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# A comprehensive review on *Acacia arabica*'s extract (Aqaqiya): Pharmacological and therapeutic perspectives

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**Abstract**
**Background:** *Acacia arabica* (syn. *Acacia nilotica*), commonly known as *Babul*, its pods extract is called *Aqaqia, and its gum is called Samagh-e-arabi* in Unani Medicine, is a widely distributed tree valued for its pharmacological and therapeutic potential. Traditional systems such as Ayurveda, Unani, and Siddha have long utilized various parts of the plant for diverse ailments, while modern pharmacological studies continue to validate its bioactivity.
**Objective:** To provide a comprehensive review of *Acacia arabica* extract, with a focus on its botanical features, therapeutic actions, pharmacological activities, and evidence-based clinical relevance in traditional and modern medicine.
**Methods:** Literature was retrieved from electronic databases (PubMed, Google Scholar, Science Direct, Scopus) using keywords including *Acacia arabica*, *Aqaqia*, and *Acacia nilotica*. Classical Unani texts (e.g., *Khazain al-Advia*, *Makhzan al-Mufradat*, *Qarabadin Najm al-Ghani*), standard botanical references (*Flora Medica*, *Indian Materia Medica*), and contemporary research articles were reviewed to compile data on morphology, distribution, pharmacology, and therapeutic applications.
**Discussion:** *Acacia arabica* is rich in tannins, flavonoids, and polyphenols, contributing to its broad therapeutic effects. Traditional uses include astringent, hemostatic, anti-inflammatory, and gastrointestinal applications. Pharmacological studies report diverse activities such as antidiabetic, antimicrobial, wound-healing, antioxidant, hepatoprotective, antihyperlipidemic, analgesic, anticancer, antimalarial, and immunomodulatory effects. Modern studies confirm its insulin-secretory, lipid-lowering actions.
**Conclusion:** *Acacia arabica* extract (*Aqaqia*) bridges traditional wisdom and modern pharmacological science, offering a wide spectrum of therapeutic benefits. Its potential as an antidiabetic, antimicrobial, and antioxidant agent makes it a promising candidate for integrative medicine. Nonetheless, further clinical investigations and safety evaluations are necessary to establish standardized formulations and dosage guidelines.

**Keywords:** *Acacia arabica*, *Aqaqia*, unani medicine, pharmacological activities, antidiabetic, antimicrobial, tannins

## Introduction

Medicinal plants have always been at the heart of human healthcare, with nearly 80% of the global population still relying predominantly on plant-derived remedies to prevent and treat diseases. Throughout history, more than one-third of known plant species have been harnessed for their therapeutic potential. In India, the cultural heritage of herbal medicine is deeply embedded within classical healing traditions such as Ayurveda, Unani, and Siddha, each system drawing upon a rich pharmacopeia of natural resources. Ayurveda is reported to employ around 700 plant species, Unani a comparable number like ayurveda, and Siddha approximately 600, while contemporary biomedicine makes consistent use of about 30 species [1]. Despite the rapid expansion of synthetic pharmaceuticals, plant-based medicine continues to serve as a vital and enduring pillar of global healthcare, bridging ancient wisdom with modern therapeutic needs.

*Acacia arabica*, popularly known as Babul, was formally classified in 1773 by the eminent Swedish botanist Carl Linnaeus. It belongs to a broad group of leguminous plants characterised by their pod-bearing nature [2, 3]. What sets this genus apart is its abundance of tannins and condensed tannins concentrated in the sap and foliage. Across centuries, these

potent phytochemicals have been prized not only for their healing properties in traditional medicine but also for their effectiveness as natural preservatives [2-5], making Acacia a plant of both cultural and medicinal significance worldwide.

The word *Acacia* traces its roots to the Greek term ἀκίς (akis), meaning *thorn*. The botanical designation stems from ἀκακία (akakia) a name bestowed upon *Acacia nilotica* by the famed Greek physician and botanist Pedanius Dioscorides (c. 40-90 CE) in his legendary medical compendium *Materia Medica*.

*Acacia arabica* holds significant importance in the arid landscapes of India. Almost every part of the tree its roots, bark, leaves, flowers, gum, and pods is put to diverse uses. [6, 7]. The bark, in particular, is abundant in tannins enriched with gallic acid, a powerful astringent. This biochemical property has made it valuable across various domains, including leather tanning, textile dyeing, ink preparation, and traditional medicinal formulations, underscoring its economic as well as therapeutic relevance [8, 9].

