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Review Article

### TRADITIONAL USES, PHYTOCHEMISTRY AND PHARMACOLOGICAL ACTIVITIES OF *PAPAVER SOMNIFERUM* WITH SPECIAL REFERENCE OF UNANI MEDICINE: AN UPDATED REVIEW

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#### ABSTRACT

*Papaver somniferum* commonly known as Khashkhash /Afyon, belongs to family Papaveraceae. It is one of those traditional plants, which have a long history of usage as medicine. The opium poppy (*Papaver somniferum*) produces some of the most widely used medicinal alkaloids like morphine, codeine, thebain and porphyroxine which are the most important component of this plant. Apart from these alkaloids, opium poppy produces approximately eighty alkaloids belonging to various tetrahydrobenzyl isoquinolinederived classes. It has been known for over a century that morphinan alkaloids accumulate in the latex of opium poppy. According to Unani literature, it possesses most important therapeutic values as modern literature and research studies also prove its therapeutic importance. It is used as analgesic, narcotic, sedative, stimulant as well as nutritive, etc. It is also useful in headache, cough, insomnia, cardiac asthma, and biliary colic. In this paper we have provide a review on habitate, pharmacological actions, phytochemical with special refrence to Unani Medicine. In this review, an attempt is made to explore the complete information of *Papaver somniferum* including its phytochemistry and pharmacology.

**Keywords:** Khashkhash, Biliary colic, Alkaloid, phytochemistry.

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#### INTRODUCTION

Over a period of times, the researchers have become more interested in finding out the potential of various drugs to treat diseases and to maintain the general health<sup>1</sup>. Herbal medicines are the unique gift of the nature as complementary to all the life in the world. Herbs are being use as medicine since the inception of life in the universe. Herbal drugs are derived from plants as whole or its part i.e. roots, stem, bark, leave, flower, fruit and seeds for the healing purposes<sup>2</sup>. Despite the emergence of new chemical drugs in contemporary medicine, the application of herbal remedies has not yet been declined.

Recently, interest in traditional medicine was revived by the WHO recommendations for the development of native knowledge and the use of alternative national medicine<sup>3</sup>. During the recent decades, chemical side effects have been identified and measures have been taken to overcome this problem. Thus, people again turned to natural products, especially in pharmaceutical industry. In recent years, medicine as well as health aspects are receiving special attention from the general public<sup>4</sup>. According to World Health Organization (WHO) reports that as many as 80% of the world's people depend on traditional medicine for their primary health care needs<sup>5</sup>. Although the use of medicinal herbs

is not the only therapeutic method in traditional medicine, it is the basis of medical treatments<sup>6</sup>. A large number of herbal drugs are mentioned in Unani System of Medicine, one of them is Khashkash/Afyon (*Papaver somniferum*), belongs to family Papaveraceae. It is one of those traditional plants, which have a long history of usage as medicine. The word "opium" is of Greek (Unani) origin which is derived from "opos" (juice) and "opion" (poppy juice). Opium mostly postulated to came into Greece from Asia Minor and the ancient Greeks associated various divinities with opium, including Hypnos (sleep), Morpheus (dreams), Nyx (night) and Thanatos (the twin brother of Hypnos) (death). Opium is frequently mentioned in classical Unani literature for its pain-relieving and sleep inducing action<sup>7</sup>. The opium poppy (*Papaver somniferum*) produces some of the most widely used medicinal alkaloids like morphine, codeine, thebain and porphyroxine which are the most important component of this plant. Morphine was the first plant alkaloid ever isolated in 1806 by a 22 year old German pharmacist, Friederich Wilhelm Adam Serturner. Morphine was extracted from the dried milky exudates, obtained from the capsule of *Papaver somniferum*. In 1839 the British successfully waged the Opium War with China to preserve its profitable opium trade. The surgeon William Halstead successfully "treated" a debilitating addiction to cocaine by switching to morphine<sup>8</sup>. According to Unani literature, it is used alone or in combination with other medicine as compound formulation like Itrifal Muqawwi Dimagh, Sharbat khashkhash, and khamir-e-khashkhash.etc<sup>9</sup>.

#### TAXONOMICAL CLASSIFICATION (ITIS Standard Report)<sup>10</sup>.

Kingdom	Plantae
Subkingdom	Viridiplantae
Infrakingdom	Streptophyta
Superdivision	Embryophyta
Division	Tracheophyta
Subdivision	Spermatophyta
Class	Magnoliopsida
Superorder	Ranunculanae
Order	Ranunculales
Family	Papaveraceae
Genus	Papaver L
Species	Somniferum L

#### VERNACULAR NAMES<sup>9, 11, 12, 13</sup>.

Language	Name
English	Opium, Poppy, White poppy
Urdu	Khashkash safaid
Hindi	Afin, Khashkash, Afyun
Arabic	Abunom, Afyiun
Bengali	Pasto, Post
Malyalam	Bungapion
Greek	Agria
Persian	Afiun, Khashkhash, Koknar
Italian	Papavero, Papavero domestico
Gujrati	Aphina
Tamil	Abini

#### HABITAT & DISTRIBUTION

It is an erect annual herb, about 60-120 cm height and is cultivated in many parts of the world and chiefly in Turkey, Asia minor, Persia, India, China, and Southeastern Europe. It is also grown and produced in Nepal, Assam, and Barma. It is produced in Bihar, Bangal, Banara, Central and Western India<sup>9,11,13</sup>.

