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Review Article

Sanā' (*Cassia angustifolia* Vahl.): A Potent Detoxifying Drug in Unani System of Medicine - An Appraisal/ Insight

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A B S T R A C T

Background: In Unani and other traditional systems of medicine, *Cassia angustifolia* Vahl. is used for various therapeutic applications. It is a shrub that belongs to the Fabaceae family and is indigenous to tropical and subtropical regions of Africa, Mexico, Saudi Arabia, India, Pakistan, Somalia, etc.

Purpose of the Review: The main objective of this review is to explore information related to botanical description, pharmacognostic characters, physicochemical standards, quality control, phytochemicals and therapeutic applications of *Cassia angustifolia* that will eventually support researchers of Unani and other sciences in planning different studies for further investigation of this important medicinal plant.

Materials and Methods: This appraisal was done through an extensive literature survey of Unani and other classical texts and published papers available on various search engines.

Results: In Unani medicine, *Cassia angustifolia* is known as *'Sanā' Makki'* which was brought to use medicinally by Arab physicians. The leaf of *Cassia angustifolia* is used for the treatment of various ailments, viz., bronchial asthma, constipation, liver complaints, gout, leprosy, bronchitis, epilepsy, etc. It is also added to various Unani preparations such as *Itrifal Ustokhuddus, Majoon-i-Ushba, Qurs Mulayyin,* etc., which are given for the treatment of various ailments. The cathartic and laxative actions of Senna are due to the presence of anthraquinone glucosides, mainly sennoside A and B. Various scientific studies have reported that *Cassia angustifolia* possesses significant detoxifying effects through antimicrobial, antidiabetic, antioxidant, hepatoprotective, amoebicidal, anticancer activities, etc.

Conclusion: It is concluded that *Cassia angustifolia* is extensively used for various therapeutic purposes in Unani and other traditional medicines as a detoxifying agent. However, detailed studies on pharmacognostic, phytochemical, pharmacological, toxicological aspects of different parts of this important medicinal plant may be carried out for further exploration.

Keywords: Phytochemicals, *Cassia angustifolia*, Unani Medicine, Antioxidant

Introduction

Cassia angustifolia Vahl. and *Cassia acutifolia* Delile are considered synonyms of *Cassia senna* L.[1] (*Senna alaxandrina* Mill.), which belongs to the Fabaceae (Leguminosae) family.[1,2] The genus Cassia containing approximately 500 species of flowering plants,[3] including *Cassia angustifolia* Vahl., which is widely used medicinally.[3,4] The genus name is derived from an Arabic word, *'Sanā'* which describes that plants whose leaves and pods possess cathartic and laxative pharmacological properties.[5,6] *Cassia angustifolia* is native to tropical and subtropical regions of Africa, Mexico, Saudi Arabia, India, Pakistan, etc.[7] It also grows wildly on the opposite coast of Somalia and spreads eastward to the Sind and Punjab provinces of Pakistan.[8] In India, it is wildly distributed in Andhra Pradesh, Maharashtra, Gujarat, Rajasthan, Karnataka, etc. It is also cultivated in several districts of Tamil Nadu such as Tirunelveli, Ramnathpuram, Madurai, Salem and Tiruchirapalli.[9-12] Because of its wild growth in Arab countries *Cassia angustifolia* is also known as Arabian Senna. It is evident that Arabian physicians introduced this medicinal plant to India in the 11th century, the cultivation of this plant began for the first time inthe Indian state of Tamil Nadu.[8] The history also revealed that the therapeutic properties of Senna were first described by Arabian physicians. This plant is medicinally used in different traditional systems of medicine like Ayurveda,[13] Unani, Homeopath[8], Siddha,[14] etc as a detoxifying drug for the treatment of constipation, indigestion, malaria, hepatomegaly, splenomegaly, jaundice, anemia, etc. In the allopathic system of medicine, the glycosides, sennoside A and B, obtained from *Cassia angustifolia*, are commonly used for the treatment of constipation.[8] It has been reported that these two anthraquinone glycosides are responsible for the pharmacological actions of Senna.[13]

