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# **Review Article**

# MAKOY (SOLANUM NIGRUM) - A REVIEW ON A UNANI DRUG

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# **ABSTRACT**

 $m{A}$  Unani medicine has been practiced traditionally in Indian subcontinent since a very long time. A Unani drug Makoy or blacknight shade, botanically named as Solanum nigrum Linn. belongs to family Solanaceae cultivated throughout the country in dry parts, quite common in cultivated lands, road sides and gardens. The drug has two varieties, one is bearing black color fruit, and other one has reddish brown color fruit. In both varieties, black color fruits are toxic in nature. It is recommended that the root bark should not to be given to pregnant women. The Unani physicians have prescribed Makoy in various ailments like ascites, piles and chronic cirrhosis of the liver, gonorrhoea, inflammatory swellings and chronic cirrhosis of the liver and spleen, rheumatic and gouty joints and various skin disorders. This drug has been used extensively for its various therapeutic purposes such that astringent, carminative, diuretic, anti inflammatory, anti microbial, hepatoprotective and analgesic. In this review, an effort has been made to provide information on medicinal properties of Makoy (Solanum nigrum) mentioned in Unani classical literature as well as in recent scientific studies.

KEYWORDS: Makoy, Solanum nigrum, Unani drug, Enab-us-salab.

#### INTRODUCTION

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The Unani drug Makoy, botanically named as Solanum Nigrum (SN) Linn. belongs to family Solanaceae. It is a herbaceous annual weed, 30-45 cm high, found throughout the country in dry parts, quite common in cultivated lands, road sides and gardens. The plant has been in use from the period of Egyptians, Greeks and Romans. In Unani classical literature, it is mentioned as Enab-us-salab in Arabic [1].

Its common names are Makoy and blacknight shade. Its two varieties are found, one is bearing black color fruit, and other one has reddish brown color fruit. In both varieties, black color fruits are toxic. The leaves, whole plant and roots are used for health point of view. The Unani physicians have prescribed this plant in various ailments like ascites, piles and chronic cirrhosis of the liver, gonorrhoea, inflammatory swellings and chronic cirrhosis of the liver and spleen, rheumatic and gouty joints, skin diseases etc. The seeds are laxative and they are very useful in giddiness, gonorrhoea, thirst and inflammation [2-7]

In some locals, ripe berries and cooked leaves of edible strains are used as a food, and parts of this herb are used as a traditional medicine. The root bark should not to be given to pregnant women. It is found in all dry districts in the plains as well as low hills throughout India from Punjab and Assam to Kanyakumari. In south India, it is found abundantly along the Coromandel Coast and in the district of Tinnevell [8-10]

#### **Description According to Unani Classical Literature:**

Makoy is of different types like jangli, bustani and pahadi. The branches of bustani variety are about one and a half meter, and its

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leaves are broad and blackish in color. Its flowers are small and white in color. Its fruits are round like that of small pea, and seeds are of small in size. Fresh fruits are of green color whereas dried fruits are of red color. Dried fruits contain small seeds like seeds of Khashkhas<sup>[11]</sup>.

There are two types of Makoy described by Ibn Baitar in al-Jami al-Mufradat wa al-Adwiya wa al-Aghzia (1999) and successive writers followed the classification, such as Najmul Ghani, Hakim Momin, Ibn Hubal Baghdadi and others .Their description is as follows [1, 19].

- Makoy-e-Barri / Jangli: This variety has male and female. The i. male plant is known as Enab-us-salab munawwim, and female plant is known as Enab-us-salab mujannan.
- Makoy-e-Bustani: This variety has male and female variety too. The male plant is known as Kaknaj. The female plant is mainly used for medicinal purpose.
- Makoy-e-Hajari / Pahari: This male plant of this variety is known iii. as Kaknaj ghalia and mainly cultivated in houses and it is smaller than Kaknai.

The plants of Makoy are wildly grown. Its leaves are resembles with chilli's. Its flowers are small and white. Fruits are black and in bunch. It is bitter, pungent and hot [12].

