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Review Article

Evaluating the Efficacy of *Tukhm Turb* (*Raphanus sativus* L. Seeds) in Melasma: Insights from Recent Research and Traditional Unani Literature

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Abstract

Melasma is a common pigmentary skin condition that predominantly affects individuals with darker or light brown skin tones, with a prevalence of up to 70% in pregnant women. *Ibn e Sina*, a renowned Unani scholar, described *Kalaf* as a skin discoloration resembling melasma in its clinical features. The Unani system of medicine, known for its plant-based remedies, highlights the potential of *Tukhm Turb* (*Raphanus sativus* seeds), a member of the *Brassicaceae* family, for treating melasma. According to Unani principles, *Tukhm Turb* possesses *Jālī* (detergent), *Mulaṭṭif* (attenuant), *Muḥallil* (anti-inflammatory), and other beneficial properties. Modern studies corroborate these attributes, demonstrating that *Raphanus sativus* has anti-inflammatory, antioxidant, and tyrosinase-inhibiting activities, which are attributed to its phytochemicals such as alkaloids, glucosinolates, brassinosteroids, and flavonoids. This review examines the traditional use of *Tukhm Turb* for melasma in Unani literature and evaluates findings from recent pharmacological studies, clinical trials, and in-vitro/in-vivo investigations. A systematic search of databases such as PubMed, Google Scholar, and ScienceDirect was conducted, alongside a review of classical Unani texts using keywords like "melasma," "*Kalaf*," "*Raphanus sativus*," and "Raphani semen." The integration of classical and modern evidence suggests that *Tukhm Turb* may be effective in managing melasma due to its multifaceted pharmacological properties. While promising, further rigorous clinical studies are required to validate its efficacy and establish its potential as a standard treatment for melasma.

Keywords: Alkaloid, Flavonoid, Kalaf, Raphanus sativus, Traditional Medicine, Tukhm Turb

1) Introduction

One of nature's greatest gifts to humanity is the plant kingdom. The Unani medical system has a long history of using plant-based remedies, which provide medicine for the prevention and cure of numerous medical conditions. Several medicinal herbs have been used for many generations in the treatment of melasma[1]. The potential cosmetic applications of natural compounds with inhibitory effects against melanin production are increasing[2]. The use of naturally occurring substances to treat pigment problems is becoming a growing trend[3].

Melasma is a common skin condition with irregular borders and bilateral distribution that can be identified by pigmentation on sun-exposed areas, notably the face[4]. Patients with melasma experience considerable emotional and psychological consequences, along with an influential physical impact that affects their appearance[5]. It is still uncertain how often melasma is in reality; studies show that it ranges from about 1 to 33% and is more prevalent among darker skin types among individuals with light brown skin types[6], such as those from Middle Eastern, East Asian (Japanese, Korean, and Chinese), Indian, Pakistani, and Mediterranean-African backgrounds[4]. 70% of pregnant women get melasma and the condition persists after postpartum[7].

Although the primary cause of melasma is still unknown, a number of factors, including pregnancy, oral contraceptives, genetics, sun exposure, hormones, vascular conditions, and some medications, might contribute to the development of melasma[8]. *Ibne Sina*,

the renowned Unani scholar, presented in his book The Canon of Medicine the genesis of *Kalaf*, a type of skin discoloration that resembles melasma in clinical manifestations and typically affects women's faces. Additionally, the etiologies explained by the Unani scholars are amenorrhea or oligomenorrhoea, digestive disorder, chronic quartan fever[9], and vascularization[10].

2) Methods

This is a review article that investigates some classical Unani literature, such as the Canon of Medicine, Al-Jam-e-li-Mufradat-Al-Adviah-Wal-Aghziya, and other books, such as The Wealth of India and Indian Materia medica. Also, some systemic electronic databases, such as PubMed, Scopus, Google Scholar, and Science Direct, with the keywords melasma, Kalaf, Raphanus sativus, and Raphani semen, were used.