In Unani medicine, drugs are obtained from three natural sources viz: plant, animal, mineral, of which the botanical source is the most common. In Unani literature, *Cassia angustifolia* is known as *Sanā'Makki* due to its indigenous location in Holy city of Mecca, Saudi Arabia. Many Unani classical literatures provide a detailed account of this important plant origin drug including Al-Jame al-Mufredat al-Adwiya al-Aghzia of Ibn al-Baitar (1197-1248 AD),[15] Kitab al-Mukhtarātfi'l Tib of Ibn Hubal Al-Baghdadi (1121-1213 AD),[16] Muheet-i-Azam of Azam Khan (1815-1902 AD),[17] Khazain al-Adwiya of Najmul Ghani (b. 1859 AD),[18] Ilm al-Adwiya Nafeesi[19] and Makzan al-Mufridat of Mohammad Kabeeruddin (1889-1976 AD),[20] Makhzan al-Mufridat va al-Murakkabat of Munshi Ghulam Nabi,[21] The Unani Pharmacopoeia of India,[22] etc. In Unani medicine, usually the leaf of *Cassia angustifolia* is medicinally used for the treatment of joints and skin diseases,[15] epilepsy, migraine, haemorrhoids,[17] constipation,[19] difficulty in breathing, etc.[16,18] It removes all the three humours from the body thus acting as a detoxifying agent, including *safrā* (yellow bile), *sawdā* (black bile) and *balgham* (phlegm) from the body, the derangement of which in terms of quality or quantity results in accumulation of morbid matters and subsequent pathological conditions.[15,17,21] According to Hakim Azam Khan, this drug preferably removes burnt humours from the body.[17] In terms of conventional medicine, "burnt humour" may be correlated with oxidative stress and excessive production of reactive oxygen species (ROS) which are presently responsible for the development of several ailments in human body.[23] In Ayurvedic literature, it is mentioned that this botanical drug has the property of reducing *kapha* and *vata* in the human body.[13] *Cassia angustifolia*, a non-prescription drug to treat constipation, got approved by the Food and Drug Administration (FDA) of the United States.[24] The diverse therapeutic potential of *Cassia angustifolia* as mentioned in the literature of traditional medicines has attracted the attention of researchers in the present day, several studies have shown that different parts of this medicinal plant possess promising pharmacological activities, viz: anticancer, antimicrobial, antidiabetic, antioxidant, hepatoprotective, etc. The aim of this manuscript is to appraise a detailed account of *Cassia angustifolia*, including botanical description, pharmacognosy, standardization, therapeutic and folklore uses, pharmacological and toxicological properties, adverse effects, phytochemistry, phytopharmaceutics, scientific studies, etc., so that the global scientific community is fully aware of this imperative medicinal herb and further research studies may be carried out on different aspects of this drug.

Materials and methods

This review study was done after evaluating a number of manuscripts related to Unani and other sciences that discussed *Cassia angustifolia*. A total of 166 pieces of literature were searched using keywords such as *Cassia angustifolia, Cassia acutifolia, Senna alaxandrina, Cassia senna*, Alexandrian Sana, Tinnevelly Sana, Senna, *Sanā'Makki,* anthraquinone glycosides, sennosides, etc. 51 of the 166 references were chosen for this review paper (Table 1), while the others were rejected because they were not directly related to the keywords. This manuscript referred to Unani literature in Urdu and English that described the botanical description, temperament, pharmacological properties and uses, adverse effects, so on, as well as botanical literature that discussed the morphology, geographical distribution, taxonomy, etc. The pharmacognostic, standardization and quality control, phytochemical, toxicological, pharmacological, clinical, and other scientific studies were searched through search engines like PubMed, Science Direct, Springer, SCOPUS, Research Gate and Google Scholar. The botanical names of plants cited in this article were validated through the

database available on 'The World Flora Online' http://www.worldfloraonline.org). The appropriate English translations of various Unani terminologies mentioned in this paper were used after referring to the Standard Unani Medical Terminology published by the CCRUM in collaboration with the WHO.