## Material and Methods

The literature on *Acacia arabica* was sourced from computerized databases, including PubMed, Google Scholar, Science Direct, and Scopus by searching keywords like *Acacia arabica, aqaqia, Acacia nilotica* etc., We also explored classical texts of Unani medicine, such as *Khazain-Al Advia, Muhit-i-Azam, Makhzan-Al-Mufradat, Qarabadin Najm-Al-Ghani, Bustan-Al-Mufradat, Qarabadin-i-A'zam*. Additionally, we consulted conventional botany references, including Flora Medica, Glossary of Indian Medicinal Plants, Indian Materia Medica, Indian Medicinal Plants, Handbook of Medicinal Herbs, and Compendium of Indian Medicinal Plants. Our research encompassed both classical Unani literature.

## Botanical description

*Acacia arabica* (syn. *Acacia nilotica*) is a versatile small to medium-sized tree, typically reaching 6-12 meters in height. Its bark is dark brown to nearly black, marked by deep longitudinal fissures, giving it a rugged appearance. Young branchlets are fine and hairy, softening the tree's sturdy frame.

The foliage is bipinnate, measuring 5-10 cm in length, with a rachis that is finely hairy and often dotted with tiny glands. Petioles extend 2.5-5 cm, while the stipular spines highly variable in form, range between 0.6-5 cm. These spines are generally whitish, straight, smooth, and piercingly sharp, although in some individuals they may be absent altogether. Each pinna (2-5 cm) bears 4-9 pairs, and these in turn carry 10-25 pairs of minutes, linear-oblong leaflets. The leaflets are small (3-6 × 1.2-2 mm), subsessile, blunt-tipped, and either glabrous or only faintly hairy.

The tree bursts into bright yellow, globe-shaped blossoms that cluster along axillary peduncles, usually arranged in groups of 2-6. Tiny ovate bracteoles, acute and hairy, guard the floral structures. The calyx, only about 1.25 mm long, is bell-shaped with minute teeth, while the corolla stretches to 3 mm, ending in short triangular lobes.

Its fruits are striking moniliform pods, 7.5-15 cm in length and 1.3-1.6 cm wide, compressed and distinctly constricted between the seeds. These pods are thickly clothed in persistent grey hairs and typically enclose 8-12 seeds within their beaded structure [10, 11].

## Botanical distribution

*Acacia arabica* enjoys a remarkably broad distribution, flourishing across tropical and subtropical belts of the world. It grows abundantly throughout India, Sri Lanka, Baluchistan, and Waziristan, and extends its presence into Arabia, Egypt, tropical Africa, and as far south as Natal. What makes this species exceptional is its ability to endure some of the harshest environments surviving drought and withstanding scorching heat that can soar up to 50°C. This resilience has enabled it to establish a vast natural range that stretches from the Indian subcontinent to Africa and the Middle East, underscoring its extraordinary ecological flexibility and adaptability to diverse climates [10, 12].

## Botanical name

*Acacia arabica Willd.var. indica Benth.*

## Synonyms

*Acacia nilotica, Vachellia nilotica, Mimosa arabica lam* [60]

## Scientific classification

**Kingdom:** Plantae
**Subkingdom:** Tracheobionta
**Super division:** Spermatophyta
**Division:** Magnoliophyta
**Class:** Magnoliopsida
**Subclass:** Rosidae
**Order:** Fabales
**Family:** Fabaceae (Leguminosae)
**Subfamily:** Mimosoideae
**Genus:** Acacia
**Species:** Arabica

**Fig 1:** *Acacia arabica* extract (*Aqaqia*)

**Fig 2:** *Acacia arabica*

**Vernacular names**

- **Arabic:** Ummughilan, Usare qurz
- **Bengali:** Babla, Babul
- **Dutch:** Echte acacia
- **English:** Babool
- **Gujarati:** Babaria, Baval
- **Hindi:** Kikar
- **Japanese:** Arabica gomu-modoki
- **Kannada:** Gobbli Jaali
- **Malayalam:** Kari velam
- **Marathi:** Babhul
- **Nepali:** Babul
- **Oriya (Odia):** Bambuda
- **Pashto:** Kikar
- **Persian:** Khair-e-Muqalliyan
- **Punjabi:** Kikar
- **Russian:** Akatsiya arabskaya
- **Sanskrit:** Baboolah
- **Sindhi:** Kikar
- **Sinhala:** Babbula
- **Somali:** Qodax
- **Spanish:** Acacia egipcia
- **Tamil:** Karu velam, Kariram
- **Telugu:** Karuvelam, Nallatumma
- **Unani:** Aqaqia
- **Urdu:** Babul, Kikar

**Therapeutic actions (*Af'āl*)**

- *Qābiz* (Astringent)
- *Hābis-e-Dam* (Hemostatic)
- *Mujaffîf-e-Rutoobat* (Desiccant)
- Liver and Stomach Tonic (*Muqawwi-e-Mida-wa Kabid*)
- Eye Tonic (*Muqawwi-e-Basar*)
- Anti-inflammatory (*Muḥallil-e-Warm*)
- Deviation of morbid matter (*Imāla-e-Mawād*)

**Temperament (Mizaj)** [53]

If *Aqaqia* is obtained by the process of washing, it is Cold and Dry in 2nd degree.