According to Ibn Hubal Baghdadi, there are five types of Makoy, one type is used commonly as a medicine that plant has green leaves and yellow fruits having mizaj cold in first degree and dry in second degree. Out of which three are described: one is mukhaddar which is cold in second degree. One species is munawwim wa mukhaddar whose functions are like Afiyun and its other type is muhalik [13]

Al Biruni described itas Enab al-tha lab in detail in his celebrated book titled "Kitab al Saidnah fil al Tib". According to Al Biruni, Dioscorides mentioned it Atan wa khiwas. The cultivated variety is eaten. It is multi-plexly branched and bears blackish foliage. One variety's branches grow high, and it bends towards the earth. The fruit bears a sheath that is like the bladder in shape. The fruit is like grape, soft and red, but is not eaten. One variety is sudorific, with entwined hard boughs. It is copious in foliage. The flowers are red and large, saffron-like. The bark of the root is red. It grows among stones. At first

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its branches grow straight to a cubit in length. The color of the foliage is olive-like, and it is long, slender, and beauteous. The bud is big, white, curly, and like the bunch of gram. It bears grains, five or six in number like gram, soft, hard, and having different hues. Its root is about half an inch thick. It grows on rocks not distant from water. It is, at times, lethal when the dose is beyond the normal. Its root is employed in place of its grains. Ibn Mandawath writes: "One variety (of nightshade) is soporific; it should be abstained from. Muhammad bin Habib says about 'ibab that it is 'inab al-tha 'lab, and whoever saysibab al-tha 'lab is wrong. Abi bin Mataq Hijazi says: "Ibab is inab al-tha lab and both expressions are current." Abu Hanifah quotes from Abu Ziyad that 'Ebab is like wild rue but it is high and its branching like the latter is adhesive. The Bedouin says that the grains of 'Ebab are very red, smaller than jujube, and far larger than those of nightshade's. They are sheathed, and each sheath bears a grain. When Abu Ziyad showed him Kakanaj, he was told that this was not 'inab al-tha-'lab. Its foliage is broad and thick and becomes perforated rather early. It is believed by people that these perforations are made by genii and they do it through their envy for mankind. Therefore, unperforated leaves are searched for, brayed and pasted for the alleviation of pain. The pain is made to subside. Physicians mentioned Kakanaj by the name of 'inab. Abu mu'adh writes; "It has five (5) varieties. Ibn Sarabiyun has described them in detail. Some of them are lethal. According to Abu Hanifah, 'ibraq is night shade and so is fana. The nightshade grain is not red but yellowish. It bears black spots, while some varieties of the grain are entirely black. One variety is profusely branched with the distal ends large and black. Its fruit, when it nears maturity, becomes pale and finally black. It is dark blue and does not harm the skin". Falimum has mentioned herbs that are associated with water: 'inab al-hayyah,karafs al-ma''ausaj-i-saghir, wild bakijar,and thayyal. In Persian nightshade is Kalin-kar. In Zabuli, it is sag angur kin karzi in Sigzi, and fana in Arabic'. A poet (in Behr-i-Ramal) said:

"In *Akhraj* is nightshade of diverse colors and the garden primrose in the full flush of their bloom in the garden."

Zuhayr bin Sulma(in Behr-i-Tanwil) says: "Red and fibres still sprinkled along the diurnal journey like nightshade's grains that have not been broken."

Al-Mutannabi says in praise of falcon's eye:

"Aromatic colored, black like nightshade."

Some people call '*tshriq* by the name of *fana*, Abu Hanifah says: "Nightshade is not red but inclined to be yellowish. It bears some varieties entirely in black. It is also called *fibraq*, *thulthan*, and *thafala*. In the exegesis of *Taf Stir al-Saba'iyat*. It has been stated that *fana* is a tree whose grains are weighed in *qairats*. Very red, even if, they reveal a reddish interior <sup>[14]</sup>.

In Zakhira Khwarjam Shahi, Jurjani mentioned that Makoy is effective in female diseases, such as waram-e-rahem and quruh-e-rahem [15].

