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REVIEW ARTICLE

## *Terminalia chebula* Retz. – an important medicinal plant

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### Summary

Ayurveda, whispered to be the ancient practice of healthcare existed and contributes a holistic approach to health, healing and longevity. *Terminalia chebula* Retz. is a popular plant and widely spread all over southern Asia. *T. chebula* is a native plant of India and its dried fruit is extensively used in various types of home remedies. Dried fruit of *T. chebula* contains high quantities phenolic compounds that consist of ellagic acid, gallic acid and chebulic acid. The fruit extract of *T. chebula* is known to display different biological properties like anticancer, anti-inflammatory, antioxidant, anti-protozoal, antimicrobial, hepato and renal protective activities, and in the management of metabolic syndrome. The phenolic active compounds might play vital role in the influence of biological activity. Fruit extract of *T. chebula* is widely employed as an important ingredient in various ayurvedic preparations like 'Triphala'. This formulation is beneficial as detoxifying agent of the colon, purgative in chronic constipation, aids in digestion and as a body rejuvenator. The fruit has great medicinal significance and conventionally applied for the management of various illness conditions, such as sore throat, high cough, asthma, ulcers, gout, heart burn, vomiting, diarrhea, dysentery, bleeding piles and bladder diseases. It is also utilized as mild laxative, antispasmodic and stomachic. Because of these enormous medicinal properties, *T. chebula* is commonly termed as 'King of Medicine' in Tibet and can be called as a 'wonder herb'. In the present review, recent advances in medicinal properties of *T. chebula* are discussed.

**Key words:** *Ayurveda*, *Terminalia chebula*, *dried fruit*, *phytochemicals*, *medicinal properties*

### INTRODUCTION

Ayurveda, believed to be the ancient form of healthcare, gives a holistic approach to health, healing

and longevity. Ayurveda is a very ancient medicinal practice deep-rooted in ancient Indian culture. According to WHO, nearly 80% of global population believe primarily in herbal based folk treatment for

main health care requirements [1]. Ancient medicinal systems all over the world practice herbal preparations as an important resource for finding of modern drugs [2]. During screening numerous therapeutic plants, investigators exposed one of the best valued therapeutic plant, *i.e.* *Terminalia chebula*, which possesses many therapeutic activities because of diverse ingredients. The fruit part displays various health benefits and also acts as a folk medicine for home therapy against many human diseases since early times [3, 4].

*Terminalia chebula* (local name: haritaki, family *Combretaceae*) is common medicinal plant used in folk medicines like Unani, Ayurveda and homeopathy. *T. chebula* is a native plant of India and its dried fruit is widely used in different types of home remedies [5]. *T. chebula* has many medicinal properties and was commonly termed as 'King of Medicine' in Tibet. The entire plant retains great medicinal significance and has been conventionally employed for the management of various diseases of humans. Certain rural folks utilized this plant in the management of sore throat, high cough, asthma, ulcers, gout, heart burn, vomiting, diarrhea, dysentery, bleeding piles, and bladder diseases [6-8]. *T. chebula* has been also employed as co-ingredient in Ayurvedic formula named 'Triphala'. In Indian system of medicine (ISM) it is widely mentioned as Rasayana drug. Three plants, such as *Emblica officinalis*, *T. chebula*, *T. bellerica* are used in preparation of triphala and utilized in ratio of 1:1:1, according to Ayurvedic Formulations of India (AFI) [9]. This formulation is useful as detoxifying agent of colon, purgative in chronic constipation, to help in digestion and as a body rejuvenator. The plant has been proved to exhibit many medicinal and pharmacological activities, for instance antidiabetic, antimicrobial, antioxidant, anti-mutagenic, anti-proliferative, anti-inflammatory, cardioprotective and wound healing [5]. In present review, recent advances in medicinal properties of *T. chebula* are discussed.

