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Review of Phytochemistry and Pharmacological Properties of Amla (*Phyllanthus emblica*) Linn in the Context of the Unani System

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ABSTRACT

The rising incidence of lifestyle diseases—including diabetes, obesity, and cardiovascular disorders—presents a critical challenge to modern public health. While conventional medicine is effective, herbal alternatives like Amla (*Emblica officinalis*) offer potent therapeutic benefits without toxicity or adverse side effects. Known as the "king of medicinal plants" in Unani medicine, Amla is rich in phytochemicals such as vitamin C, phenols, and flavonoids, which provide anti-inflammatory, antioxidant, and anticancer properties. Research indicates that Amla supplementation significantly improves blood glucose levels, lipid profiles, and fat mass in obese individuals. Beyond traditional formats like juices and pickles, incorporating Amla powder into regional value-added food products represents an innovative strategy to enhance its consumption and leverage its health-promoting qualities.

Keywords: Amla, *Emblica officinalis*, Functional foods

INTRODUCTION

Phyllanthus emblica, a prominent member of the *Euphorbiaceae* family, occupies a distinguished position within traditional Indian pharmacopeia. The botanical nomenclature is derived from the Greek *phyllon* (leaf) and *anthos* (flower). While native to the Indian subcontinent, the species is widely distributed across tropical and subtropical regions, including Southeast Asia, China, Sri Lanka, Pakistan, and Uzbekistan. Characterized by an exceptionally high concentration of ascorbic acid (Vitamin C) and low molecular weight hydrolysable tannins, *P. emblica* serves as a potent antioxidant [1]. Clinically, it is utilized for its diuretic properties and in the management of conditions such as biliousness and anemia [2]. In Unani medicine, *Emblica officinalis* (Amla) is utilized to manage chronic conditions including diabetes, hepatic and cardiovascular diseases, malignancy, and anemia . Its high ascorbic acid content supports cognitive function, ophthalmic health, and lipid modulation. Additionally, Amla offers dermatological and trichological benefits, underpinned by documented antioxidant, antimicrobial, radioprotective, and chondroprotective properties.[3,4]

Classification:[5]

Kingdom: Plantae

Genus: Phyllanthus

Species: P.emblica

Family: Euphorbiaceae

ScientificVernacular Names:[5,6,7,8,9]

Arabic: AmlajPersian: Aonla, Amla, Amuleh, Amia

English: Emblic Myrobelan, Indian Goosebery

Hindi: Amla, Aonla, Amlika

Kannada:Nallika,Nelli,Amalaka,Nellikkai

Kashmiri: Ambali, AmliAonla

Malayalam: Nellikka, Nellikai, Nelli

Marathi: Anvala, Avolkathi, Avala, Arda, Bhuiawali, Aonli

Sanskrit: Dharti-phala, Amraphalam, Amalku, Adiphala

Tamil: Nellikkai, Nelli, TopiAmalagam

Telegu: Usirikayi, Nelli, Amalekamu, Usiri, TriphalamUsirikai

Urdu: Aamla, Amlaj

Unani Description

It is a fruit of a large tree with thin branches and short, thin leaves; it is yellowish green in color and resembles AaluBukharain in size and structure [7,10].

Most drugs are made from the pericarp of dried fruits. It has a sour, slightly bitter flavor. The seed is spherical and splits into three pieces when broken. [11 12]

Hissa Mustamela (Parts used):

Plant, Stem bark, Leaf, Root, Flower, Fruit and Seed[13]

Mizaj (Temperament): Barid1°Yabis2° ;Barid2°Yabis3° [7,10,14,15]

Afa'al (Actions according to Unani medicine):

Qabiz,

Muqawwie Meda,

Muqawwie Shaar

.Muqawwie Qalb,

Muqawwie Hafiza, MuqawwieBasar[7,10]

Muzirat (Adverse effects):

Harmful to Spleen and produces colitis [7,11,17].

Musleh(Corrective):

Shehad, SunbulUtteeb and Roghan Badam shireen[6,17].

Badal(Substitute): Halela Kabuli[6,17].

Miqdare Khurak (Dose):

10 to 17 gm[16];3-5gm [7].