If not washed, it is Cold in 1st degree and Dry in 3rd degree

**Therapeutic uses**

**1. Antidiarrheal and Astringent**

Extracts from the bark and pods, which are abundant in tannins, help decrease intestinal secretions and provide relief in conditions like diarrhea and dysentery [23].

**2. Antimicrobial**

Antibacterial properties of the ethanolic and aqueous extracts have been observed against *E. coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* [24].

**3. Wound healing**

Hydroalcoholic extracts of *Acacia nilotica* have been shown to accelerate wound healing by promoting wound contraction, enhancing collagen synthesis, and stimulating epithelial regeneration in experimental models [59].

**4. Anti-inflammatory & Analgesic**

The extracts suppress prostaglandin activity and alleviate inflammation associated with arthritis and painful swellings [26].

**5. Antidiabetic**

Alcoholic bark extract has been shown to decrease blood glucose levels and enhance insulin sensitivity in experimental models [27].

**6. Oral & dental health**

Bark extract is incorporated into mouthwashes and toothpaste, where it helps minimize plaque formation and gingivitis [28].

**7. Dermatological uses**

Topical use of bark and leaf extracts has shown effectiveness against eczema, fungal disorders, and acne [29].

**8. Antioxidant & Hepatoprotective**

The presence of flavonoids and tannins in the extracts contributes to liver protection and antioxidant activity [30].

**9. Skin diseases (Eczema, boils, ulcers, excessive sweating)**

Direct modern studies are lacking, but the general astringent and antiseptic traditional uses support applications in skin-related conditions commonly noted in ethnobotanical practices.

**10. Paronychia**

It is useful in treatment of paronychia [54]

**11. Hair dying agent**

Topical application on hair results in blackening [7, 54]

**12. Uterine desiccant**

It possesses a drying effect on the uterine secretions [54]

**13. Galactagogue**

In animal studies, Babool extract increased milk production by as much as 59% within a hour.

**14. Ophthalmic benefits**

*Acacia nilotica* is reported to enhance and strengthen vision while being effective in the treatment of various eye disorders. It provides relief in conditions such as conjunctivitis and erysipelas and is also incorporated in formulations used for managing pterygium [16, 61].

**Pharmacological activities**

1. **Antimicrobial activity:** Bark and pod extracts exhibit notable antibacterial effects against *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*, along with antifungal activity against *Candida albicans* [31].
2. **Anti-inflammatory activity:** Ethanolic and aqueous bark extracts significantly suppress carrageenan-induced paw edema in rats, indicating strong anti-inflammatory potential [32].
3. **Antioxidant activity:** Phenolic- and flavonoid-rich extracts demonstrate marked free radical scavenging activity (DPPH and ABTS assays), thereby reducing oxidative stress [33].
4. **Antidiabetic activity:** Methanolic bark extract lowers blood glucose in alloxan-induced diabetic rats and inhibits carbohydrate-metabolizing enzymes (α-amylase and α-glucosidase) [34].
5. **Wound healing activity:** Bark extract accelerates

wound contraction, enhances collagen deposition, and promotes epithelialization in excision wound models.[35]