### Phytoconstituents of *T. chebula*

The main phytoconstituents found in *T. chebula* are tannins, phenolic compounds and some miscellaneous constituents, which are responsible for the therapeutic activity of this herb. Williamson *et al.* [10] showed that tannins isolated from *T. chebula* are of pyrogallol category and other components contain phenolics such as ellagic acid, chebulinic acid, anthraquinones, and polyphenols including

galloylglucose, corilagin, terflavin A, punicalagin and triterpene maslinic acid. A team of investigators established 14 constituents of hydrolysable tannins (chebulagic acid, gallic acid, punicalagin, neochebulinic acid, corilagin, chebularin, ellagic acid, 1,6-di-O-galloyl-D-glucose, chebulinic acid, 3,4,6-tri-O-galloyl-D-glucose, 1,2,3,4,6-penta-O-galloyl- $\beta$ -D-glucose, terchebulin, and casuarinin) from the fruits of *T. chebula* [11]. Khare [12] reported that *T. chebula* plant has pyrogallol and phloroglucinol, along with phenolics like caffeic, ferulic and vanillic acids, *p*-coumaric, and oil taken out from kernels generated from stearic, palmitic, linoleic, oleic, arachidic, and behenic acids [12]. The fruits of *T. chebula* comprise more tannins (32–34%) but varies geographically [13, 14]. Moreover, amino acids, fructose, betasitosterol, resin, succinic acid and laxative value of anthraquinone are also present [15, 16]. Flavonol, triterpenoids, glycosides, gallic acids conjugated with coumarin named chebulin and in addition further phenolic compounds were also reported [17-19]. Triterpenoid glycosides like arjunin, 2 $\alpha$ -hydroxyursolic acid, chebulosides I and II, 2 $\alpha$ -hydroxymicromiric acid, and arjunglucoside have been also described [20]. Baliah and Astalakshmi [21] investigated the fruit extracts of *T. chebula* and reported the existence of phytochemicals such as alkaloids, glycosides, phenolic compounds, flavonoids, saponin, quinine, steroids and tannin.

## MEDICINAL PROPERTIES

### Antioxidant activity

Oxidative stress plays an important role in the pathogenesis of many diseases. Therefore, reducing oxidative stress by reducing reactive oxygen species and increasing antioxidant defense may be effective in the treatment of many pathological conditions. *T. chebula* is known to be a good antioxidant and very helpful in the balance of nervous system [4]. It stimulates the receiving power of five senses. *T. chebula* extract was established for its possible antioxidant action through its ability to hinder  $\gamma$ -radiation-mediated lipid peroxidation in verified liver microsomes of rat and the inhibition of enzyme present in the mitochondria of rat, superoxide dismutase. These studies prove that *T. chebula* is capable of protecting the antioxidant enzymes and consequence of ROS which is formed by radiation. Recently Majid *et al.* [22] showed the antioxidant

potential of *T. chebula* in DMBA croton oil-treated mice following topical application. Eshwarappa *et al.* [23] evaluated antioxidant activity of leaf gall extracts of *T. chebula* and showed the highest free radical scavenging potential with ethanolic extract. Advanced antioxidant activities were detected in 95% ethanolic and methanolic extracts of *T. chebula*. Its fruit extract is similarly established to have its antioxidant action in rats and is reported to reduce the lipid peroxidase enzyme [24].

### Antiprotozoal activity

*T. chebula* has been reported for antiamebic action against *Entamoeba histolytica* [25] and antiplasmodial activity against *Plasmodium falciparum* was described with acetone extract of *T. chebula* seeds [26]. Recently, Joshi *et al.* [27] reported that *T. chebula* exhibits fairly good antiplasmodial activity with  $IC_{50}$  values of  $4.5 \pm 2.4 \mu\text{g/ml}$ .

