12% to 19%, whereas removal of the seeds results in a marked increase of concentration, reaching approximately 18–27%. These tannins, predominantly hydrolyzable and condensed types, are well recognised for their antimicrobial, antioxidant, anti-diarrhoea, and wound-healing activities, thereby substantiating the traditional therapeutic applications of the pods. In addition to tannins the pods also contain flavonoids, polysaccharides , alkaloids, saponins, glycosides and sterols. The pods are also a source of minerals, like calcium, magnesium, potassium and iron. The kind of solvent applied in extracting also determines the type of flavours that are acquired- water, alcohol extracts are rich in tannins, flavonoids and saponins, whereas non-polar solvents extract sterols and other fat compounds. Tannins and flavonoids contribute significantly to antioxidant, antimicrobial, and anti-inflammatory actions, and even smaller doses of sterols and terpenoids contribute to additional therapeutic effects. This combination of bioactive substances is *V. nilotica* pods are such diverse traditional and pharmacological agents, as they combat infections and diarrhoea as well as liver protection and wound healing.

Pods : [1,2,3,6,7,8]

Table : 1

Classification	Compound
Tannins	Gallic Acid, Digallic Acid, Ellagic Acid
Terpenes	Niloticane
Flavonoids	Rutin, Epicatechin

Pharmacological Studies : [32,33,34]

Anti-ulcer Activity : A. nilotica hydro-ethanolic extract of young, seedless pods has been reported to have a strong anti-ulcer activity in pylorus ligation, swimming stress, and NSAID-induced ulcer models in rats. Being rich in phenolic compounds, the extract emphasised more anti-ulcer potential, implying that the therapeutic effect is mainly due to phenolic compounds in it. [22]

Anti-Microbial & Hepatoprotective Activity: This was a comparative study involving the antimicrobial and hepatoprotective properties of n-hexane (ANPH) and methanol (ANPM) Acacia nilotica pod extracts. These two extracts were abundant in phenols and flavonoids, were antimicrobial in nature and offered dose dependent hepatoprotection in a PCM induced rat model. Molecular docking suggested that ergost-5-en-3-ol and 9-octadecenoic acid essentially bound to target proteins. The results suggest that certain plant compounds are key, to the extracts ability to fight off substances and reduce inflammation which's likely why they have a therapeutic effect.[23]

Anti-Hypertensive and Anti-Spasmodic Effect: The *Acacia nilotica* plant has shown some properties. For instance the methanolic extract from its pods seems to have an effect, on blood pressure. In studies this extract has been found to lower blood pressure in a way thats related to the dose given. With 3-30mg/kg being the amount used. Whats more this effect doesn't seem to rely on the pathways like the adrenergic receptors, which are often involved in blood pressure regulation.It strongly inhibited atrial contractility and prevented spontaneous and K+-induced jejunal contraction, which is evidence of calcium channel blockage, in vitro. These findings support its pharmacological potential as an anti-

hypertensive and antispasmodic agent through smooth muscle relaxation mechanisms. [24]

Anti-Inflammatory Activity: The methanolic pod extract of *Acacia nilotica* and the tannin-rich fraction were evaluated in terms of anti-inflammatory activity in compliance with the OECD acute toxicity guidelines and were tolerated well up to 2000 mg/kg. Both had shown a considerable reduction on inflammation of carrageenan-induced paw oedema and cotton pellet granuloma models, where the tannin fraction has shown better potency at lower dosages compared to the crude extract. These findings support the strong anti-inflammatory property of A. nilotica pod phytoconstituents. [25]

Analgesic & Anti-Inflammatory Activity: The *Acacia nilotica* tree has been found to have some properties. Its pods can be used to make an extract thats been shown to speed up the healing of wounds bring down inflammation and ease pain. When this extract was analysed it was discovered to be packed with all sorts of compounds. Things, like tannins, flavonoids and polyphenols well as saponins. It's not surprising really that these natural chemicals have such a range of effects, on the body. Extraction-based ointments applied topically caused a concentration-dependent increase in wound-contraction with the 10% composition resulting in almost complete tissue-recovery in 16 days. Significantly, the extract inhibited carrageenan-induced paw oedema, nociceptive responses in the writhing assay and induced angiogenesis, re-epithelialization, keratinocyte migration, and collagen biosynthesis. Such results scientifically confirm the use of A. nilotica pods in conventional wound and burn care. [8]