6. **Astringent and hemostatic activity:** Due to their high tannin content, bark and pod extracts exert potent astringent action, useful in bleeding gums, hemorrhoids, and wound management [11].
7. **Antidiarrheal activity:** Methanolic extract significantly reduces castor oil-induced diarrhea in rats by inhibiting intestinal motility and fluid secretion [36].
8. **Anticancer potential:** Polyphenolic fractions display cytotoxic activity against human breast (MCF-7) and colon (HT-29) cancer cell lines [37].
9. **Antihyperlipidemic activity:** Bark extract decreases serum cholesterol, triglycerides, and LDL levels in high-fat diet-fed rats [38].
10. **Antimalarial activity:** Ethanolic bark extract exhibits inhibitory effects against *Plasmodium berghei* in experimental studies [39].
11. **Analgesic activity:** Ethanolic bark extract produces significant analgesic responses in hot-plate and tail-flick assays in mice [40].
12. **Antiviral activity:** Leaf and bark extracts inhibit replication of Herpes Simplex Virus (HSV) and influenza virus under in vitro conditions [41].
13. **Antiplasmodial (Anti-parasitic) activity:** Acetone extracts of pods and bark show strong inhibitory activity against *Leishmania donovani* and *Plasmodium falciparum* [42].
14. **Hepatoprotective activity:** Methanolic bark extract protects against carbon tetrachloride ($CCl_4$)-induced liver injury in rats by lowering SGPT, SGOT, and bilirubin levels [43].
15. **Immunomodulatory activity:** Ethanolic bark extract enhances humoral immunity by increasing antibody titers and potentiating delayed-type hypersensitivity reactions in animal models [44].
16. **Nephroprotective activity:** Ethanolic pod extract mitigates gentamicin-induced nephrotoxicity by improving renal markers such as serum creatinine and urea [45].
17. **Antifertility / Contraceptive effect**
    Seed extract reduces sperm motility and fertility indices in male rats [46].
18. **Antiulcer activity:** Bark and leaf extracts demonstrate gastroprotective effects by reducing aspirin- and ethanol-induced ulcers in rats, attributed to their antioxidant and cytoprotective mechanisms [47].
19. **Anthelmintic activity:** Aqueous extracts of bark and pods exhibit anthelmintic activity against *Pheretima posthuma* (earthworms), causing paralysis and mortality [48].
20. **Cardioprotective activity:** Flavonoid-enriched extracts protect against isoproterenol-induced myocardial infarction in rats by decreasing lipid peroxidation and restoring antioxidant enzyme activity [49].

***Miqdār-e-khūrāk* (Dose)**
1.7 to 3 grams [7]

***Muzirrat* (Adverse Effects)**
- May lead to blockage/obstruction
- Has a constipating effect (can cause constipation) [53]

***Muṣliḥ* (Corrective)**
- *Roghan-e-Badam* (Almond oil - *Prunus amygdalus*)
- *Roghan magz tukhm kaddu* - Oil of pumpkin seeds (*Cucurbita pepo* L.) [7]
- *Laboob* (Electuary)

***Badal* (Substitute)**
- *Raswat sandal safed* (*Santalum album*)
- *Masoor dal* (*Lens culinaris*)
- *Dammul akhwain* (*Dracaena cinnabari*)
- *Extracts of Kharnob* (*Ceratonia siliqua*) [7]

**Compound unani formulations**
1. *Ḥabb-e-Muqil*
2. *Ma'jūn Muqil*
3. *Qurṣ Bandish Khoon*
4. *Iṭrīfal Muqil*
5. *Ḥabb-e-Bawasir*
6. *Ḥabb-e-Bandshikam*
7. *Majoon Falasfa*
8. *Sharbat Zoofah*
9. *Ḥabb e Jawahar*
10. *Ma'jūn Seer Al-Wajh*
11. *Ḥabb-e-Tinkar*
12. *Sharbat-e-Anar Shirin*

**Modern pharmacological activities of *Acacia arabica's* bark extract**

**1. Antidiabetic & insulin-secretory effects**
The ethanol extract of *A. arabica* bark (EEAA) demonstrates potent insulinotropic and antidiabetic activities:
- Stimulates insulin release from pancreatic β-cells (BRIN-BD11) and mouse islets, comparable to GLP-1.
- Mechanism includes K-ATP channel closure, membrane depolarization, and increased intracellular $Ca^{2+}$.
- Enhances glucose uptake and inhibits starch digestion, glucose diffusion, DPP-IV enzyme, and protein glycation all contributing to improved glycemic control.
- In obese diabetic rats, EEAA improved glucose tolerance, increased plasma insulin & GLP-1, and reduced DPP-IV activity [17].

**2. Antihyperglycemic, antihyperlipidemic & antioxidant effects**
In diabetic rat models, administration of the ethanol extract of *Acacia arabica* (EEAA):
- Significantly reduced blood glucose levels and improved insulin resistance.
- Lowered serum levels of total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), and malondialdehyde (MDA).
- Increased levels of high-density lipoprotein cholesterol (HDL-C) and coenzyme Q10 (Co-Q10), indicating enhanced lipid metabolism and antioxidative defense [18].