#### MORPHOLOGY

##### Macroscopic:

The Seeds of *Papaver somniferum* Linn are dried, white, grey or grayish black in colour, sub-reniform and about 1.25 mm long. The surface is covered with polygonal reticulations about nine in length and five in width of seed, the hilum and micropyle are situated in a depression near one end. The embryo is curved and embedded in endosperm. Sweetish or oily in taste and unpleasant odour<sup>9,13</sup>.

##### Microscopic:

Sectional view of seed coat showed a single layer of epidermis which contains somewhat elongated, thick walled parenchymatous cells with thick cuticle on outer side. Below which the region is composed of polygonal to oval, thin walled parenchymatous cells. The epidermis of cotyledons is usually consisted of rectangular to oval, slightly thick walled parenchymatous cells which possess yellowish brown contents. Rest of the part is made up of thin walled, hexagonal to polygonal parenchymatous cells, containing starch grains. The starch grains are oval to round in shape.

The sectional view of radical showed the epidermis composed of squarish parenchymatous cells. Aleurone grains are present in cortical region which consisted of many layers of thin walled, polygonal to oval parenchymatous cells<sup>9</sup>.

**Parts Used:** Fruits, Seeds and latex<sup>9,12</sup>

**Temperament: (Mizaj): Seed.** Cold<sup>2</sup>, Dry<sup>1,9</sup> Cold,<sup>14</sup>

**White seed.** Cold<sup>2</sup>, Moist<sup>1,13</sup>

**Black seed.** Cold<sup>3</sup>, Dry<sup>2,13</sup>

**Dose (Miqdar-e-Khurak): Seed.** 1-3g<sup>9</sup>

**Post.** 6.75 gm<sup>15,16</sup>

**Post.** 1.75gm<sup>14</sup>

**Side Effects (Muzir Asrat):** It has side effect on lungs<sup>15,16</sup>

**Correctives (Musleh):** Sugar, Asal (Honey) Mastagi (*Pistacia lentiscus*)<sup>15,16</sup> Karkas (*Pimpinella anisum*)<sup>16</sup>

**Substitutes (Badal):** Tukhm-e-Kahu (*Lactuca sativa* Linn)<sup>16</sup>

##### Compound Formulations (Murakkabat):

Sharbat-e-Khashkhas, Looq-e-Khashkhash, Itrifal Muqawwi-e-Dimagh, Roghan-e-Kishneez, Habb-e-Shaheeqa, Khameera-e-Khashkhash, Laboob barid<sup>9</sup>

**PHARMACOLOGICAL ACTIONS: (In Unani)****Actions of Seed:**

- *Mukhaddir* (Anaesthetic) <sup>9</sup>
- *Qabiz* (Constipative) <sup>9,11</sup>
- *Munawwim* (Sedative/Hypnotics) <sup>9,14</sup>
- *Muqawwi bah* (Aphrodisiac) <sup>9,11</sup>
- *Muqawwi Dimagh* (Brain tonic) <sup>9,13</sup>
- *Mulattif* (Demulcent) <sup>12,13</sup>
- *Mughazzi* (Nutritive) <sup>12,13</sup>
- *Habis* (Mild Astringent/ Retentive) <sup>13</sup>
- *Musakkin alam* (Antianalgesic) <sup>14</sup>

**Actions of Fruit:**

- *Muzaf-e- bah* (Anaphrodisiac) <sup>11</sup>
- *Moharrik baah* (Sexual stimulant) <sup>11</sup>
- *Muqawwi Badan* (Body tonic) <sup>11</sup>
- *Hazim* (Digestive) <sup>11</sup> .
- *Munawwim* (Sedative/Hypnotics) <sup>11,13,14</sup>
- *Muarriqu* (Soporific) <sup>13</sup>
- *Mudir* (Diuretic) <sup>11</sup>
- *Habis* (Stringent) <sup>11,13</sup>
- *Musakkin alam* (Antianalgesic) <sup>14</sup>

**THERAPEUTIC USES (IN UNANI)****Uses of Seed**

- *Ishaal* (Diarrhoea) <sup>9,11,13</sup>
- *Zaheer* (Dysentery) <sup>9,11,13</sup>
- *Nazla* (Catarrh/influenza) <sup>9</sup>
- *Sual* (Cough) <sup>9,11,13</sup>
- *Asthma* (Zeequnnafs) <sup>13</sup>
- *Sahar* (Insomnia) <sup>13,14</sup>
- *Sual yabis* (Dry cough) <sup>13,14</sup>
- *Sailanur Raham* (Leucorrhoea) <sup>13,14</sup>
- *Ishaal safrawi* (Bilious diarrhoea) <sup>14</sup>,
- *Hirqatul masana* ( Burning in bladder) <sup>14</sup>,

