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A comprehensive review on *Turbud (Operculina turpethum (L): A potential unani drug*

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Abstract

Turbud (Operculina turpethum (L.) Silva Manso) belongs to family Convolvulaceae, is a Potent and well-known medicinal herb, used in Unani system of medicine to treat various ailments. The word *Turbud* is considered to be coined from its Sanskrit name Tripatak meaning triangulated as its stems are triangulated. It is large Perennial twinner with milky juice. Roots are long, slender, fleshy, much branched. In classical text it is mentioned that the *Turbud* which is white in colour, light weighted and having resin on both ends is of good quality. In unani system of medicine its main actions are expectorant and laxative and used in several diseases like arthritis, ascites, gout, hemiplegia etc. According to Avicenna use of *Turbud* along with *zinjabeel* is more efficacious. It has been used as an important component in many compound formulations such as *ItrifalUstu-khud'dus*, *Itrifal Zamani*, *Itrifal Muqil*, *Itrifal Mulaiyyin*. The major chemical constituents present in it are turpethin, glucoside, jalapine, convolvulin etc. *Operculina turpethum* Linn. is validated for its different pharmacological action like anti-inflammatory effect, ulcer protective. The present review comprehensively embodied its phytochemical, pharmacological and pharmacognostical, description.

Keywords: Turbud, convolvulin, turpethin, traditional medicine

1. Introduction

Ipomoea turpethum (L) belong to family Convolvulaceae. The family comprises of 55 genera and 1650 species which are found in tropical region of the world. In India the family is represented by 177species belonging to 20 genera [1]. It is native to Asia (India, Nepal, Bangladesh, Pakistan, Shri Lanka, China, Taiwan, Myanmar, Thailand, Indonesia, Malaysia, Papua New Guinea, & Philippines), Africa (Kenya, Tanzania, Mozambique, Zimbabwe, Madagascar, Mauritius & Reunion) & Australia while is naturalised in West Indies [2]. It is large Perennial twinner with milky juice [3-6]. Roots are long, slender, fleshy, much branched. Stems are very long, twining, and much twisted together, angled and winged [4, 5, 6], pubescent, tough and brown when old. Leaves are 5-10x 1.37 cms, ovate or oblong, rarely slightly lobulate, subacute, more or less pubescent on both sides especially when young, minutely reticulately veined, base cordate or truncate; petioles 2-5cm long, pubescent. Cymes few flowered; peduncles stout, 2.5-5cm long; bracts large, lanceolate, pubescent reaching 2.5cm long, caduceus, often pinkish; pedicels 0.6-2.5cm, long, pubescent, slightly thickened upwards. Outer sepals upto 2.2cm, long in flower, much enlarged in fruit, broadly ovate or suborbicular, obtuse, 2cm long, very thinly membranous, glabrous, apiculate. Corolla is white 3.8-5cm long, subcampanulate. Anthers 8mm long, narrowly oblong, cordate, capsules 13-8mm diameter, globose, enclosed in the enlarged brittle, very imbricate sepals, glabrous or faintly pubescent [2].

2. Taxonomical Classification

Kingdom	:	Plantae
Subkingdom	:	Tracheobionata, vascular plants
Super division	:	Spermatophyta, seed plants
Division	:	Angiosperma
Class	:	Dicotyledons
Order	:	Solanales
Family	:	Convolvulaceae
Genus	:	Operculina
Species	:	<i>O. turpethum (L.)</i> Silva Manso [2]

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3. Vernaculars

Arabic	:	Turbud
Persian	:	Turbud
English Turpeth root, Indian jalap	[3]	
Bengali	:	Teudi, tvuri, Dhdhakalami
Gujarati	:	Kala Nashotar [3]
Hindi	:	Nishothra [3]
Kannada	:	Vilitigade
Malayalam	:	Trikolpokanna
Marathi	:	Nisottar
Oriya	:	Dudholomo
Punjabi	:	Nisot(9), chitabansa [3]
Sanskrit	:	Shyama, Tribhandi [3]
Tamil	:	Kumbam, sivadai [3]
Telugu	:	Tella, Tegada
Urdu	:	Turbud [3,4],