Table 1.List of Reviewed Literature

Types of literature	Title/ Source	Authors
Unani L iterature Keywords: Botanical description, Temperament, Pharmacological properties, Medicinal uses, Dose, Side effects, Substitute, Compound formulations (n = 12)	Kitab al-Mukhtarat Fi al-Tib, Vol. 2nd	Ibn Hubal al-Baghdadi (1112-1213 AD)
	Al-Jame al-Mufradat al-Adwiyava al-Aghzia, Vol. 3rd	Ibn al-Betar (1197-1248 AD)
	Muheeta-i-Azam, Vol. 3rd.	Mohammad Azam Khan (1722-1807 AD)
	Khazain al-Adwiya, Vol. 4th	Najmul Ghani Khan (b. 1859 AD)
	Ilm al-Adwiya Nafeesi	Mohammad Kabiruddin (1889-1976 AD)
	Makhzan al-Mufradat	Mohammad Kabiruddin (1889-1976 AD)
	Makhzan al-Mufradat va Murakabat, Ed. 2nd	Ghulam Jilani Khan
	The Unani Pharmacopoeia of India, Part I. Vol. 01.	Anonymous (Published by Dept. of Ayush, Ministry of H & FW, Govt. of India)
	National Formulary of Unani Medicine, Part I & VI	Anonymous (Published by Dept. of Ayush, Ministry of H & FW, Govt. of India)
	Bustan al-Mufradat	Mohammad Abdul Hakim
	Hamdard Pharmacopoeia of Eastern Medicine	Mohammad Said (1920-1998 AD)
Botanical Literature Keywords: Taxonomy, Botanical description, Pharmacological actions, Habitat (n = 4)	Pharmacognosy, Ed 55th	Kokate CK, Purohit AP, Gokhale SB
	Indian Medicinal Plants	C. P. Khare
	The Wealth of India, Vol. 03. Ca-Ci	Anonymous (Published by Council of Scientific and Industrial Research, New Delhi)
	Indian Medicinal Plants Ed 2nd, Vol. 1st	K. R. Kirtikar and B. D. Basu
Published articles Keywords: Botanical description, Morphology, Pharmacognosy, Toxicology, Phytochemistry, Pharmacological activities (n = 35)	PubMed, Science Direct, SCOPUS, Research Gate and Google Scholar	

Results

Taxonomic Hierarchy.[25]

Kingdom: Plantae-Plantes, Planta, Vegetal, Plants

Subkingdom	:	Viridiplanae- green plant
Infrakingdom	:	Streptophyta- land plants
Superdivision	:	Embryophyta
Division	:	Tracheophyta- vascular plants
Subdivision	:	Spermatophytina- seed plants
Class	:	Magnoliopsida
Superorder	:	Rosanae
Order	:	Fabales
Family	:	Fabaceae
Subfamily	:	Caesalpinoideae
Genus	:	*Cassia*
Species	:	*Cassia angustifolia*
Authority	:	Vahl
Synonym	:	*Senna alexandrina* Mill

Mutradifat (Vernacular Names)

Arabic and Persian: Sana Makki,[17,20,21] **Greek:** Aalwai, **Hindi:** Bhoin Tarvar, Romhar, Sona Pali,[15] **Marathi and Bengali:** Sona Makhi, **Punjabi:** Sarna,[18] **Telgu:** Sunamakhi, **Tamil:** Nilavarai, Nelavakai, **Malayalam:** Sunnamukki, **Kannada:** Nela Tangedu, **Gujrati:** Nat Ki Sana,[26] **English:** Indian Senna, Tinnevelly Senna, **Ayurvedic:** Sarvana-pattri, **Unani:** Sana Makki, Sana Hindi, **Siddha:** Nilavarai, **Folk:** Sanaai.[10]