### Antibacterial activity

Antibacterial activity of *T. chebula* is well established. Many Gram-negative and Gram-positive human pathogenic bacteria were apparently inhibited by *T. chebula* fruit extracts [28, 29]. Ethanolic extract of *T. chebula* and its main component – gallic acid has been reported to possess antimicrobial activity against methicillin-resistant *S. aureus* [30]. Butanol fraction of *T. chebula* fruit extract which contains ethanedioic acid and ellagic acid has good antibacterial action against enteric pathogens such as *E. coli* and *Clostridium perfringens* [31]. *T. chebula* fruit extract were also active in preventing the urease activity of *Helicobacter pylori*, which is associated with the increase in gastritis, ulcers and stomach cancers [28]. *T. chebula* fruit and seed extracts were described as strong antibacterial agents against *S. aureus* and *Streptococcus mutans*, salivary bacteria [32, 33]. Extracts from *T. chebula* was also effective on plant pathogenic bacteria like *Xanthomonas campestris* pv. citri and in that way useful in the controlling of citrus canker disease [34]. Nayak *et al.* [35] reported that the mouth wash formulated from ethanol extract of *T. chebula* showed considerable antibacterial activity and could be used as an active anticaries agent. *In vitro* antibacterial action of methyl gallate (MG) from *T. chebula* against MDR – *Shigella* species was described by Acharyya *et al.* [36]. *Terminalia* was effective on Gram-negative as well

as Gram-positive bacteria and was established to perform as good antimicrobial agent counter to the investigated microorganisms such as *Salmonella typhimurium*, *Proteus vulgaris*, *Bacillus subtilis*, *E. coli* K-12, *P. aeruginosa* and *S. aureus* [28]. Minimum Bacteriocidal concentrations were observed with water and alcoholic extracts of *T. chebula*. It demonstrated as real anti-bacterial agent by establishing the inhibitory zone against *Bacillus bronchiseptica*, *B. cereus*, *B. pumilis*, *Pseudomonas fluorescens*, *P. aeruginosa*, *Staphylococcus aureus* and *S. epidermidis* [33, 37].

### Antifungal activity

Anti-fungal activity of *T. chebula* is very well reported. Antifungal action of aqueous and twig alcoholic extracts from *Terminalia* sp. were verified against the mycotic strains *Alternaria alternata*, *A. brassicicola*, *Aspergillus flavus*, *A. niger* and *Helminthosporium tetramera* [38]. Outcomes exhibited that aqueous mixtures were not considerably active. Alcoholic extracts displayed better impact than aqueous one. It was moreover established that *A. niger* was well controlled by *T. chebula*. Additional investigation was completed on the inhibitory effect of forty-two methanolic herbal extracts comprising *T. chebula* against clotrimazole-resistant *A. flavus* and *C. albicans*. Similarly, the methanolic collection of *T. chebula* immature seed repressed the mycotic infection [39-41]. Antifungal activity against many dermatophytes and yeasts has been detected with aqueous extract of *T. chebula* [38, 40]. Inhibitory effect of *T. chebula* extract on 3 yeasts (*Candida* spp.) and dermatophytes (*Trichophyton* spp.) was also explored [39]. Anti-candidal action of *T. chebula* extract has been detected counter to clotrimazole resistant *C. albicans* and extract from seed displayed inhibitory action counter to *Trichophyton glabrata* [40, 41]. In storage conditions of different foods, *T. chebula* (fresh and dry) extracts have been indicated to offer protection from *Aspergillus* species [42].

### Antiviral activity

*T. chebula* fruits were famous home-based therapy for cough and cold. *T. chebula* defended upper respiratory cells from influenza A virus, it was also useful to fight against acute pulmonary infections [43]. The healing activity against herpes simplex virus was established in different studies [44]. A group of Japanese