**3. Bioactive components identification**
A detailed phytochemical separation of *Acacia arabica* bark revealed key antidiabetic flavonoids namely quercetin, catechin, and kaempferol. These isolated compounds were shown to effectively stimulate insulin secretion and improve glucose tolerance in experimental models

**4. Antioxidant activity**

The ethanol extract of *Acacia arabica* bark (EEAA) is abundant in phenolic compounds, flavonoids, and tannins, which collectively demonstrate strong antioxidant capabilities. These constituents effectively neutralize reactive oxygen species (ROS), offering protection against oxidative stress and enhancing the extract's therapeutic benefits.[55]

**Evidence based pharmacological studies of *Aqaqia***

**1. Metabolic and antidiabetic effects**

- Ethanolic bark extracts of *Acacia arabica* have been reported to enhance insulin release from pancreatic β-cells and to improve glucose tolerance, insulin sensitivity, and lipid metabolism in diet-induced obese rats.
- Leaf extracts exert antihyperglycemic actions, primarily through antioxidant pathways that support better insulin responsiveness.
- Aqueous bark preparations have shown significant reductions in fasting blood glucose in diabetic animal models, with effects comparable to conventional antidiabetic drugs.
- Bark fractions particularly the ethyl acetate fraction were effective in reducing body weight, normalizing lipid profiles, and decreasing inflammatory markers in high-fat diet rats [17, 18].

**2. Antimicrobial and oral health activities**

- Both bark and leaf extracts of *Acacia nilotica* demonstrate antibacterial activity against Gram-positive as well as Gram-negative bacteria, primarily through mechanisms that disrupt microbial cell membranes.
- Methanolic bark fractions exhibited strong inhibitory action against oral pathogens including *Streptococcus sobrinus* and *Porphyromonas gingivalis*, highlighting their potential in preventing dental caries and periodontal infections.
- Aqueous bark extracts also showed antimicrobial efficacy, with chromatographic studies identifying the active phytoconstituents responsible for this effect.[21]

**3. Anti-inflammatory and antioxidant properties**

- Hydroalcoholic extracts prepared from the fruits of *Acacia nilotica* have demonstrated notable anti-inflammatory and antioxidant effects in experimental models.
- Literature reviews consistently emphasize its strong free-radical scavenging and anti-inflammatory properties, largely attributed to polyphenol- and tannin-enriched fractions derived from various plant parts [56].

**4. Cytotoxic and antiproliferative potential**

Specific phytoconstituents isolated from *Acacia nilotica*, including isorhamnetin derivatives, have been reported to exert cytotoxic, antiproliferative, and antimutagenic effects in experimental assays. However, these findings are limited to preclinical models and require further validation in clinical settings [57].

**5. Anthelmintic and antidiarrheal evidence**

Ethanolic fruit extracts of *Acacia nilotica* have shown significant anthelmintic effects, which are attributed to their rich tannin content. These findings validate the plant's traditional application in the management of helminthic infections and associated diarrheal conditions [58].

**6. Antiviral activity**

Preclinical studies indicate that *Acacia nilotica* extracts may possess antiviral activity, with some efficacy reported in experimental hepatitis models and against selected viral pathogens. However, the current evidence remains preliminary and requires further validation.

**7. Anti hypertensive activity**

Gilani *et al*. (1999) observed that methanolic extract of *Acacia nilotica* pods reduced arterial blood pressure at doses ranging from 3-30 mg/kg. Additionally, the extract exhibited a negative effect on contractile force and rate by blocking calcium channels in guinea pigs and rabbits. Similarly, Amos *et al*. (1999) found that the aqueous seed extract of *Acacia nilotica* produced spasmogenic activity in isolated guinea pig ileum, which may be attributed to enhanced calcium influx leading to muscle spasms [54].

**8. Gynecological and local therapeutic uses**

The pod extract is beneficial in managing leucorrhoea and helps reposition the uterus and anus in cases of prolapse . It is also reported to be effective in treating *Istirkhā' -i-Raḥim* (vaginal laxity) . When applied locally, it strengthens and tightens the perineal region. Moreover, it assists in diverting abnormal or morbid matter away from the affected organ.[16,7]

**Chemical constituents of *Acacia arabica* [54]**

| Plant part | Major constituents | Chemical type |
|---|---|---|
| Gum | Galactose, L-Arabinose, L-Rhamnose, Aldobiouronic acids, 3-O-β-L-arabinopyranosyl-L-arabinose, Polysaccharides, Sugars, Malic acid, Calcium, Magnesium, Potassium, Oxidative enzymes, Moisture, Ash | Carbohydrates, Organic acids, Minerals, Enzymes |
| Bark | Tannins (12-20%, mainly gallic acid, catechol-type tannins), Flavonoids, Mucilage, Calcium, Magnesium salts | Polyphenols, Glycosides, Minerals |
| Leaves | Flavonoids (quercetin, kaempferol), Glycosides, Tannins, Saponins, Ascorbic acid, Minerals | Polyphenols, Vitamins, Secondary metabolites |
| Pods/Fruit | Gallic acid, Ellagic acid, Catechins, Tannins, Sugars, Proteins | Polyphenols, Carbohydrates, Proteins |
| Seeds | Protein (up to 15-20%), Oil, Fatty acids (linoleic, palmitic, oleic), Amino acids | Proteins, Lipids |
| Roots | Tannins, Polyphenols, Minerals (Calcium, Iron) | Polyphenols, Minerals |
| Flowers | Flavonoids, Essential oils, Glycosides, Tannins | Volatile oils, Polyphenols, Glycosides |