Murakkabat (Important compounds):

- *Murabba-e-Amla,*
- *Majoon-e-Maqawwi-e-Rahem,*
- *Majoon-e-Mundi,*
- *QurseMulaiyin,*
- *Jawarishe Aamla Sada,*
- *Sufoofe-Hazim Kalan[10,16,18]*
- *Anoshdaru,*
- *Majoon-e-Lana,*
- *Dawa-ul-MiskMotadilSada,*
- *Itrifal-e-Sagheer,*
- *Itrifal-e-UstuKhuddus,*
- *Sufoofe-Aamla.*
- *Majoon-e-Kundur,*

Ethnobotanical Description

Habitat and distribution: The species exhibits a wide habitat tolerance and extensive distribution, thriving across diverse geographical regions. Within India, it is ubiquitous, commonly found on hill slopes, in deciduous forests, and readily cultivable in varied local climates Internationally, its primary distribution encompasses tropical and subtropical areas worldwide, including china,Indonesia , and the [Malay] Peninsula.[5]

Traditional Uses: [6,7,10,11,14,16,17]

In Unani medicine, *Emblica officinalis* is traditionally utilized to fortify the cardiovascular and gastrointestinal systems while regulating bodily humors. It serves as an effective intervention for polydipsia (excessive thirst), nausea, and emesis. Characterized by its *qabiz* (astringent) properties, it strengthens hair follicles and preserves natural pigmentation. When applied topically in conjunction with Lawsonia inermis (henna), it functions as a natural dye to restore hair color and mitigate alopecia [19].

Pharmacognostical description:

Phyllanthus emblica is a medium-sized deciduous tree, reaching heights of approximately 18 meters, characterized by grey bark and reddish wood. It exhibits significant ecological plasticity, flourishing across diverse soil types and agroclimatic conditions. The foliage consists of small, linear-oblong leaves with rounded bases, arranged in a pinnate-like phyllotaxy.

The inflorescence comprises diminutive, greenish-yellow flowers clustered in the axils of lower leaves; male flowers are situated on slender pedicels, while female flowers are sparse and delicate, typically appearing in October [20]. The fruit is a globose or oval drupe, yellowish-green in color, featuring a smooth cuticle marked by six to eight distinct longitudinal grooves. Upon maturation, the fruit transitions from vibrant green to a yellow or reddish hue. Anatomically, the edible portion consists of the fleshy mesocarp, while the endocarp forms a lignified stone enclosing approximately six seeds [1,19].

Chemical ingredients:

The fruit pulp of *Phyllanthus emblica* (Amla) contains a complex biochemical profile. Key amino acids include alanine, aspartic acid, glutamic acid, lysine, and proline. The fresh fruit pulp is a rich source of macronutrients and micronutrients, containing proteins, carbohydrates, fiber, essential minerals (calcium, phosphorus, potassium, iron, copper, and chromium), niacin, and a high concentration of vitamin C[21].

Tannins are widely distributed throughout the plant's fruits, leaves, and bark. Specific phytochemicals isolated include ellagic acid and lupeol from the root, and leucodelphinidin from the bark. The seeds yield approximately 16% of a stable, brownish-yellow fixed oil, characterized by a fatty acid composition comprising linoleic acid (44.0%), oleic acid (28.4%), linolenic acid (8.8%), palmitic acid (3.0%), stearic acid (2.15%), and myristic acid (1.0%) [22].

The fruit contains a variety of polyphenolic compounds in addition to quercetin, phyllaemblic chemicals, gallic acid, tannins, flavonoids, pectin, and vitamin C. The active component of Amla with a notable pharmacological effect is "phyllemblin."Hydrolyzable tannins (Emblicanin A, Emblicanin B, punigluconin, and pedunculagin) are among this plant's phytochemicals [23].Leucodelphinidin, procyanidin, 3-0-gallated prodelphinidin, carotene, nicotinic acid, riboflavin, D-glucose, D-fructose, myoinositol, and a pectin containing residues of D-galacturonic acid, D-arabinosy, D-xylosyl, L-rhamnosyl, D-glucosyl, D-mannosyl, and fatty acids (seed oil) [24 23].