The parts of the *makoy* used are leaves, stems, flowers, seeds, root, fruits <sup>[1,5-7,16,18,21]</sup>. According to classical Unani literature, the *mizaj* of *Makoy* is cold and dry in second degree <sup>[1,16,18]</sup>. The seeds of *Makoy* are shown in Figure 1.



Fig. 1: Seeds of Makoy

# Various Actions & Clinical Indications:

Muhallil-e-Auram (Antiinflammatory), Warm-e-Ahsha (Inflammation of viscera), Waram-e-Meda (Gastritis), Waram-e-Jigar

(Hepatitis), Waram-e-Lisan (Glossitis) [1, 5, 6, 8, 11, 12, 16, 17, 19, 22-24], Dafa-e-Qai(Antiematic) <sup>[7, 12]</sup>, Dafa-e-Is'hal (Antidiarrheal) <sup>[10, 21]</sup>, Dafa-e-Zaheer (Antidysentric) <sup>[1, 8, 10]</sup>, Dafa-e-Humma (Antipyretic /Febrifuge), Humma (Fever) [1, 5, 6, 8, 10, 16, 17, 21], Dafa-e-Ratubat-e-Rahem (Expellant of Uterine fluids) [1, 11], Dafa-e-Suda (Pain killer for headache) [1, 8, 19, 22], Mana-e-Hamal (Abortifacient) <sup>[1, 22]</sup>, Mubarrid (Refrigerant) <sup>[6, 8, 19]</sup>, Mudir-e-Baul (Diuretic) [1, 5, 6, 8, 10, 13, 17, 19, 20, 22, 24], Kasir-e-Riyah (Carminative) [1], Mujaffif (Desiccant) <sup>[20, 22]</sup>, Mulattif (Demulcent) <sup>[1, 18, 20]</sup>, Mulayyin (Laxative) <sup>[1, 7, 8,</sup> <sup>19, 20]</sup>, *Munaffis* (Expectorant) <sup>[5, 7, 8]</sup>, *Munawwim* (Hypnotic) <sup>[1, 5, 7,13, 19, 22]</sup>, Musaffi-e-dam (Blood purifier) <sup>[1]</sup>, Mushil (Purgative) <sup>[1,6,8,20]</sup>, Musakkin-e-Alam (Analgesic/Anodyne), Suda (Headache), Waja-ul-Mafasil (Arthritis), Dard-e-Chasm (Ophthalgia), Dard-e- Gosh (Otalgia), Dard-e-Dandan (Toothache) [1, 5, 6-8, 11, 12, 13, 16, 17, 19, 21]. Musakkin-e-Atas (Thirst quencher) [1, 5, 19, 20], Muqawwi-e-Qalb (Cardiotonic) [5-7], Mana-e-Sailan-e-Haiz (Antiemmenagogue) [1, 11], Qabiz (Astringent), Zaheer (Dysentry), Is'hal (Diarrhoea) [1,8,11,11,18,19,20,22], Amraze Chasm-wa-Uzn-wa-Anf (Eye, Ear, Nose diseases) [1, 5, 8, 11, 19, 22], Amraz-e-Jild (Skin diseases) [5-8, 11, 19].

# **Botanical Description:**

It is an erect, diffused, much branched, shrubby herb; leaves  $4-8\times2.5-4$  cm., ovate, sinuate or lobed, dark green; flowers small and white, in drooping, sub-umbellate extra auxiliary cymes; berries about 0.8-1.0 cm. in diameter, red or black, smooth, polished, seed small reniform, smooth yellow <sup>[16, 24]</sup>.

# **Microscopic Description:**

Its fruit is differentiated into an outer single layered epidermis and an inner fleshy mass of tissue in which the seeds are embedded. The epidermis is cutinised. The cells of the epidermis are rectangular to polygonal in shape. Below this, there is sub-epidermal collenchymatous layer. The ground tissue of the mesocarp is parenchymatous and filled with starch grains. Starch grains are simple or compound. The compound grains consist of 2-4 simple grains. The testa of the seed is nearly light brown to yellowish and smooth, the thickness being 15-20 microns. The testa consists of a single layer of stone cells. The hilum is present in the acute edge near the narrower end of the seed. The interior portion is filled with oily endosperm, embedded within which a cylindrical embryo 0.25-0.5 mm. in thickness having a hypocotyls and a radical, the radical in turn is directed towards the hilum and coiled parallel to the flat surfaces so as to bring the tips of the cotyledons adjacent to the redicle. Aleurone grains are observed in endosperm cells as main food reserve [16].