3) Pharmacognosy, pharmacology and bioactive constituents of Raphanus sativus

Raphanus sativus L. belongs to the Brassicaceae family, commonly known as radish, cultivated annually or biennially with different morphological and ecological characteristics, having white or lilac-purple racemoid flowers. The herb produces fruits filled inside with yellow or brown-colored 2- 8 globose seeds[11]. Radishes are consumed around the world as an edible vegetable. Its leaves and pods are eaten as salad and served as pot-herbs[12] [Figure 1].

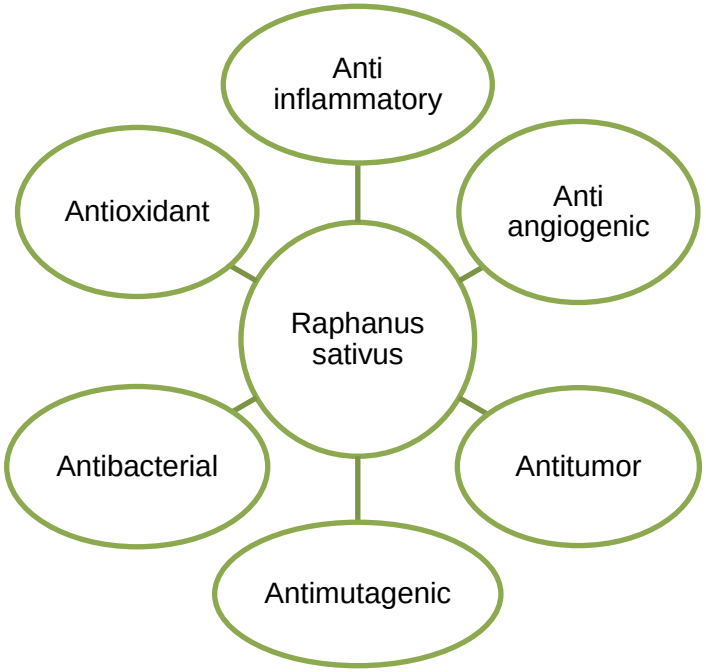

Figure 1 Pharmacological actions of Tukhm Turb in contemporary medicine

In the Unani system of medicine, it is found in the name *turb* or *fijl* and its seeds as *tukhm turb,* which possess' properties like *Jālī* (detergent), *Mulaṭṭif* (attenuate), *Muḥallil* (anti-inflammatory), *Kasr-i-Riyāḥ* (anti-flatulent), *Muqawwī-i-Bāh* (aphrodisiac), and *Muqī* (emetic)[13] [Figure 2].

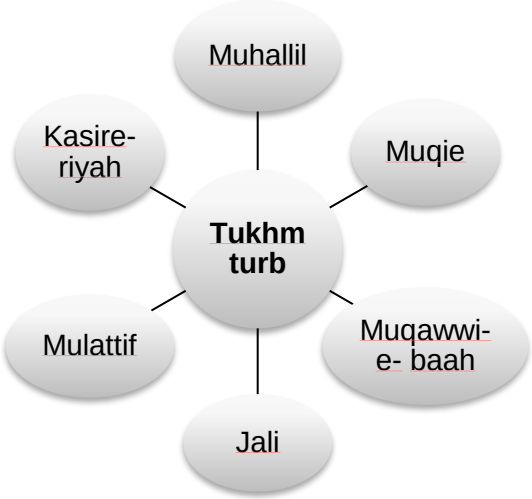

Figure 2 Pharmacological actions of Tukhm Turb in Unani system of medicine

In studies, it has been found to have anticancer, antimicrobial, antioxidant, anti-inflammatory[14] and antiangiogenic[15] medicinal properties.

The active compounds present in Raphanus sativus seeds are alkaloids, glucosinolates, brassinosteroids, and flavonoids [Figure 3]. Other nutritional components include minerals, fatty acids, vitamins, proteins, and polysaccharides[16].