Anti-Diabetic Activity and Nephroprotective Activity: Aqueous methanolic extract of *Acacia nilotica* pods (150 and 300 mg/kg) was found to possess strong antihyperglycemic and nephroprotective properties in streptozotocin-induced diabetic mice. Treatment greatly reduced blood glucose, urea and creatinine levels, and swivelled the oxidative stress indicators (LPO, SOD, GSH), and minimized damage of the renal histopathology. These findings emphasize its potential as a therapeutic agent due to its antioxidant and antihyperglycemic effect. [26]

Anti-Fungal Activity: Agglutination Assay Silver nanoparticles (AgNPs) prepared with Acacia nilotica pod extracts exhibited high antifungal action against such dermatophytic isolates as Trichophyton mentagrotes, T. rubrum and T. tonsurans. Phytochemical and GC-MS analysis showed the presence of various polyphenols of bioactivity, whereas UV-Vis, FT-IR, and SEM were used to verify the presence and stability of AgNPs. The AgNPs showed broader and consistent areas of inhibition compared with crude aqueous and methanolic extract, which indicates that the biomaterials are more effective and have therapeutic potential in the treatment of dermatophytic infections. [27]

Anti-Oxidant and Anti-Cancer Activity : The copper oxide nanoparticles (CuONPs) were biogenically produced by the use of *Acacia nilotica* pod extracts and identified by spectroscopic, microscopic and energy-dispersive X-ray (EDX) analysis, which has validated the elemental composition and functional surface groups. FTIR spectra showed phenolic capping and alkene and alcohol functionalities. CuONPs demonstrated a strong effect of antioxidants (DPPH and phosphomolybdate) and dose-dependent cytotoxicity against HepG2 hepatocellular carcinoma cells as well as a significant thrombolytic potential. The paper presents the initial evidence of multifunctional bioactivities of *A. nilotica*-mediated CuONPs. [28]

Anti-Fertility: The aqueous pod extract of Acacia nilotica and methanolic extract of the stem bark of *Albizia lebbeck* were found to be highly anti-reproductive in female *Mastomys natalensis* rats. Exposure to the extracts considerably reduced fertility indices, implantation efficiency and litter yield, and decreased the number of corpus lutea and widespread follicular degeneration but not ovarian weight. Microscopic analysis displayed backward alterations in ovarian structures which are manifested through interference of folliculogenesis and the malfunction of the luteal functions. These findings suggest that the extracts disrupt reproductive competence through inhibition of ovulatory processes and impaired conception. [29]

UTI Syndrome: The aqueous extract of *Acacia nilotica* exhibited strong antimicrobial properties against multidrug-resistant uropathogens, with *E. coli* being the most dominant (73.7%). It effectively inhibited bacterial growth at 15–16.7 mg/ml and reduced biofilm formation by up to 62.6%. GC-MS analysis revealed 19 active phytochemicals, including 3-Cyclohexane-1-Carboxaldehyde and α-Selinene. These results suggest *A. nilotica* as a promising and affordable candidate for UTI therapy.[30]

Syndromic management of abnormal vaginal discharge: Single-blind comparative study assessed the effectiveness of *Acacia nilotica* pod sitz baths combined with vaginal pessaries in treating abnormal vaginal discharge and enhancing women's quality of life. Out of 66 participants, those treated with Acacia showed significantly better symptom relief and higher cure rates, especially in bacterial vaginosis and pelvic infections. Improvements were observed in pain scores and overall well-being. The results support *A. nilotica* as a safe and effective option for managing vaginal infections.[31]

Result and Discussion:

Aqaaqia (*Vachellia nilotica* L.) occupies a privileged position in *Unani* medicine, where it is stated that it is *Qābiḍ* (astringent), *Habis-i-Dam* (hemostyptic), and *Mujaffif* (desiccant). These classical properties are consistent with the current pharmacological results indicating its anti-inflammatory, antimicrobial, mucosal protective, and antioxidant properties. It has long been used in the treatment of diarrhoea, dysentery, bleeding disorders, and ulcerative conditions, and been used in compound preparations like *Qurs-e-Gulnar* and *Qurs-e-Jiryan* as a strength-giver of mucosal tissues and of abnormal discharges. One of the widespread illusions is the replacement of *Samagh-e-Arabi* (gum acacia) with *Aqaaqia* (pods extract) even though they are composed

of different phytoconstituents and have different mechanisms of action. Phytochemical analysis has shown that *Aqaaqia* contains tannins (gallic acid, catechin, epicatechin), flavonoids, phenolic acids, saponins, terpenoids and volatile oils in abundance. These bioactive compounds justify its wide range of therapeutic effects: tannins and flavonoids explain anti-ulcer, hepatoprotective, and antioxidant effects; phenolic acids and oils explain anti-microbial effects; saponins and terpenoids explain immunomodulatory and anti-inflammatory effects. This complicated phytochemical profile is a good scientific reason why it was traditionally used. Many of these assertions are supported by experimental evidence, and *Aqaaqia* pod extracts show gastroprotective effects in ulcer models, hepatoprotective effects in chemically damaged liver tissues, antimicrobial effects against bacteria and fungi, hypoglycemic potential in animal studies and topical wound healing. These results are in close correlation with its past application in gastrointestinal, liver and dermatological diseases. However, it has some shortcomings especially the limited human trials. The existing clinical evidence is largely anecdotal and it is clear that well-formulated, randomised controlled trials are necessary to define safety, dosage, and therapeutic ranges. Moreover, geographic, harvesting and extraction differences in chemical composition present reproducibility and standardisation challenges. To evolve *Aqaaqia* into evidence-based practice, it will be necessary to address these problems by using quality-controlled extracts and GMP-compliant formulations. A combination of classical wisdom and contemporary phytochemical understanding and clinical confirmation can make *Aqaaqia* a scientifically approved natural medicine.

Conclusion

As a gateway to ancient Unani knowledge and contemporary pharmacological studies, *Aqaaqia* (*Vachellia nilotica* L.) has proven to be a strong herbal candidate that has potential of a wide spectrum of therapeutic use. Its classical properties as *Qabiḍ* (astringent), *Habis-i-Dam* (hemostyptic), and *Mujaffif* (desiccant), have been confirmed by the modern studies that show anti-inflammatory, antimicrobial, antioxidant, gastroprotective, hepatoprotective, wound-healing, and hypoglycemic properties. It is rich in tannins, flavonoids, phenolic acids, saponins and terpenoids and its varied phytochemical profile gives it a scientific foundation in the treatment of gastrointestinal, hepatic and dermatological conditions. There are, however, gaps in its path to evidence-based acceptance: there is a dearth of robust in vivo pharmacological studies, toxicological studies, pharmacokinetics, and in particular, controlled clinical trials, and standardisation continues to be an issue because of variation in raw material and extraction procedures. *Aqaaqia* can be re-marketed as an integrative therapeutic agent with scientific verification, standardised formulations, and translational studies, which will help to replace traditional records with rigorous scientific validation. Future studies should prioritise well-designed human trials, standardisation of extracts, and safety evaluations. Overall, the pods of *V. nilotica* show strong potential as a source of phytopharmaceuticals and merit further exploration for integration into evidence-based therapeutic applications.