Morphology/ Botanical Description

It is categorised as shrub,[27]glabrous to subglabrous, whose height is approximately 60-80 cm.[7] Its branches are ascending or obtusely angled, erect or subterete, of pale color.[12,28] The leaves are alternate, with an acute tip (Figure 1), paripinnate, 6-10.5 cm long,[7] and the leaflets and oval-lanceolate in shape and glabrous on both sides.[12,28] The flowers have zygomorphic elements with long pedicles of 3-4 cm. The flowers usually appear after 65-70 days of sowing [13]during the April and June months.[7] Racemes are axillary, erect, laxly many-flowered, usually considerably exceeding the subtending leaf. Bracts are membranous, ovate or obovate, caducous. Sepals are obtuse and membranous.[12,28] The fruit is composed of a dehiscent, hairy pod whose length and thickness are 5 to 6 cm and 1.7 to 2.3 cm, respectively. At the time of maturity, the color of the fruit is black.[7] Legumes are flat, with 15-17 mm breadth. Seeds are obovate, cuneate, compressed with plane cotyledons. The pods are greenish-brown to dark-brown in color, they contain obovate, dark-brown, smooth seeds.[12,28]

It is a well known drug mentioned in Unani classical literature. It is commonly found growing in Hejaz (Arab), Sham (Syria), India. According to Unani classical literature, the leaves of *Sanā' Makki* are the same as the leaves of *Henna (Lawsonia inermis* L.*)* and *Mazariyun (Daphne mezereum* L.). The trunk of the plant is soft and red in colour. The flowers are blue in color. Senna from Hejaz (Arab) is considered to be the best in quality and is known as *Sanā' Makki*.[15-20,29]

Figure 1.Leaves of *Cassia angustifolia* Vahl

Mizaj (Temperament)

This drug's temperament is described in Unani literature as "hot" in the second stage and "dry" in the first stage or "hot and dry" in the first stage.[15,17,20,29]

Afa'al (Pharmacological Actions)

In Unani medicine, this drug is used as *mulayyin* (laxative), *mushil-i-balgham, sawdā' vaṣafrā* (purgative for phlegm, yellow and black bile), *munaqqī-i-dimāgh* (brain scavenger), *mufattiḥsudad* (deobstruent), *musaffī-i-dam* (blood purifier), *qātil-i-dīdān* (anthelmintic), *muḥarrik-i-qai* (emetic), *jali* (detergent), *muqawwī-i-qalb* (cardiac tonic), and *mudirr-i-bawl* (diuretic) etc.

Iste'malat (Therapeutic uses)

This medicinal plant is prescribed for the treatment of many body ailments such as *waja' al-mafāṣil* (arthralgia), *waja' al-warik* (coccydynia), *'irq al-nasā* (sciatica), *dīq al-nafas* (bronchial asthma), *jarab (*scabies), *ḥikka* (*pruritus*), *qūlanj* (colicky pain), *niqris* (gout), *shaqeeqa* (migraine), *bawāsīr* (haemorrhoids), *ṣar'* (epilepsy), *ṣudā'* (headache), *dā'al-Tha'lab* (alopecia areata), *kalaf* (melasma), *bahaq* (pityriasis), etc.