investigators examined the antiviral action of *T. chebula* on human CMV and established that *T. chebula* was active in preventing the CMV replication in immune compromised mice and determined that it could be useful to inhibit CMV infections in immune compromised patients [45]. Tannins isolated from *T. chebula* are also active on plant pathogenic potato virus x [46]. Lin *et al.* [47] stated that punicalagin and chebulagic acid from the fruits of *T. chebula* were repressed HSV-1 pass at non cytotoxic concentrations in human lung A549 cells. Ajala *et al.* [48] described that chebumeinin A, chebumeinin B and two new hydrolysable tannins together with 8 identified and associated compounds from the dried fruits displayed activity against Hepatitis C virus. *T. chebula* extracts have been displayed important antiviral activity on influenza A virus H3N8 viral assays when used at higher doses [49]. *T. chebula* was shown to have significant antiviral action with cytomegalo virus. Aqueous extract of *T. chebula* plant suppressed the plaque development of HCMV independent of dose. Anti-MCMV or anti- HCMV actions were observed at the lesser concentration and *T. chebula* considerably inhibited the pulmonary load of CMV in the cyclosporine compromised mice when compared to control animal group. The study performed with *T. chebula* extracts along with acyclovir against herpes simplex virus 1 displayed their anti-HSV-1 property intensely. *T. chebula* is also a potent inhibitor of swine influenza virus. According to the authors, acetone extract was used as an effective alternative in the fight against contagion swine influenza A virus because of its less price, easy to prepare and substantial therapeutic prospective [44, 50, 51].

### Anti-HIV activity

Natural products of strong anti-HIV activities have been isolated mostly from medicinal plants, which fit in diverse chemical classes [52, 53]. An investigation showed that fruits of *T. chebula* comprise 4 HIV-type 1 inhibitors of integrase, viz. three galloyl glucoses and gallic acid, and proposed that moiety of galloyl had a main part for abrogation of the 3'-processing of HIV-1 integrase role [54]. A thorough review was published by Chinsembu and Hedimbi [55] and Singh *et al.* [56] to classify different medicinal plants that are utilized for the treatment of HIV infection. *T. chebula* inhibitory activities on HIV-1RT and protease have been reported in literature [57]. Kesharwani *et al.* [58] suggested that *T. chebula* extract, chebulagic and chebulinic acids have higher

direct antiviral activity against HSV-2 and ability to inhibit virus attachment and penetration to the host cells as compared to acyclovir. Theepireddy *et al.* [59] showed that crude extract of *T. chebula* and gallic acid showed dose-dependent inhibition on different HIV-1 strains such as NARI-VB 28, NARI-29, NARI-VB 30, NARI-VB 39, NARI-VB 49 and HIV-1 92 HT599.

### Anticancer activity

*T. chebula* has been shown to act against cancer. Methanolic plant extract of *T. chebula* against five diverse human cell-lines like breast cancer (MCF-7), prostate cancer cell line (PC-3), osteosarcoma (HOS-1), mouse (S115) breast cancer cell line, and a normal prostate cell line (PNT1 A) was established [60]. Compounds such as ellagic, chebulinic acids and 2,4-chebulyl- $\beta$ -D glucopyranose from *T. chebula* showed cytotoxic action and maximum efficacy was observed on PC3 and PNT1A cell lines. Chebulagic acid was shown to inhibit the development of 5 cell lines like HCT-115, COLO-205 (colon cancer), MDA-MB-231 (breast carcinoma), DU-145 (prostate cancer) and K-562 (myeloid leukemia). *T. chebula* was tested for chemo-modulatory effect against the nickel chloride induced toxicity in Wistar rats. Triphala was shown to reduce the tumor size in animals engrafted with human pancreatic tumors [54, 61, 62].