**Uses of Fruits**

- *Sual* (Cough) <sup>11,13</sup>
- *Humma* (Fever) <sup>11</sup>
- *Zaheer* (Dysentery) <sup>11,13</sup>
- *Faqrud Dam* (Anaemia) <sup>11</sup>
- *Ishaal* (Diarrhoea) <sup>11,13</sup>
- *Suda* (Headache) <sup>11,13</sup>
- *Ashob-e-chasham* (Conjunctivitis) <sup>14</sup>,
- *Ishaal safrawi* (Bilious diarrhoea) <sup>14</sup>,

**CHEMICAL CONSTITUENTS**

Opium is valued for its alkaloids contents, the total alkaloid content varying from 5 to 25% (generally 20%). A large number of alkaloids have been isolated from opium of which few known alkaloid are as follows:

**Morphine type:**

- Morphine <sup>12,13</sup>
- Codein <sup>12,13</sup>
- Neopine <sup>12,13</sup>
- Morphine (Pseudo, or oxymorphone) <sup>12,13</sup>
- Thebain <sup>12,13</sup>
- Porphyroxine <sup>12,13</sup>

**Phthalide isoquinolone type:**

- Hydrocotarnine <sup>12,13</sup>
- Narcotoline <sup>12</sup>
- L-Narcotine : <sup>12</sup>
- Grosopine (dl-narcotine) <sup>12,13</sup>
- Oxynarcotine : <sup>12</sup>
- Narceine <sup>12,13</sup>

**Benzyl isoquinoline type:**

- Papaverine <sup>12,13</sup> .
- Xanthaline (Papaveraldine) : <sup>12</sup> .
- dl-Laudanine : <sup>12</sup> .
- Laudanine (Triotopine,l-laudanine) : <sup>12</sup> .
- Codamine <sup>12,13</sup>
- Laudamine <sup>12,13</sup>
- Laudanosine <sup>12,13</sup>

**Cryptopine type:**

- Protopine (macleyine, fumarine), <sup>12</sup>
- Cryptopine, <sup>12</sup>

**Unknown Constitution:**

- Aporeine <sup>12</sup>
- Rheoadine <sup>12</sup>
- Meconidine <sup>12</sup> .
- Papaveramine <sup>12,13</sup>
- Larthopine <sup>12,13</sup>

**The ash of opium contains:**

- Calcium, 7.79% <sup>9,12</sup>
- Phosphorus, 7.52% <sup>12</sup>
- Potassium, 28.04% <sup>9,12</sup>
- Sudium , 0.78% <sup>9,12</sup>
- Magnisium, 0.69% <sup>12</sup>

- Sulphur, 4.67%.<sup>12</sup>
- Iron, (Fe<sub>2</sub>O<sub>3</sub>)+ aluminium, (Al<sub>2</sub>O<sub>3</sub>) 5.17%<sup>12</sup>
- Carbon dioxide, 1.18%<sup>12</sup>
- Sand and Silica, 20.13%<sup>12</sup>

#### Opium contains several acids including,<sup>12</sup>

Meconic acid (up to 10%), Lactic (1-2%). Malic, Tartaric acid, Citric acid, Acetic acid, Succinic acid, Sulphuric acid, Phosphoric acid.

#### Other constituents:

Protein, Free amino acids, Caoutchous, (5-10%). Brown wax (6-13.6%). Volatile oil, Colouring matters, Dextrose (2.7-3.3%). Pectin, Amonia, and three neutral principles, viz, meconin (opainyl), meconoisin and opoinin, and presence of the enzymes like, protease, oxydase, maltase, invertase, urease, and emulsion is also reported<sup>12</sup>

### PHARMACOLOGICAL STUDIES

- Antiallodynic activity<sup>17</sup>
- Analgesics activity<sup>18,19,20,21,22,23,24,25,26,27</sup>
- Antitussive activity.<sup>28,29</sup>
- Anti-diarrheal activity<sup>30,31</sup>

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- Anti- smoking activity( *Addiction*)<sup>32,33</sup>
- Antidepressant activity<sup>34,35,36,37</sup>
- Anti-anxiety activity<sup>38</sup>
- Bronchodilator activity.<sup>39,40</sup>
- Antibacterial activity<sup>41</sup>
- Narcotic activity<sup>42,43</sup>

### CONCLUSION

From the time immemorial, it has been used for variety of ailments. Research in medicinal plants has gained a renewed focus recently. The discovery of natural alkaloids with promising biological activities have been demonstrated the significance of this plant drug. This review enriches our knowledge regarding the phytochemical as well as therapeutic values and pharmacological aspect used in Unani System of Medicine. Though *Papaver somniferum* has various medicinal applications, but it is need of hour to explore the more medicinal values at molecular level with the help of biotechnological tools and techniques. Further studies should be conducted to elucidate its mechanism of action in different diseases.

### CONFLICT OF INTEREST

All authors have no conflict of interest.

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