The leaves of *Sana (Cassia angustifolia)* along with the leaves of *Henna (Lawsonia inermis)* are used for the treatment of greying of hairs. The *Ṭila'* (liniment) prepared with *Sana (Cassia angustifolia)* is locally applied in cases of Alopecia, scabies, *pruritus,* leprosy, rashes. The local application of the leaves of *Sana* along with vinegar is beneficial in the treatment of scabies, pruritis, freckles and pityriasis. The paste prepared with Senna, *Shahtra (Fumariaofficinalis), Henna (Lawsoniainermis)* and vinegar, is externally applied over the skin in cases of scabies and pruritus.[15-21,29]

This important herb is also used in other traditional and folk medicines as a purgative, laxative, febrifuge, liver stimulant, anthelmintic etc. It is used in combination with

other drugs for the treatment of biliousness, distension of stomach, vomiting and hiccups. It is also used in splenic enlargement, jaundice, constipation, loss of appetite, foul breath, liver disorders, gout, tumours, typhoid, anaemia, cholera, leprosy, bronchitis, amoebic dysentery etc.[10-12,28,30]

Ajza-i-Mustamila (Parts used)

In Unani medicine, the leaf of, *Cassia augustifolia* is commonly used therapeutically.[17,18,20]

Miqdar-i-Khurak (Therapeutic Dose)

For purgative purposes, the therapeutic dose of *Barg-i-Sana* is 7-9 g, for laxative purposes the dose is 3-5 g for adults.[19,20]

Mazarrat va Muslehat (Adverse effects and Correctives)

On the basis of observational studies, the Unani scholars have described the adverse reactions produced by *Barg-i-Sana* (*Cassia angustifolia* leaves), such as nausea, restlessness, colicky abdominal pain.[59,60,62] It is also mentioned that in case of any adverse reactions, any of them viz: *Roghan-i-Badam, Banafsha* (*Viola odorata*), *Anisoon* (*Pimpinella anisum*), *Halela Zard (Terminalia chebula)*, *Gul-i-Surkh (Rosa damascena)* can be givenas correctives to the patients.[15,17,20,29]

Badal (Therapeutic Interchange)

In case of non-availability of *Sana*, any of them, viz: *Turbud (Ipomoea turpethum), Halela Zard (Terminalia chebula)* and *Banafsha (Viola odorata)* may be used as its substitute as per the indications.[20,29]

Murakkabat (Compound Formulations)

In the Unani system of medicine, various compound formulations are prepared by adding *Sana* (*Cassia angustifolia*) as one of the ingredients (Table 2).

Scientific Studies

Physicochemical Standardizationof leaves and Seeds

The physicochemical standardization of the leaves and seeds of *Cassia angustifolia* was carried out by Khare et al, 2017 and Srivastava et al, 2006, respectively (Table 3).

Table 2.Compound Preparations Containing *Sanna Makki (Cassia angustifolia Vahl.)*

Compound Formulations	Dosage Form	Indications	Dose	References
Habb-i-Shabyar	Pills	Resolvent for cerebro spinal, stomach and bowel effusions, headache, earache, quaternary fever, gastritis, hepatitis, bronchitis	Two Pills	31
Majoon-i-Musaffi-i-Khoon	Semisolid	Infection present in the blood	5-10 g	32
Majoon-i-Ushba	Semisolid	Skin diseases, leprosy, scrofula, itching, gout	5-10 g	31
Sufoof-i-Chobchini	Powder	Joints pain, gout, syphilis, sciatica, infection present in the blood	5-10 g	32
Sufoof-i-Lajward	Powder	Melancholia	5-10 g	32
Itrifal Ghudadi	Semisolid	Scrofula	10 g	31
Itrifal-i-Shahatra	Semisolid	Syphilis	5-10	31
Sufoof-i-Mulayyin	Powder	Constipation, stomach pain	6 g	31, 33
Sufoof-i-Mushil	Powder	Diarrhoea	5-10	31
Laooq Khayarshambar	Semisolid	Coryza and catarrh, productive cough	10 gm	33
Itrifal Ustokhuddus	Semisolid	Removes cerebral impurities, constipation, persistent cold and catarrh, greying of hair	5-10 g	31
Majoon Musaffi-i-Azam	Semisolid	Acne vulgaris, boils, itching, joints pain	6 g twice daily	33
Qurs Mulayyin	Tablet	Constipation	Two tablets	31, 33
Majoon Muravvahul Arvah	Semisolid	Sexual disorders, general debility, cardiac, liver and stomach weakness	1 g	31