# **Phytochemical Studies:**

The plant of *Makoy* contains organic constituents, namely alkaloids, reducing sugars, glucosides, saponins, steroids, and inorganic constituents are potassium, calcium, iron, sulphur, phosphorus <sup>[16]</sup>.

*Makoy* possesses numerous compounds that are responsible for pharmacological activities. Its active components are glycoalkaloids, glycoproteins, polysaccharides, polyphenolic compounds, such as gallic acid, catechin, protocatechuic acid (PCA), caffeic acid, epicatechin, rutin and naringenin <sup>[25]</sup>.

Ashrafudoulla *et al.*, (2016) evaluated the phytochemical screening on leaf extract of *Solanum nigrum* L, *S. myriacanthus Dunal, Solanum melongena* and *Averrhoa bilimbi* which were from 3 districts in Bangladesh. The phytochemical constituents like tannins, proteins, alkaloids, flavonoides and saponins of these species in dry and shady areas were investigated qualitatively. The results revealed that the proteins and alkaloids were more abundant on *Solanum melongena* and *Solanum nigrum* L respectively of shady areas. Tannins and alkaloids were also abundant on *Solanum myriacanthus Dunal* of dry areas <sup>[26]</sup>.

Physicochemical Studies: [16]

: Not more than 16 per cent
: Not more than 7 per cent
: Not less than 4 per cent
: Not less than 15 per cent
: Not more than 2 per cent

# Pharmacological Activities:

Antidiabetic study:

Akubugwo (2008) evaluated hypoglycaemic activity of the aqueous and hydro-alcoholic extracts of different parts of SO plant, viz.,

leaf, fruit and stem in Sprague Dawley rats. The results of the study indicated that aqueous extracts of leaf and fruit possessed significant hypoglycaemic effect in dose dependent manner, followed by hydroalcoholic extracts. It was observed that the stem extract of SO had no profound effects <sup>[27]</sup>.

Ali *et al.*, (2010) studied effect of crude ethanolic extract of SO on blood sugar of albino rat after daily oral administration of dose at the level of 250 mg/kg b.wt. for five and seven days, respectively. It was observed that the chronic administration for longer duration lead to significant decrease in blood sugar as compared to control. Hence, it could be concluded that SO had the antidiabetic property <sup>[28]</sup>.

#### Immunostimulant study:

Hanifa (2011) studied that immune stimulant potential of plants was an alternative for preventing fish diseases. On the basis of results of the study, the ethanol and methanol extract treated group showed less mortality rate when compared to chloroform toluene and water extract treated group. It was concluded that plants extracts had great potential as immune stimulant against micro-organisms and that they could be used in the treatment of infectious diseases caused by micro-organisms <sup>[29]</sup>.

#### Antimicrobial study:

Venkatesan *et al.*, (2009) carried out a study on phytochemical constituents, functional group identification and antimicrobial activity of ethanolic extract of SO. The phytochemical screening of the crude extract showed the presence of alkaloids, reducing sugars, tannins, flavonoids, Phlobatannis, and steriods. The results of the study showed that the crude ethanolic extract of SO revealed antimicrobial activity against gram positive and gram negative bacteria <sup>[30]</sup>.

Moadilal *et al.*, (2015) studied on SO for its activity against the isolated pathogens from sputum samples. In the results of the study, it was observed that the ethanolic extract of SO showed highest antimicrobial activity in comparison to aqueous and diethyl ether extracts. Phytochemical analysis of the plant showed the presence alkaloids, terpenoids, flavonoids, saponins, steroids and phenols. Hence, it was concluded that SO had antimicrobial activity and could be used clinically to find novel antibacterial compounds for respiratory tract pathogens <sup>[31]</sup>.