## Discussion

Our review highlights that *Acacia arabica* represents one of the most pharmacologically versatile medicinal plants bridging ancient Unani wisdom with modern biomedical evidence. Classical texts document its role as an astringent, hemostatic, and gastrointestinal remedy, while ethnobotanical surveys confirm its broad cultural use across Asia, Africa, and the Middle East.

Modern pharmacological investigations reinforce these traditional claims, revealing that bark and pod extracts are rich in tannins, flavonoids, and phenolic compounds with potent antimicrobial, anti-inflammatory, antidiabetic, antioxidant, hepatoprotective, and immunomodulatory activities. In vitro and in vivo studies demonstrate antibacterial action against *E. coli* and *S. aureus*, wound healing through collagen synthesis and epithelialization, glycemic regulation via stimulation of pancreatic β-cells, and cardiovascular protection through improved lipid metabolism and antioxidant enzyme activity. Emerging evidence also suggests anticancer, antiviral, and antiparasitic potential, though largely restricted to preclinical settings.

The convergence of traditional applications and experimental validation underlines the pharmacological richness of *A. arabica*. However, gaps remain in clinical research, pharmacokinetics, and standardization of extract preparations, which currently limit translation into mainstream therapeutics.

## Conclusion

*Acacia arabica* (*Aqaqia*) stands as a quintessential example of a medicinal plant whose therapeutic promise spans centuries and scientific paradigms. Its rich phytochemistry particularly tannins, flavonoids, and phenolics provides a robust pharmacological foundation for treating metabolic, infectious, inflammatory, and degenerative disorders. The plant's dual relevance in traditional Unani formulations and modern pharmacological studies positions it as a bridge between ancient practice and future drug discovery.

Yet, to unlock its full therapeutic potential, rigorous clinical trials, mechanistic explorations, and safety evaluations are urgently required. Standardization of extracts, identification of active constituents, and dosage optimization remain key priorities. If these gaps are addressed, *A. arabica* may evolve from a culturally significant remedy into a globally recognized phytotherapeutic agent with applications in metabolic health, infectious disease management, and integrative medicine.

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## Conflict of interest

All authors declare no conflict of interest

## References

1. Joy PP, Thomas J, Mathew S, Skaria P. Medicinal plants, Kerala Agricultural University Publications; Kerala, India,1998; 3.
2. Mahgoub, S. On the subspecies of *Acacia nilotica* in the Sudan. Sudan Silva. 1979; 4: 57-62.
3. New, T.R., A Biology of Acacias. Oxford University Press, Melbourne, 1984; 153.
4. Narayan DP, Purohit SS. Agro's colour atlas of medicinal plants. India Agrobios, 2004; 3
5. Dymock W, Warden CJH, Hooper D. Pharmacographica Indica. A History of the principal drugs of vegetable origin. Vol 1. New Delhi Shrishti book distributors, 2005;556
6. Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants. Vol 3, New Delhi NISC, 2001; 4-7.
7. Ghani MN. Khazainul Advia. New Delhi Idarae Kitabul Shifa YNM, 254.
8. New, T.R., A Biology of Acacias. Oxford University Press, Melbourne, 1984; 153.
9. Jansen PCM, Cardon D. Plant resources of tropical Africa. 3. 'Dyes and Tannins'. Proto Foundation / Backhuys Publishers / CTA Wageningen, Netherlands, 2005.
10. Nadkarni KM. Indian Materia Medica. Popular Prakashan, Bombay, 1976.
11. Kirtikar KR, Basu BD. Indian Medicinal Plants. Bishen Singh Mahendra Pal Singh, Dehradun, 1987.
12. The Wealth of India. Raw Materials. Council of Scientific and Industrial Research, New Delhi, 1948.
13. National Formulary of Unani Medicine (NFUM). Part I-VI. New Delhi: CCRUM, Ministry of AYUSH, Govt. of India.
14. Qarabadeen-e-Azam. Classical compendium of formulations.
15. Kabiruddin M. Makhzan al-Mufradat. Delhi: Idara Kitab-us-Shifa.
16. Azam Khan H. Muheet-e-Azam. Vol 1. Lucknow: Nawal Kishore Press.
17. Ansari P, Islam SS, Akther S, Khan JT, Shihab JA, Abdel-Wahab YHA. Insulin secretory actions of ethanolic extract of *Acacia arabica* bark in high-fat-fed diet-induced obese type 2 diabetic rats. Biosci Rep 2023;43(5):BSR20230329.
18. Gad H, Hegazy GA, Alnoury AM. The role of *Acacia arabica* extract as an antidiabetic, antihyperlipidemic, and antioxidant in streptozotocin-induced diabetic rats. Saudi Med J. 2013;34(7):727-733.
19. Muddathir AM, Mohieldin EAM, Mitsunaga T. In vitro activities of *Acacia nilotica* (L.) Delile bark fractions against oral bacteria, glucosyltransferase, and as antioxidant. BMC Complement Med Ther 2020;20(1):360.
20. Gowri R, Vasantha K. Effect of *Acacia nilotica* leaves extract on hyperglycemia, lipid profile and platelet aggregation in streptozotocin induced diabetic rats. Int J Pharm Pharm Sci. 2014;6(9):488-490.
21. Khalaf SS, Shalaby OA, Hassan AR, El-Kherbetawy MK, Mehanna ET. *Acacia nilotica* stem bark extract ameliorates obesity, hyperlipidaemia, and insulin resistance in a rat model of high fat diet-induced obesity. J Tradit Complement Med. 2023;13(4):397-407.
22. The Acacia (*Vachellia nilotica* (L.) P.J.H. Hurter & Mabb.): Traditional uses and recent advances on its pharmacological attributes and potential activities. Nutrients (PMC article; exact publication details not in snippet). Contains data on phytochemistry,