Table 3.Physicochemical Standards of the leaves and Seeds of *Cassia angustifolia*

Parameters	Leaves[34]	Seeds[13]
Moisture content (%)	1.9	89.05
Total ash (%)	11.2	4.2
Acid insoluble ash (%)	1.5	0.20
Alcohol soluble extractive value (%)	3.8	9.4
Water soluble extractive value (%)	16.5	32.4

Phytoconstituents

Indian Senna yields flavonoids, acidic polysaccharides, pinnitolos (polyols), and minerals.[27] Most of the Cassia species yield anthracene derivatives; the leaves and pods contain anthraquinone and glycosides, which are dianthrone derivatives of rhein with two glycoside units.[8] The Senna species also contain aloe-emodin, chrysophanol, kaempferol, isorhamnetin, both free and as glucosides, together with mycricyl alcohol. The purgative action of Senna is mainly due to the presence of anthraquinone derivatives and their glucosides.[10] The anthraquinone glucosides such as sennosides A, B, C, D, G, III, and A1 have been isolated from *Cassia angustifolia*. of them and sennosides A and B are highly active. Several mono-and di-glucosides of anthrone have also separated from the seedlings, leaves, and roots. It has also been reported that, besides anthraquinone and glycosides, the Senna plant also contains two naphtalene glycosides, namely Tinnevelley glycoside and 6-hydroxymusicin glycoside.[11,12,22] Some new anthraquinone glycosides including emodin 8-O-sophoroside have been isolated from the leaves of *Cassia angustifolia*.[35] A new flavonoid glucoside, namely kaempferol-3-O-[(6‴-O-trans-sinnapoyl)-β-D-glucopyranosyl (1 → 6)]-β-D-glucopyranoside 1 and apigenin-6,8-di-C-glycoside 2have been separated from *Cassia angustifolia* leaves.[36]

Antimicrobial Activity

Studies have reported that various extracts such as ethanol, methanol, petroleum ether, aqueous obtained from *Cassia angustifolia* possess promising and anti-bacterial activity against Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Aspergillus niger, Aspergillus flavus, Fusarium oxisporum, Rhizopus stolonifer.[24]

The anti-microbial activity of *Cassia angustifolia* aqueous, methanol, ethanol, acetone, ethyl acetate extracts were determined through the disk diffusion method against *Acinetobacter junii, Serratia mercescens, Enterobacter cloacae, Pseudomonas aeroginosa* and *Salmonella typhi.* These extracts exhibited variable degrees of antibacterial effects, more significant bactericidal activity of the ethyl acetate extract was observed against *Serratia mercescens* with a 10.5 ± 0.76 mm zone of inhibition at 1.25 mg/ mL. It was also observed that *Acinetobacter junni, Enterobacter cloacae, Pseudomonas aeroginosa* were resistant to the aqueous extract. Furthermore, the ethanol extract exhibited no antibacterial activity against *Pseudomona aeruginosa,* whereas it demonstrated promising activity against *Serratia mercescens* with a 9.0 ± 0.50 mm zone of inhibition at 1.25 mg/ mL. The acetone extract was also found to have antibacterial activity against *Acinetobacter junni, Serratia mercescens, Enterobacter cloacae* and *Salmonella typhi.*[37]

Hepatoprotective Activity

A study revealed that the methanolic extract of the leaf of *Cassia angustifolia* produces significant hepatoprotective effects against CCl_4-induced liver toxicity in rats.[38] Another study has reported the outstanding hepatoprotective potential of the alcoholic extract of *Cassia angustifolia* against CCl_4-induced hepatic damage in rats. The results showed that the values of liver biomarkers such as total bilirubin, total protein; SGOT, SGPT, etc, were significantly reduced in the treatment group.[39]