4. Description of Root

i) Macroscopic

Roots occur in pieces, 1.5-15 cm long, 1-5 cm diameter usually unbranched, cylindrical elongated, bearing thin rootlets; thicker pieces, occasionally split and show central wood portion; surface dull grey, reddish-grey to light brown, showing deep furrows or longitudinal wrinkles giving a rope-like or columnar appearance; transversely cut surface shows thick, whitish bark and light yellow centre; fracture in bark short; in wood fibrous, odour indistinct; taste slightly acrid and nauseating when kept in mouth for some time.

ii) Microscopic

Mature root shows thin cork, consisting of 3-5 rows of brown cells; secondary cortex 4-6 layered, composed of tangential elongated, thin-walled cells; some of the cortical cells become thick walled appearing as isolated, oval to sub rectangular sclerenchymatous cells having wide lumen, secretory cavities surrounded by subsidiary cells and resin canals found scattered in secondary cortex; secondary Phloem, a wide zone, consisting of sieve elements, and phloem parenchyma; vascular bundles arranged in continuous and a discontinuous ring, traversed by uni and biseriate medullary rays, numerous resin cells also seen in phloem in longitudinal rows; xylem shows 3-5 radiating arms; small patches of intraxylary phloem often formed; xylem vessels in singles or 2-3 in groups, having simple pits on their walls; calcium oxalate crystals as prisms and rosettes food scattered in cortex, phloem parenchyma, xylem parenchyma and medullary ray cells; starch grains, both simple and compound, simple ones elliptical to spherical with central cleft hilum, compound grains consisting of 2-4 components, size vary from 5-44 μ in diameter, found scattered in cortex, phloem parenchyma, xylem parenchyma and medullary ray cells [9]

5. Unani Description

i) Mahiyat

Operculina turpethum is called *Turbud* in Arabic. The word *Turbud* is considered to be coined from its Sanskrit name Tripatak meaning triangulated as its stems are triangulated [8]. Upper surface of its root is whitish brown and after peeling the inner side appears white in colour. It has a central woody portion like carrot which is removed by splitting on one side. The outer brownish surface is peeled and then the middle portion is used as medicine. [10]. The taste of fresh root is sweet followed by sour, old root has no specific taste [8]. It is branched with pointed leaves, flowers are sky blue in colour some physicians stated that the colour of flower is white, blue and blackish red in the morning, evening and night

respectively. It is most commonly found over the banks of river in India and Kharasan [10]. Unani writers have mentioned it has two variants white and black, the black variant is advised not to be used, as it produces harmful effects and poisonous in nature. Ainslie find it described by IbneSina by the name of *Turbud* according to him, the first among the Arabs who prescribed it were Mesus and Rhazes [11, 12] *Turbud* which is white in colour, light weighted and having resin on both ends is of good quality. The worst quality of *Turbud* is one which grows in river because it causes pain in stomach and it is not purgative. According to Ibn e Sina use of *Turbud* along with *zinjabeel* is more efficacious [8]

ii) Mizaj (Temperament)

Haar3⁰ [8] Yaabis2⁰ [8, 10]

iii) Hissa e mustamila (part used)

Root [3]

iv) Af'al (Action)

Mushil-e-Balgham, *Mukhrij-e-balgham*, *Daaf-e-hummiyat-e-harah*, *Munaffis-ebalgham*, *Mudir-e-bol*, *Daf-e-wajaulmafasil* [10], *Munaqqi-e-Dimagh* [8], *Mushil*, *Mulayyin* [13, 3]

v) Istemal (Therapeutic Uses)

Istisqa, *WajaulMafasil*, *IrqunNIsa*, *Laqwa*, *Falij*, *Sual*, *Zeeq-un-Nafas*, *Junoon*, *Sara* [14] *bawaseer*, *niqras*, *melancholia* [15]

vi) Mazarrat (Toxicity)