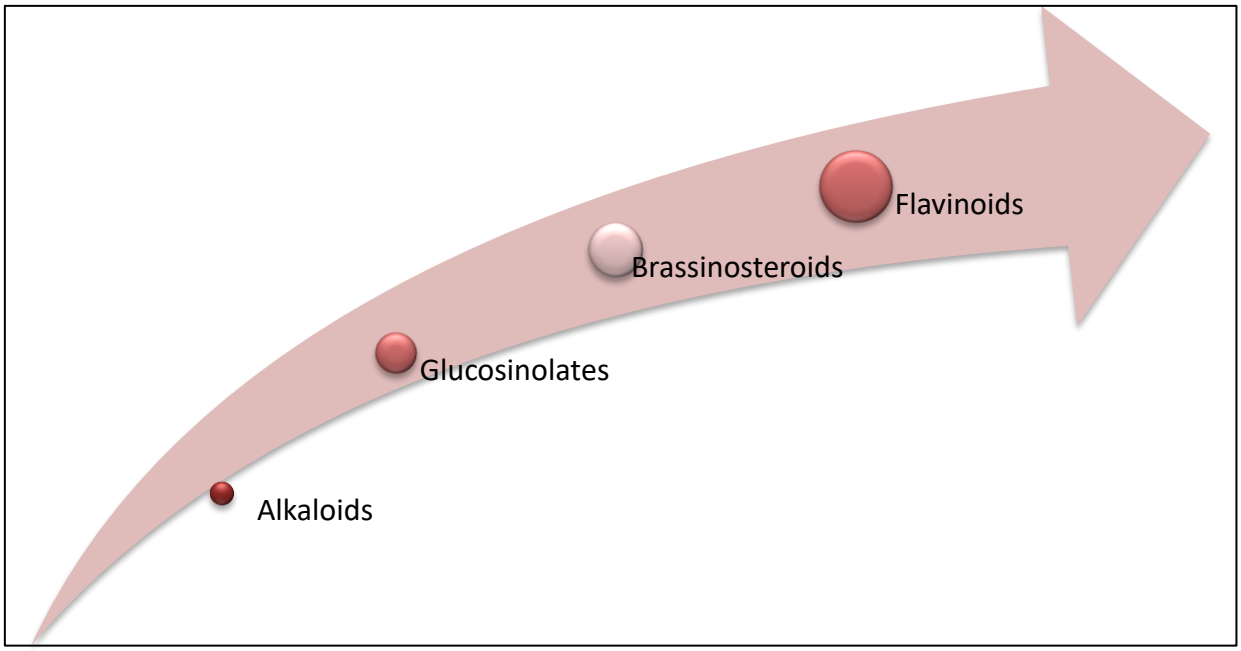

Figure 3 Active components of Raphanus Sativus

Figure 4 *Raphanus Sativus* (Seeds)

4) Different pharmacological actions of Raphanus sativus seeds implicated in its anti-melasma activity

4.1) Antioxidant property

Raphanus sativus seeds are rich in antioxidant properties and have a high content of tocopherol[11]. Studies suggest that melanogenesis-related oxidative stress may impact melanin formation because of reactive oxygen species. Thus, using *Raphanus sativus* seeds, as they have potent antioxidant properties, might stop tyrosinase from activating oxygen[17]. Thus, this might contribute to the management of melasma[18]. γ-Tocopherol protects the epidermis from sunburn and oxidative stress[19].

4.2) Anti-inflammatory property

Studies indicate that local inflammatory mediators in

the skin play a role in the process of melanogenesis, like interleukin-18 and 33, which regulate the processes of TYRP1 and TYRP2, and may be suggestive of promoting inflammation that results in melanogenesis by acting on melanocytes and causing pigmentation[20]. Flavonoids like anthocyanin present in the seeds of radish help in the reduction of oxidative stress and inflammation[21].