The inhibitory activity of phenolics from *T. chebula* fruit on the cancer cell growth were described by a group of investigators and recognized that ellagic, tannic and chebulinic acids were the maximum growth controlling phenolics of *T. chebula* [60]. Ethanol extract of *T. chebula* fruit induced cell apoptosis and inhibited cell division in numerous malignant cell lines with mouse (S115) breast cancer cell line and human (MCF-7), human osteosarcoma cell line (HOS-1), prostate cancer cell (PC-3) and a non-cancerous immortalized prostate cell line (PNT1A) in a dose response manner and established that the extract from *T. chebula* fruit harbors ingredients with hopeful anti-carcinogenic action [63]. Chebulagic acid from *T. chebula* studied by Achari *et al.* [64] showed the effect on human hepatocellular carcinoma cell line HepG2. Ahuja *et al.* [62] stated that ethanolic extract of *T. chebula* fruit considerably inhibited tumor in Ehrlich-Ascites carcinoma induced cancer in Swiss Albino mice. Apoptosis and cell cycle arrest where the main mechanisms of *T. chebula* fruit extract inhibited cell proliferation in A549 lung cancer cells [65]. Recently, Ravishankar

*et al.* [66] established the anticancer activities of *T. chebula* leaf gall extracts on BRL3A, MCF-7, and A-549 cells. Authors attributed the activity in part to the phenolics/flavanoids features of the extract that has been already demonstrated to act as cytotoxic agents. Wani *et al.* [67] reported anticancer activity of commercially available homeopathic preparations of *T. chebula* against breast cancer and revealed their nanoparticulate nature.

### Anti-inflammatory activity

Moeslinger *et al.* [68] showed that the *T. chebula* fruit extract displayed anti-inflammatory activity, mediated by inhibition of inducible nitric oxide synthesis. Polyherbal preparation of *T. chebula* (Aller-7) showed anti-inflammatory activity in a dose dependent manner against arthritis induced by Freund's adjuvant in rats [69]. Chebulagic acid from seed extract of *T. chebula* considerably repressed the increase of arthritis in collagen induced mice model [70]. Nair *et al.* [70] assumed that *T. chebula* fruit will be helpful in the management of rheumatoid arthritis. The usefulness of *T. chebula* fruits in the management of arthritic complaints have been proven by Bag *et al.* [4]. Yang *et al.* [71] reported the anti-inflammatory action of 12 bioactive compounds from the extract of *T. chebula* fruits through inhibition of COX-2 and iNOS activities. Triphala treatment was shown to inhibit the paw volume, lipid peroxidation stages, lysozymes and TNF- $\alpha$ , a mediator of inflammation. On the other hand due to its anti-oxidant activity it showed an elevation of plasma, spleen and liver of monosodiumurate crystal induced mice as compared control mice. Reduced lactate dehydrogenase and  $\beta$ -glucuronidase level were observed in monosodiumurate crystal incubated polymorphonuclear leucocytes treated with triphala. Data gained from the above findings evidently showed that Triphala had a strong anti-inflammatory response in the treatment of gouty arthritis [69, 70, 71]. Gautam *et al.* [42] showed curative effect of *T. chebula* extract on acetic acid-induced experimental colitis and indicated the presence of active principles with proven antioxidants, anti-inflammatory, immunomodulatory, and free radical scavenging and healing properties in the extract. Recently Zhao *et al.* [72] showed that chebulanin, isolated from *T. chebula* suppresses the expression of inflammatory mediators and prevents cartilage destruction and bone erosion in mice. Therefore, authors concluded that chebulanin is a strong therapeutic alternative for the treatment of rheumatoid arthritis.

### Anti-diabetic activity

*T. chebula* was established to possess anti-hypoglycemic and anti-diabetic activity. Studies have shown activity of *T. chebula* against the advanced glycation end products (AGEs)-influenced endothelial cell malfunction. Ethanolic and methanolic extracts of *T. chebula* was able to decrease the levels of glucose [73, 74]. Three new polyhydroxytriterpenoid derivatives, 23-O-neochebuloylarjungenin 28-O- $\beta$ -d-glycopyranosyl ester, 23-O-4'-epi-neochebuloylarjungenin, and 23-O-galloylpinfaenoic acid 28-O- $\beta$ -d-glucopyranosyl ester have been reported to be isolated from the fruits of *T. chebula* along with fourteen known ones [75]. Specifically, 23-O-galloylarjunolic acid and 23-O-galloylarjunolic acid 28-O- $\beta$ -d-glucopyranosyl ester showed potent inhibitory activities against  $\alpha$ -glucosidase. Shyni *et al.* [76] showed that chebulagic acid isolated from *T. chebula* enhances insulin mediated glucose uptake in 3T3-L1 adipocytes via PPAR $\gamma$  signaling pathway, according to authors it can be useful in the treatment of type 2 diabetes.