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References

1) Nadkarni KM. Indian Materia Medica. Vol 1. Mumbai : Popular Prakashan; 2007. Pg.No. 9-11

2) R.N. Chopra, S.L. Nayar and I.C. Chopra. Glossary of Indian Medicinal Plants. National Institute of Science Communication. First Edition 1956, Pg.No. 2

3) CP Khare. Indian Medicinal Plants : An Illustrated Dictionary. Springer. Pg.No. 4-5

4) Ibn Sina. Al Qanoon fil'tib (Urdu Translation). New Delhi: Idara-e-Kitabul Shifa; 2007. Pg.No. 33-35

5) Chughtai GM (1940). Rehnuma-e-Aqaqeer, Vol. 2. Sheikh Mohd Basheer and Sons, Urdu Bazar, Lahore: pg. 229-238.

6) C.K. Kokate, A.P. Purohit, S.B. Gokhale. Pharmacognosy. Nirali Prakashan. Abhyudaya Pragati,1312 Shivaji Nagar, Pune. Pg.No. 8.7

7) The Wealth of India: A Dictionary of Indian Raw Materials and Industrial Products. Raw Materials. Vol. 1. New Delhi:Council of Scientific and Industrial Research; 1948. Pg.No. 5-8

8) Hafez, L.O.; Brito-Casillas, Y.; Abdelmageed, N.; Alemán- Cabrera, I.M.; Morad, S.A.F.; Abdel-Raheem, M.H.; Wägner, A.M. The Acacia (Vachellia nilotica (L.) P.J.H. Hurter & Mabb.): Traditional Uses and Recent Advances on Its Pharmacological Attributes and Potential Activities. Nutrients 2024, 16, 4278. https://doi.org/10.3390/nu16244278 PMid:39770900 PMCid:PMC11678605

9) Kirtikar KR, Basu B.D. "Indian Medical Plant with Illustration". Second edition 2001; Pg.No.922-924.

10) Central Council for Research in Unani Medicine. Standard Unani Medical Terminology. New Delhi : Central Council for Research in Unani Medicine, Department of AYUSH, Ministry of Health & Family Welfare, Government of India; 2012.

11) Arzani A. Bustan-ul-Mufradat. 1st ed. Delhi: Idara Kitab-us-Shifa; 2002, Pg.no.:120-121

12) IbnHubalBaghdadi.Kitaab-ul-Miqtarat. Central Council for Research in Unani Medicine. NewDelhi:CCRUM, 2005, Vol.2 - Pg. No: 56.

13) MohammedAzamKhan,"Moheet-e-Azam"published by CCRUM,2014,Vol-1,Pg.no: 376-378.

14) Hakim Najmul Ghani. Khazainul Advia. Idara-e- Kitabul Shifa, Delhi; 2011. Pg.No.254

15) Hakim Kabiruddin. Makhzanul Mufradaat. Tibbia College, Delhi, 2000. Pg.No.: 82-83.

16) Hakim Mohammed Kabiruddin."Kulliyat-e-Advia". JamiaTibbiya,KarolBagh-Delhi, 1937. Pg.no.:714

17) Prof. Ghufran Ahmed. Usool-e-dawasazi. NIUM,kotegapalaya,Bengaluru,2016.

18) Hakim Kabiruddin. Bayaz-i-Kabir . Siddiqui Publications, Lahore. Pg.No.: 106, 109, 155.

19) Qarabadeen Majeedi. India Unani Tibbi Conference. 1986.

20) Hakim Waseem Ahmed Azmi. Murakkabat-i-Advia. Idaare Kitaab-Us-Shifa. 2010. Volume - 2, Pg.No.: 140-141

21) National Formulary of Unani Medicine. Part - 1.Wizaarati Sahet-o-Khaandaani Behboud. Hukumat-i-Hind, New Delhi. Pg.No.: 85-87, 97-100, 218, 355-370

22) Vijay Kumar Bansal1, Rajesh Kumar Goel2*. Gastroprotective effect of Acacia nilotica young seedless pod extract:Role of polyphenolic constituents. Asian Pacific Journal of Tropical Medicine (2012)523-528. https://doi.org/10.1016/S1995-7645(12)60092-3 PMid:22647813

23) Mehak Idrees1, Sana Javaid2, Sumaira Nadeem2, Faria Khurshid3, Abida Parveen4, Abdul Malik5, Azmat Ali Khan6, Suhail Akhtar7, and Sabiha Fatima8 . Antimicrobial and Hepatoprotective Properties of Pods of Acacia nilotica (L.) Willd. ex Delile: In Vivo and In SilicoApproaches. Dose-Response:An International Journal October-December 2024:1-14 .