4.3) Antiangiogenic property

Angiogenesis may play a role in the mechanism of melasma, as speculated in Unani literature and also in conventional systems of medicine[10]. Evidence shows that seeds have potent antiangiogenic[15] effects that inhibit vascular endothelial growth factors (VEGFRs) activity and further hamper tyrosinase activity and melanin production[22].

5) Validation of anti-melasma activity of *Raphanus sativus* as described in ancient Unani texts

According to *Ibne Baitar,* the eminent physician *Jalinoos* mentioned that *muḥallil* activity found in the seeds of *Raphanus sativus* aids in the depigmentation of melasma[23]. Furthermore, a recent in vivo study indicates that *Raphanus sativus* seed has anti-inflammatory as well as anti-angiogenic potential[15]. A clinical trial with the paste of *Tukhm turb* in the management of melasma is reported[24]. One more in vitro study exhibits that the seeds of *Raphanus sativus* possess tyrosinase-inhibiting activity[25].

Table 1 Recent research shows in vivo, in vitro and clinical trials on Raphanus sativus seeds.

S.No.	Studies on *Raphanus sativus* seeds	Study type	Actions in melasma
1.	Asif et al.,2022	*in vivo*	*Raphanus sativus* seeds oil has anti-inflammatory, and antiangiogenic properties[15]
2.	Hamed et al.,2021	*in vitro*	Tyrosinase inhibition potential[25]
3.	Gauri et al.,2015	*Clinical trial*	Topical Application (*Zimad of TukhmeTurb, Tukhme Karafs and Sirka*) in Melasma[24]

6) Discussion

Raphanus sativus seeds are a time-tested drug used in the Unani system of medicine in the treatment of melasma. Its topical application for the treatment of melasma was mentioned by numerous ancient scholars. All the reviewed articles as well as classical Unani literature showed that *Raphanus sativus* seeds exhibit significant improvement in melasma. The clinical trial demonstrates the potential benefits of using Raphanus seeds as early as the onset of disease occurs. The information also suggests that the seeds contain flavonoids and alkaloids that possess antioxidant, anti-inflammatory, and anti-angiogenic properties. Thus, melasma can be treated by reducing oxidative stress and inhibiting the release of inflammatory mediators and VEGFRs that directly or indirectly affect the tyrosinase activity. Though a lot of work has been done on the different properties of *Raphanus seeds*, the rationale for the effectiveness of Raphanus seeds in melasma has yet to be explored. There is an increasing need to conduct more randomized clinical trials on *Raphanus sativus*, which is a time-tested drug, to gain better insight into its mechanism of action and to promote its rationale for use.

7) Conclusion

The review consolidates evidence from classical Unani literature and modern scientific research, highlighting the efficacy of *Tukhm Turb* (*Raphanus sativus* L. seeds) in the management of melasma. *Raphanus sativus* is rich in phytochemicals, such as flavonoids, alkaloids, and glucosinolates, which exhibit anti-inflammatory, antioxidant, and anti-angiogenic properties. These pharmacological actions contribute to its potential to reduce oxidative stress, inhibiting tyrosinase activity, and mitigating inflammation and vascularization—key factors involved in melasma's pathogenesis. Classical Unani texts, including works by eminent scholars like *Ibn Sina* and *Jalinoos*, support the depigmenting properties of *Tukhm Turb*. Additionally, recent in-vivo, in-vitro, and clinical studies validate its therapeutic potential. Notably, its application has shown no significant adverse effects, reinforcing its safety and viability as a natural treatment option.

While existing studies provide a strong foundation, further rigorous clinical trials and research are essential to standardize its use, optimize dosage forms, and establish it as a globally accepted treatment for melasma. *Tukhm Turb* represents a promising intersection of traditional wisdom and modern science in addressing melasma.

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