### Wound healing activity

Hydroalcoholic extract of *T. chebula* fruit studied for wound restorative function in an animal model of diabetes induced by alloxan with the excision and dead space wound. This study clearly demonstrated the wound healing activity of *T. chebula* fruit extract. Topically applied *T. chebula* extract decreased the wound contraction in diabetic rats induced by alloxan through increase in rate and extent of wound closure. Fruit extract of *T. chebula* was assessed in excision and incision model in rats by applying an ointment, and resulted in wound healing function [77, 78]. Nasiri *et al.* [79] showed that *T. chebula* extract was capable of accelerating wound healing in rats by wound contraction, and had beneficial effects more than silver sulfadiazine 1% cream in the management of burn injury.

### Anti-ulcer activity

The methanolic fruit extract of *T. chebula* was assessed for antiulcer action in the ethanol treated and pylorus ligation ulcer models. Results of this study displayed *T. chebula* as a very good antiulcer agent. Histopathological evaluation performed in the pylorus ligation model showed recovery from the edematous form of the gastric tissue, hemorrhage

and deterioration [80, 81]. Mishra *et al.* [82] showed anti-secretory and cyto-protective effects of chebulinic acid isolated from the fruits of *T. chebula* on gastric ulcers in cold restraint, aspirin, alcohol and pylorus ligation induced animal models.

### Anti-caries activity

*T. chebula* aqueous extract was examined for its capability to prevent the development and physiological activities of *Streptococcus mutans*. This extract demonstrated bactericidal activity against *S. mutans*. Mouth wash with the solution containing the *T. chebula* extract showed major decrease in the overall salivary bacteria in addition to the total streptococcal amount. This evidences that *T. chebula* extract can be utilized as an active ingredient in the management of carious teeth due to its ability to prevent the development of *S. mutans* on the surface of tooth and stop the increase of demineralization from acids, and the damage of the tooth surface [33]. Gargle with *T. chebula* extract is helpful to recover from bleeding gums, sore throat, and muscular rheumatism. Lee *et al* [75] investigated the preventive effects of an ethanol fruit extract of *T. chebula* on dental plaque bacteria-induced inflammation and showed *T. chebula* may be a beneficial supplement to prevent dental plaque bacteria-mediated periodontal disease.

### Other medicinal properties

*T. chebula* has been utilized with sugar water in the treatment of ophthalmia, skin irritation and oedema. Its preparations have been also useful in the treatment of heart problems, brain dysfunction and inflammation as an antioxidant and also effective as neuroprotective drug. It has been helpful in recovering from stress as well [4]. Chebulagic acid from *T. chebula* displayed antispasmodic activity similar to that of papaverine [83]. The plant was helpful as an antidote against snake bite. Haritaki improves memory because of its supportive effect on the brain nerves [24]. In chronic fever it acted as adjuvant herb [29]. In extensive period of consumption, it was useful to gain the body weight and to lose weight in overweight people. This herb had the capability to halt hemorrhage. The fresh fruit consumption before mealtime accelerated digestion, while if used with meals it raised brainpower, nurtures the senses and disinfects the gastrointestinal and genitourinary tract. Haritaki

increases digestion, regulates colon function and stimulates the absorption of nutrients. The herb also exhibited adrenergic role and supported to supports the fight with stress. The presence of dye powder (brown) and the key coloring constituent, chebulinic acid, aids to eliminate toxins and undesirable fat from the body. *T. chebula* was effective as skin glow and complexion agent. [4, 24, 83, 84]. Yakaew *et al.* [85] suggested that the *T. chebula* ethanolic fruit extract was an efficacious pharmaceutical protectant of skin against photo-damage. A recent study evaluated the antidiarrheal properties of *T. chebula* fruit aqueous extract and determines the active fraction [86].