Pharmacological Actions

Antibacterial,

Adrenergic,

Alexeteric,

Antiaggregant,

Antibilious,

Antibradykinin,

Anticancer,

Anticholinergic,

Anticlastogenic,

Anticonvulsant,

Antidote,

Antihistaminic,

Anti-inflammatory,

Antileukotrien,

Antipyretic,

Antioxidant,

Antiperoxidant,

Antiserotonin,

Antiviral,

Aperient

, Aphrodisiac,

Cardiotonic,

Cerebrotonic,

CNS-Depressant,

Diuretic,

Expectorant,

Hepatotonic,

Hepatotonic,

Propecic,

Stomachic,

Tonic,

Vulnerary, and Astringent [25,26.]

antidiabetic[27]

Therapeutic Impacts

Various anatomical components of *Emblica officinalis* exhibit distinct therapeutic applications. The **root bark** is traditionally indicated for the treatment of myalgia, ulcerative stomatitis, gonorrhea, diarrhea, and jaundice. The **leaves** are utilized in managing gastrointestinal distress, such as dyspepsia and diarrhea, as well as conjunctivitis and localized inflammation.

The **fruit** serves as a potent intervention for a wide spectrum of conditions, including diabetes, peptic ulcers, anemia, bronchitis, and hemorrhage. Clinically, Amla juice has also been documented as an effective treatment for gonorrhea.

In dermatological and trichological applications, Amla is highly valued for its ability to mitigate alopecia and premature canities (greying). It facilitates calcium absorption—a critical factor for maintaining hair follicle integrity—and stimulates robust hair growth. Due to its natural detergent properties, Amla is a frequent constituent in shampoo and dye formulations. Furthermore, the **fixed oil** extracted from the seeds is utilized industrially in the production of specialized soaps [5,21,28–31.]

Pharmacological studies:

Protection against oxygen radicals**:**

Research indicates that the specific tannins found in *Emblica officinalis*—namely **emblicanin-A (37%), emblicanin-B (33%), punigluconin, and pedunculagin**—exhibit significant protective activity against reactive oxygen species. These compounds have been shown to mitigate oxidative stress-induced damage, specifically inhibiting the hemolysis of peripheral blood erythrocytes in rat models [23]

Antimicrobial action**:**

Rahman et al. investigated the alcoholic extracts of Amlawere for antimicrobial activity against a several microbiological infections. The findings demonstrated strong antibacterial activity [32].

Healing impact:

Amla extract's biphasic effect on NSAID-induced ulcers in Swiss albino mice was investigated by Chatterjee A. et al. The findings showed that ethanolicamla extract had a clear healing effect on stomach ulcers caused by NSAIDs[33].

Proliferative action**:**

Amla extract was found to have a strong proliferative impact on cultured human dermal papilla cells, which may extend the hair cycle's anagen phase [34].

Hypolipidimic impact**:**

In a study to assess the effects of Amlaon blood lipids and atherogenesis in albino rats fed a high-fat diet, the hypolipidemic effect of Amla has been demonstrated. The ethanolic extract of Amlash shown a notable decrease in cholesterol levels; nevertheless, the effects of Amlawere were not as strong as those of simvastatin, which was used as a normal medication. [36]

Antioxidant effect:

In a rat model, the antioxidant activity of tannoid active ingredients of Amlawere was assessed for emblicanin A (37%), emblicanin B (33%), punigluconin (12%), and pedunculagin (14%) [35].

Anticancer effect:

Amla contains the potent antioxidant ellagic acid, which can prevent gene mutations and correct chromosomal abnormalities. It prevents a number of malignancies, including those of the breast, uterus, pancreas, stomach, and liver, from growing and spreading. [35]

SUMMARY

Plant-derived therapeutics serve as the primary healthcare modality for approximately 80% of the global population, bridging the gap between traditional medicine and contemporary pharmacotherapy. *Emblica officinalis* (Amla) is distinguished by its multifaceted pharmacological profile, demonstrating remarkable versatility in addressing a wide spectrum of clinical indications.

While extensive *in vitro*, *in vivo*, and clinical investigations have validated its therapeutic efficacy, comprehensive longitudinal studies are necessitated to evaluate the physiological impacts of long-term supplementation. Furthermore, the rising demand for efficacious alternatives to non-steroidal anti-inflammatory drugs (NSAIDs) in the management of chronic inflammatory pathologies has positioned *E. officinalis* extracts as a focal point for continued clinical research and nutraceutical development.

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