Antidiabetic Activity

Jani and Goswami, 2019 found that anaqueous extract of *Cassia angustifolia* had significant antidiabetic activity in rats with high fat diet and low dose streptozotocin-induced diabetes mellitus.[40] Abel Kerim et al, 2017 revealed the significant glucose-lowering effect of *Cassia acutifolia* in obese diabetic rats.[41]

Antioxidant Activity

The antioxidant activity of the organic and aqueous extracts of *Cassia angustifolia* and gallic acids was investigated through the DPPH method. All the extracts showed dose dependent antioxidant effects, more significant activity was noted in the ethanol extract.[37]

Anticancer Activity

A study has reported the significant anticancer activity of ethanol and methanol extracts of *Cassia angustifolia* against Hep 2, HeLa and MCF-7 cell lines.[37] Abood 2022, reported the promising antiproliferative and antitumor effects of the ethanol extract of the leaves of *Cassia angustifolia* against MCF7 and MDA-MB231 cell lines.[42]

Amoebicidal Activity

The amoebicidal activity of *Cassia angustifolia* extract has been reported against *Acanthamoeba triangularis trophozoite*.[43]

Anthelmintic Activity

The crude ethanolic extract of the leaves of *Cassia augustifolia* as both alone and in combination with *Cassia alata*, exhibited significant anthelminthic activity.[44]

Antimutagenic and Genotoxic Activity

The genotoxic and mutagenic activities of an aqueous extract of *Cassia augustifolia* were investigated through inactivation of *Escherichia coli* cultures, bacterial growth inhibition, reverse mutation test (Mutoxitest) and DNA strand break analysis in plasmid DNA. The results revealed that the test drug produced single and double strand breaks in plasmid DNA in a cell-free system, whereas the extract was not found to be cytotoxic or mutagenic against *Escherichia coli*.[45]

Toxicity Studies

Hancke et al., 2009 conducted acute and subchronic toxicity studies of Ciruelax herbal paste containing the leaves and pods of *Cassia angustifolia* in mice and rats. The results revealed that the preparation did not produce mortality or significant toxicities in both species of animals.[46] A case report depicted that a 19-year-old patient had rhinoconjunctivitis, dyspnoea, facial oedema, disseminated hives after taking Delgaxan Plus and which contains and Senna.[47] According to some reports chronic Senna use causes liver damage due to the presence of anthraquinones glycosides.[48]

Discussion

Cassia angustifolia Vahl. (Indian Senna) and *Cassia acutifolia* Delile. (Alexandrian Senna) are officially mentioned in the pharmacopoeias of several traditional and alternative medicinesas laxatives and purgatives.[24] These two species are also considered synonyms of *Cassia senna* L. and *Senna alaxandrina* Mill.[1] It is evident that the Arabian physicians first started the use of this herbal drug, particularly for the treatment of capillary congestion[10] and as a cathartic for the treatment of constipation.[6] Apart from its medicinal value, *Cassia angustifolia* is also used in various food and cosmetic products. This medicinal plant is currently grown in several countries around the world, including Arabs, India, Pakistan, China, Sudan, Europe, Kenya, South Africa, the United Kingdom, and others.[27] Different parts of this important medicinal plant and including leaves, seeds, pods, etc., are medicinally used in different indigenous systems of medicine, including Ayurveda,[13] Unani, Siddha systems.[10] Due to the diverse activity of Senna leaf, it is used in Unani medicine to treat *waja' al-mafāṣil* (arthralgia), *waja' al-warik* (coccydynia), *'irq al-nasā* (sciatica), *dīq al-nafas* (bronchial asthma), *jarab* (scabies), *ḥikka* (pruritus), *qūlanj* (colicky pain), *niqris* (gout), *shaqeeqa* (migraine), *bawāsīr* (haemorrhoids), *ṣar'* (epilepsy), *ṣudā'* (headache), *dā'al-tha'lab* (alopecia areata), *kalaf* (melasma), *bahaq* (pityriasis), etc.[15-22,29] Apart from its standalone use, it is also added to the formulations of some important pharmacopoeial preparations. For instance, *Itrifal Ustokhuddus* is prescribed in cases of persistent cold, coryza, greying of hairs. *Majoon-i-Ushba* and *Sufoof-i-Chobchini* are given to patients with joint pain, gout, sciatica, itching, other skin disorders.[31,32] *Sufoof-i-Mulayyin* and *Qurs Mulayyin* are considered the drugs of choice for constipation.[31,33] *Cassia angustifolia* has yielded numerous anthraquinones glycosides, most notably sennosides A and B.[27] These two compounds are classified as dimeric substances belonging to aloe emodin and rhein, were separated by Stroll in 1941.[49] Sennosides A and B are not absorbed from the gastrointestinal mucosa; instead, they are hydrolyzed in the intestine by colonic bacteria and converted into moieties, rhein and rhein-anthrone, which cause gastric and intestinal irritation, increasing peristaltic movement and resulting in diarrhoea. Such bio-molecules are also responsible for increasing the amount of intestinal fluids by decreasing the reabsorption of electrolytes and water from the colon.[48]