For intestines [16]

vii) Musleh (Corrective)

Roasted in Roghan e badam [10, 17]

viii) Badal (Substitute)

Beekh e toot, [10] *Ghareeqoon* [10, 17] *kaaladana* [17]

ix) Miqdar e khurak (Dosage)

3-5gm [10]

x) Murakkabat (Formulations)

Itrifal Ustu-khud'dus, *Itrifal Zamani*, *Itrifal Muqil*, *Itrifal Mulaiyyin*, *Jawarish Ood-e Mulaiyyin*, *Jawarish Kamooni*, *Sharbat Mus'hil*, *Habb-e-Mafasil*, *Habb-e-Aftimoon*, *Habb-e-Istisqa*, *Habb-e-Ayarij*, *Habb-e-Suranjan*, *SharbatMus'hil*, *Majoon-e-Anjeer*, *Majoon-e-Sana*, *Majoon-e-Suranjan*, and *Majoon-e-Najah* [14]

6. Pharmacological Actions

Anthelmintic, Purgative, Antipyretic [4, 18], Expectorant, Carminative [18], Cathartic [6]

7. Chemical constituents

It contains resin known as turpethin present in root bark, glucoside, jalapine, convolvuli insoluble in ether, benzene, and carbon sulphide. It also contains some ether soluble resin, volatile oil, yellow colouring matter, albumin, starch, lignin, salts, ferric oxide [3], Turpethinicacids A, B, C, D and E [2, 4] glycosides, saponins, flavanoids, steroids and carbohydrates, starch, glucoside, scopoleptin, triterpenes (etulinic acid, betulin, and lupeol), sitosterol glucose and rhamnase [14].

8. Pharmacological studies

i) Anti-inflammatory

Anti-inflammatory potential of different extracts (ethanolic, aqueous and ethereal) of *O. turpethum* has been reported in

carrageenan-induced paw oedema, cotton pellet-induced granuloma and formalin induced arthritis animal model of rats. The aqueous extract was reported more potent fraction in all three animal models [19]. In another study, pre-treatment of roots of *O. turpethum* and its polyherbal formulation; Avipattikar Churna (100 mg/kg body weight) showed anti-inflammatory activity in rat paw oedema induced by formalin in experimental animal model [20].

ii) Analgesic

Chloroform and petroleum ether extract of *O. turpethum* at different doses (125, 250, 500, 1000 mg/kg) showed potent analgesic activity against various types of pain stimuli in mice [21].

iii) Anti-ulcer Activity

Oral administration of hydro-alcoholic and methanolic extract of *O. turpethum* at the dose of 100 mg/kg body weight exhibited potent anti-ulcer activity in aspirin and pylorus ligation (APL) rat animal model. This study further substantiated anti-ulcer activity as per the biochemical and histopathological parameters when compared with standard drug Ranitidine. Hydroalcoholic extract showed better effect than the methanolic extract [22]. In another study, *O. turpethum* exhibited potential anti-ulcer activity at the dose of 100 mg/kg body weight given orally in pylorus ligated albino rat model [23].

iv) Anti-diabetic

Methanolic extract of *O. turpethum* roots and stems revealed anti-diabetic activity in Streptozotocin induced type-2 diabetic animal model at the dose of 100 mg/kg of body weight [24]. In another study the antidiabetic activity of *O. turpethum* was found in alloxan induced diabetes in rats at dose of 500mg/kg body weight orally [25].

v) Anti-diarrhoeal Activity

The crude extract of *O. turpethum* exhibited anti-diarrhoeal effect in the castor oil induced diarrhoea animal model, similar to that of Loperamide (10 mg/kg) at a dose dependent manner (300-1000 mg/kg body weight) [26].