## CONCLUSIONS

*T. chebula* is among the most widely used herbal medicine in home remedies. *T. chebula* is considered as a 'King of Medicine' due to its promising medicinal value in the management of various diseases and disorders such as antidiabetic, antimicrobial, antioxidant, anti-mutagenic, anti-proliferative, anti-inflammatory, cardioprotective and wound healing activity. The fruit extracts of *T. chebula* contain different bioactive phytochemicals such as alkaloids, glycosides, flavonoids, saponin, quinine, steroids and tannin. Phenolic compounds from the fruit of *T. chebula* exhibited good antioxidant properties and are very helpful in the balance of nervous system. Many Gram-negative and Gram-positive human pathogenic bacteria, and dermatophytes were apparently inhibited by *T. chebula* fruit extracts. Ellagic, tannic and chebulinic acids were cancer growth controlling phenolics of *T. chebula*. The anti-inflammatory action of 12 bioactive compounds from the fruit extract was facilitated by inhibition of COX-2 and iNOS. *T. chebula* fruit is used as home remedy for the controlling of fever, cold, cough, asthma and urinary diseases. Wide range of therapeutic potential of *T. chebula* could be utilized as an alternative medicine for various illnesses. Because of these enormous medicinal properties, *T. chebula* can be called as a 'wonder herb'.

*Ethical approval:* The conducted research is not related to either human or animal use.

*Conflict of interest:* Authors declare no conflict of interest.

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## ***Terminalia chebula* Retz. – ważna roślina lecznicza**

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## Streszczenie

Medycyna ajurwedyjska jest znanym od dawna sposobem dbania o zdrowie stosującym holistyczne podejście do leczenia i przedłużenia życia. *Terminalia chebula* Retz. jest popularną rośliną szeroko rozpowszechnioną w południowej Azji. *T. chebula* pochodzi z Indii, a jej suszone owoce są powszechnie stosowane w wielu domowych środkach leczniczych. Suszone owoce *T. chebula* zawierają duże ilości związków fenolowych składających się z kwasu elagowego, galusowego i chebulowego. Wyciąg z owoców *T. chebula* wykazuje wiele właściwości biologicznych, takich jak przeciwnowotworowe, przeciwzapalne, antyoksydacyjne, przeciwprzewodniakowe, przeciwdrobnoustrojowe, chroniące wątrobę i nerki, a także w leczeniu zespołu metabolicznego. Aktywne związki fenolowe mogą odgrywać ważną rolę, wpływając na aktywność biologiczną. Wyciąg z owoców *T. chebula* jest szeroko stosowany jako ważny składnik preparatów ajurwedyjskich, na przykład „Triphala”. Ta mieszanka pomaga w detoksykacji jelita grubego, działa przeczyszczająco w przewlekłych zaparciach, wspomaga trawienie i ma działanie odmładzające. Owoce są stosowane w leczeniu rozmaitych stanów chorobowych takich jak ból gardła, silny kaszel, astma, wrzody, dna mocznicowa, zgaga, wymioty, biegunka, czerwotka, wylewy krwi do stawów i choroby pęcherza moczowego. Stosuje się je również jako łagodny środek przeczyszczający, rozluźniający i w chorobach żołądka. Dzięki tym wszechstronnym właściwościom leczniczym *T. chebula* bywa nazywana w Tybecie „królem medycyny” lub „cudowną rośliną”. W niniejszym przeglądzie omówiono ostatnie postępy w odkrywaniu właściwości leczniczych *T. chebula*.

Słowa kluczowe: *Ajurweda*, *Terminalia chebula*, *suszone owoce*, *związki czynne*, *właściwości lecznicze*