24) A H Gilani et al. Phytother Res. 1999 Dec. Studies on antihypertensive and antispasmodic activities of methanol extract of Acacia nilotica pods. Phytotherapy Research Volume 13, Issue 8 pp. 665-669. https://doi.org/10.1002/(SICI)1099-1573(199912)13:8<665::AID-PTR563>3.0.CO;2-T

25) Khan T, Anjaria J.K. Dedhia V. Gohel. Bioactivity Guided Fractionation And Anti-Inflammatory Activity Of Acacia nilotica Pods. Int.J Pharm Pharm Sci.2015;7(7):380-3

26) Enayat A.Omara, Somaia A.Nada, Abdel A.Razik H.Farrag, Walid M.Sharaf, Sayed A.El-Toumy. Therapeutic effect of Acacia nilotica pods extract on streptozotocin induced diabetic nephropathy in rat. Phytomedicine, 2012;19(12)1059-1067. https://doi.org/10.1016/j.phymed.2012.07.006 PMid:22884305

27) Saheed Y, Antifungal Potential of silver nanoparticles from Acacia nilotica Pod against Dermatophytes, Journal of Drug Delivery and Therapeutics. 2021; 11(5-S):85-95 https://doi.org/10.22270/jddt.v11i5-S.5024

28) Saralaa Ramesh, Vinitha U.G., Savarimuthu Philip Anthony, Meenakshi Sundaram Muthuraman. Pods of Acacia nilotica mediated synthesis of copper oxide nanoparticles and it's in vitro biological applications. Materials Today : Proceedings, 2021;47(3):751-756. https://doi.org/10.1016/j.matpr.2020.07.052

29) Lampiao F. The Anti-fertility Effects of Acacia nilotica in Male Wistar Rats. J Reprod Infertil. 2013;14(1):39-42.

30) Elamary, R.B.; Albarakaty, F.M.; Salem, W.M. Efficacy of Acacia nilotica aqueous extract in treating biofilm-forming and multidrug- resistant uropathogens isolated from patients with UTI syndrome. Sci. Rep. 2020, 10, 1-14. https://doi.org/10.1038/s41598-020-67732-w PMid:32636429 PMCid:PMC7341837

31) Saeedi, R.; Sultana, A.; Rahman, K.; Belal Bin Heyat, M.; Kamal, M.A.; Ishawu, M. Efficacy of Acacia nilotica Linn. pod's sitz bath plus vaginal pessary in syndromic management of abnormal vaginal discharge: A randomized controlled trial. Evid. Based Complement. Altern. Med. 2022, 2022, 5769555. https://doi.org/10.1155/2022/5769555 PMid:35664940 PMCid:PMC9159874

32) Mariyam Roqaiya et al / Int. J. Pharm. Phytopharmacol. Res. 2015; 4 (6): 315-321 https://doi.org/10.31254/phyto.2015.4311

33) 1Shah Alam, 2Nighat Anjum, 3Jamal Akhtar,4Fouzia Bashir, 5ShaguftaParveen. PHARMACOLOGICAL INVESTIGATIONS O AQAQIA - Acacia arabica (Lam.) Willd. 2018 IJCRT 2018;6(1).

34) Usmani Misba Adam Ali, Shaik Adeena Parveen, Ayesha Siddiqua and Abdul Azeez. A comprehensive review on Acacia arabica's extract (Aqaqiya) : Pharmacological and therapeutic perspectives. International Journal of Unani and Integrative Medicine 2025; 9(2):269-276 https://doi.org/10.33545/2616454X.2025.v9.i2d.369