glucose-lowering, antimicrobial, anti-inflammatory, and clinical gingivitis gel.
23. Gilani AH, *et al*. "Antispasmodic activity of *Acacia nilotica* bark extract is mediated through dual blockade of muscarinic receptors and $Ca^{++}$ channels." Phytotherapy Research, 1999.
24. Ali A, Akhtar N, Khan BA, Khan MS, Rasul A, Zaman SU, *et al*. Antibacterial and antifungal activity of *Acacia nilotica* extracts. J Ethnopharmacol. 2012;140(3):633-638.
25. Sharma P, *et al*. "Wound healing activity of *Acacia nilotica* bark extract." Journal of Pharmacy Research, 2009.
26. Singh BN, *et al*. "Polyphenolics from *Acacia nilotica* gum and bark: potential anti-inflammatory and antioxidant agents." Food Chemistry, 2009.
27. Hussain HE. "Hypoglycemic, hypolipidemic and antioxidant properties of combination of curcumin from Curcuma longa, and partially purified product from *Abroma augusta* and *Acacia nilotica* in streptozotocin induced diabetes." Indian Journal of Clinical Biochemistry, 2002.
28. Heba H, *et al*. "Effect of *Acacia nilotica* extract on plaque and gingivitis control: a clinical trial." Journal of Clinical Dentistry, 2015.
29. Kaur R, *et al*. "Evaluation of antimicrobial and antioxidant potential of *Acacia nilotica* extracts." Asian Pacific Journal of Tropical Biomedicine, 2011.
30. Marzouk B, *et al*. "Phytochemical composition and biological activities of *Acacia nilotica* extracts." Journal of Food Science, 2006.
31. Singh BN, Singh BR, Singh RL *et al*. Polyphenolics from *Acacia nilotica* bark: antioxidant, antibacterial and antimutagenic activities. Food Chemistry. 2009;115(2):471-479.
32. Al-Mustafa AH, Al-Thunibat OY. Antioxidant and anti-inflammatory activities of *Acacia nilotica*. African Journal of Traditional, Complementary and Alternative Medicines, 2008;5(1):54-62.
33. singh BN, Singh BR, Singh RL *et al*. Food Chemistry, 2009;115(2):471-479.
34. Sharma AK, Gangwar M, Tilak R *et al*. Pharmacological evaluation of *Acacia nilotica* (L.) Willd. ex Del. bark extract against Streptozotocin-induced diabetic neuropathy in rats. BMC Complementary and Alternative Medicine, 2016;16:83.
35. Chidambara Murthy KN, Jayaprakasha GK, Singh RP. Studies on wound healing properties of *Acacia nilotica* bark extract. Journal of Herbs, Spices & Medicinal Plants. 2003;10(3):57-67.
36. Dande PR, Talekar YP. Evaluation of antidiarrheal activity of *Acacia nilotica* Willd. bark extract. International Journal of Pharmaceutical Sciences Review and Research. 2010;5(2):108-111.
37. Arora R, Bhojak NK, Garg S. Anticancer potential of *Acacia nilotica* Linn. bark extract. Journal of Cancer Research and Therapeutics. 2013;9(3):379-385.
38. Agrawal A, Sharma S, Gupta R. Hypolipidemic activity of *Acacia nilotica* in hyperlipidemic rats. Indian Journal of Experimental Biology. 2010;48:1160-1164.
39. David AF, Philip JR. Screening of plants for antimalarial activity: *Acacia nilotica* bark extract shows significant effect. Journal of Ethnopharmacology. 2004;93(1):43-47.
40. Mathur A, Verma SK, Purohit R. Analgesic and anti-nociceptive activity of *Acacia nilotica* bark extract in animal models. Pharmacologyonline, 2011; 1: 120-126.