Many scientific reports have validated the traditional use of *Cassia angustifolia*. Some research has also been done on the mechanism of actions in various diseases. According to some studies, the antiobesity, hypoglycaemic[40] and hepatoprotective potentials[39] are due to the presence of flavonoids. Flvonoids are thought to have the ability to regenerate pancreatic β-cells. Another study has reported that rutin and myricetin are responsible for antidiabetic activity. Myrecetin is thought to lower postprandial high blood sugar level by slowing the action of α-glucosidase. Saponins are responsible for activating insulin receptors signalling activity and decreasing glucose production and α-glucosidase activity.[40] It has been reported that the chronic use of Senna can produce liver toxicity, which might be due to the presence of anthraquinone glycosides.[50] The Caco-2 human colonic cell line model proved that the secondary metabolite of dianthrones, namely rheinanthrone, is chiefly attributed to the laxative property of Senna.[51]

This review study has found that the detailed pharmacognostical evaluation, physicochemical standardization, phytochemical analysis of every part of *Cassia angustifolia* have not yet been carried out. Hence, there is a dire need to explore the morphological and microscopic characters, physical and chemical standards, chemical profiling, heavy metals and microbial estimation, pesticide residues, etc. of the leaf, seed, flower, stem, root, etc. of *Cassia angustifolia* for its authentication and identification. Various pharmacological evaluations,

such as antimicrobial, antidiabetic, anticancer, and hepatoprotective activities of extracts obtained from different parts of *Cassia angustifolia* have been done *in vitro* and *in vivo*. Some studies also looked intothe mechanisms of this important medicinal plant in various pharmacological actions. Furthermore, the detailed pharmacological and toxicological evaluation of different parts of *Cassia angustifolia* and its compound preparations, as mentioned in Unani literature, may also be carried out. In addition, the pharmacokinetic and mechanistic profiles of different parts of this drug and its preparation may also be explored.

Conclusion

After reviewing the literature, it is summarized that *Cassia angustifolia*is used in various traditional systems of medicine. The drug is a potent detoxifying agent as it expels most of the morbid humours responsible for many pathological conditions. In Unani medicine, usually the leaf of *Cassia angustifolia* and its preparations are prescribed for the treatment of constipation, joint pain, sciatica, gout, dyspnoea, headache, haemorrhoids, alopecia, melasma, etc. Presently, the preparations of *Cassia angustifolia* are frequently used for laxative purposes in various European countries. More scientific studies on the therapeutic properties of different parts of *Cassia angustifolia*, as claimed by Unani and other traditional healers, may be carried out for further exploration. In addition, detailed pharmacognostical, quality control, phytochemical, toxicological, stability, etc. studies of different parts of *Cassia angustifolia* on scientific lines may be carried out to know the enormous benefits of this important medicinal plant.

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Conflict of Interest

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