vi) Hepato-protective Activity

Ethanol extract of *O. turpethum* exhibited hepatoprotective effect in Paracetamol induced hepatotoxicity in rat in a dose dependent manner (100-200 mg/kg body weight). Results showed significant reduction in the serum levels of SGOT, SGPT, Alkaline Phosphatase and Bilirubin [27]. It also has hepatoprotective and anticlastogenic effects against N-nitrosodimethylamine induced-induced hepatic fibrosis [28]. It manifested therapeutic effects by significantly restoring the enzymatic levels and reducing the hepatic damage in mice [29]. Methanolic extract of *O. turpethum* rhizomes at the dose of 200, 400mg/kg body weight per oral showed significant ($p < 0.05$) hepatoprotective activity against Carbon tetrachloride induced liver damage in Wister albino rats by lowering the serum levels of various biochemical parameters such as serum glutamic oxaloacetate transaminase (SGOT), serum glutamic pyruvates transaminase (SGPT), alkaline phosphatase (ALP), total bilirubin (TBL), total cholesterol (CHL) and by increasing the levels of total protein (TPTN) and albumin (ALB) [30].

vii) Anti-microbial Activity

O. turpethum has manifested antimicrobial activity against gram-positive and gram-negative bacterial strains such as

Staphylococcus aureus, *Bacillus subtilis*, *Streptococcus haemolytica*, *Micrococcus luteus*, *Micrococcus pyogenes*, *Enterococcus faecalis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Shigella dysenteriae* and *Shigella sonnei* [31]. In another study antibacterial activity has been investigated against *Shigella boydii*, *Shigella flexneri*, *Shigella dysenteriae*, *Escherichia coli*, *Proteus vulgaris*, *Salmonella typhi*, *Hafnia alvei*, *Staphylococcus epidermidis*, *Streptococcus pyogenes*, *Staphylococcus aureus*, *Enterococcus faecalis* by disc diffusion and broth macro-dilution assay [32].

viii) Anti-cancer Activity

Methanolic extract of *O. turpethum* stems at the dose of 100 mg/kg body weight retrieved the level of antioxidant enzymes such as Superoxide Dismutase (SOD), Catalase (CAT), Glutathione Peroxidase (GPx) and non-enzymic antioxidants like Glutathione (GSH), Ascorbic acid (Vitamin C), Alpha-tocopherol (Vitamin E) and inhibited the levels of lipid peroxidation on 7, 12 dimethylbenzanthracene (DMBA) induced breast cancer in female Sprague-Dawley rats [33]. Another study showed ameliorating effects of *O. turpethum* and its isolated Stigma-5, 22 dien-3- β -D-glucopyranoside on haematological parameters in male mice exposed to a potent carcinogen N-nitrosodimethylamine. The ethanolic and chloroform extract of *O. turpethum* showed dose dependent inhibition of cell growth. Extract of chloroform showed highest inhibition in comparison to ethanolic extracts [34].

ix) CNS Depressant activity

Ethanoic extract of *O. turpethum* at a dose of 500 mg/kg bw showed depressant activity in rats [35].

x) Laxative effect

The chloroform and methanol extract of *O. turpethum* produced a significant ($P < 0.05$) dose and time dependent increase in the percentage of wet faeces. There was a dose dependent increase in the intestinal motility in the treated mice [36].

xi) Anti-obesity activity

The roots of *O. turpethum* are beneficial in treating fatty liver and improving fat metabolism in the liver. It works effectively against obesity by decreasing excessive body fat [37].

9. Conclusion

In this review we made an effort to compile information on pharmacological actions, therapeutic uses, and pharmacognostical description including unani description. Survey of literature revealed the presence of Turpethinic acids A, B, C, D and E [2, 4] glycosides, saponins, flavanoids, steroids and carbohydrates, starch, glucoside, scopoleptin, triterpenes (etulinic acid, betulin, and lupeol), sitosterol glucose and rhamnose and other phytochemicals also. Activities of various extracts were proved to have several pharmacological actions like anti-obesity, CNS depressant, antimicrobial etc. Hence, the extensive literature survey clearly infers that *O. turpethum* is a very potent Unani medicinal plant which were used since ages in traditional medicine and further preclinical, clinical and safety studies required for its safe, and efficacious use.

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