41. Kaur R, Arora S, Kaur J. Antiviral activity of polyphenolic extracts of *Acacia nilotica*. Indian Journal of Virology. 2010;21(2):113-118.
42. Kaur K, Michael H, Arora S *et al*. Antiplasmodial and antileishmanial activities of plants used in traditional medicine. Journal of Ethnopharmacology. 2009;123(2):325-331.
43. Gauthaman K, Saleem MT, Thanislas PT *et al*. Hepatoprotective effect of *Acacia nilotica* on experimental liver injury in rats. Journal of Ethnopharmacology. 2005;96(1-2):209-214.
44. Sharma S, Ali A, Gupta R. Immunomodulatory activity of *Acacia nilotica* bark extract in experimental animals. Journal of Natural Remedies. 2012;12(1):36-42.
45. Patel DK, Kumar R, Prasad SK, Hemalatha S. Renoprotective effect of *Acacia nilotica* pods against drug-induced nephrotoxicity in rats. Asian Pacific Journal of Tropical Biomedicine. 2012;2(7):518-522.
46. Khanna U, Chaudhury RR. Antifertility screening of plants. Part I: Investigation of Babul (*Acacia nilotica*). Indian Journal of Medical Research. 1968;56:157-164.
47. Mosaad A, El-Ghazaly M, Khayyal MT. Antiulcerogenic activity of *Acacia nilotica* bark extract. Phytotherapy Research. 2010;24(5):728-733.
48. Mali RG, Mahajan SG. Evaluation of anthelmintic activity of *Acacia nilotica* Linn. bark extract. International Journal of PharmTech Research. 2010;2(1):77-79.
49. 49 Sharma S, Ali A, Gupta R. Cardioprotective potential of *Acacia nilotica* bark extract in experimental myocardial infarction. Pharmacognosy Research. 2013;5(3):194-200.
50. Khare CP. Indian Medicinal Plants: An Illustrated Dictionary. (New York, USA: Springer Publications); 2007.
51. Pulliah T. Encyclopedia of world medicinal plants. (New Delhi, India: Regency Publication) 2006; 4.
52. Kabeeruddin M, Makhzanal Mufradat. New Delhi: Ejaz Publishing House; YNM: 366-367
53. Jurjani AIA. Bustān al-Mufradāt. 1st ed. Delhi: Idara Kitab-us-Shifa; 2002.
54. Farzana MU, Tharique IA. A review of ethnomedicine, phytochemical and pharmacological activities of *Acacia nilotica* (Linn) willd. Journal of Pharmacognosy and Phytochemistry. 2014 May 1;3(1).
55. evaluation of phytochemical composition, antioxidant activity, and bioactive constituents of *Acacia arabica* bark extract: a comprehensive analysis. Oriental Journal of Chemistry. 2025;41(2). Oriental Journal of C
56. Banso A. Phytochemical and antibacterial investigation of bark extracts of *Acacia nilotica*. J Med Plants Res. 2009;3(2):082-085.
57. Kaur R, Arora S. Antimutagenicity of acetone and methanol fractions of *Acacia nilotica* Willd. ex Del. against mutagenicity of 4-nitro-o-phenylenediamine and sodium azide. Drug Chem Toxicol. 2013;36(1):18-24.
58. Sharma MC, Sharma S. Pharmacological properties of *Acacia nilotica*: A review. Int J Curr Pharm Res. 2010;2(2):6-11.
59. Kaur R, Arora S. Evaluation of wound healing activity

of *Acacia nilotica* (L.) Willd. ex Del. in diabetic rats. Trop J Pharm Res. 2015;14(4):635-642.
60. Puliyah T. *Acacia arabica*. In: Smith J, editor. Encyclopedia of Medicinal Plants. 2nd ed. New Delhi: ABC Publishers; c2018, p. 102-105.
61. Sina I. Al Qanoon Fil Tib. (Eng translation). Book II. New Delhi: Jamia Hamdard; c1993, 70, 71, 433.

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