Devaraj *et al.*, (2012) carried out on SO Linn. for antimicrobial agents against selected bacterial strains. The results of the study showed that the leaf aqueous extract of the SO was more active against all the microbes tested with variations. It was indicated that the composition of phytochemical depend on the type of solvent system employed in extraction of the drug <sup>[32]</sup>.

Karmakar *et al.*, (2010) studied the ethanolic extract of the dried fruit of SO for its possible antimicrobial activity. The ethanolic extract showed moderate antibacterial activity against both grampositive and gram-negative bacteria <sup>[33]</sup>.

Kaushik *et al.*, (2009) evaluated antimicrobial activity of ethanolic extracts of SO. On the basis of results of the study, the extract showed significant inhibitory effect against *C. albicans* at all concentrations except at 25mg/ml as compared to standard drug Amphotericin B(100 $\mu$ g/ml)<sup>[34]</sup>.

# Antibacterial study:

Kavishankar *et al.*, (2011) studied on the antibacterial activity of methanol and water extracts of SO leaves by the phytochemical screening. The methanol and water extracts of the drug were tested against *Escherichia coli, Staphylococcus aureus, Enterobacter aerogenes* and *Pseudomonas aeruginosa*. On the basis of the results obtained, it was concluded that methanol could be used for extracting antimicrobial compounds from leaves <sup>[35]</sup>.

Britto *et al.*, (2011) carried out a study on the antibacterial activity of methanol and aqueous extracts of leaves of *Solanum nigrum*. The results of the study indicated that the methanol extracts of all the plant samples showed significant activity against the two tested bacteria. The methanol extracts of *S. nigrum* showed clear zone of inhibition against the tested micro-organisms <sup>[36]</sup>.

SenthilNath *et al.*, (2013) studied on five selected Indian medicinal plants such as *Andrograpis paniculata, Cassiaalata, Cardiospermum halicacabum, nyctanthes arbortritis* and *solanumnigrum,* analysed their phytochemical constituents and tested for antibacterial

Sridhar *et al.*, (2011) carried out a study on the methanolic extracts of leaves and seeds of black and red varieties of SO for their antibacterial and antifungal activities. Preliminary results showed that dried root tissues of black nightshade extracted with 70% ethanol contained antifungal properties against *A. Brassicicola* <sup>[38]</sup>.

Venkatesan & Karrunakaran(2010) conducted a study on SO for the activity against gram negative organism of *Escherichia coli* (NCIM: 2065) and gram positive organism of *Staphylococcus aureus* (NCIM: 2079). They were compared with control drug Penicillin at different concentrations at 0.5, 1.0, 1.5, 2.0, and 2.5 mg/ml by disc diffusion method. On the basis of results of the study, SO exhibited maximum zone of inhibition of about 30.1mm and control drug penicillin showed less activity as compared to the SO plant extracts in case of *Escherichia coli* <sup>[39]</sup>.

Sridhar *et al.*, (2011) studied on six solvent extracts from leaf, seed and roots of the organic solvent extracts (ethanol, methanol, ethyl acetate, diethyl ether, chloroform and hexane) of seeds. They were exhibited strong antibacterial activity against different pathogenic bacteria compared to leaf and root solvent extracts. The results of the study showed that the ethyl acetate seed extracts of SO exhibited strong activity against *Pseudomonas, Proteous vulgaris, Klebsiella* (20.5 – 21.0mm of zone of inhibition)<sup>[40]</sup>.

#### Anti-HCV study:

Javed *et al.*, (2011) studied on methanol and chloroform extracts of SO (SN) seeds and exhibited 37% and more than 50% inhibition of HCV, respectively at non toxic concentration. The results of the study demonstrated that chloroform extract of *Solanum* extracts decreased the expression or function of HCV NS3protease in a dose-dependent manner and GAPDH remained constant. These results suggested that extract of the SO contain potential antiviral agents against HCV and combination of SN extract with interferon would be better option to treat chronic HCV <sup>[41]</sup>.

#### Anticonvulsant study:

Son and Yen (2014) investigated the preliminary phytochemical properties, acute oral toxicity and anticonvulsant activity of the berries of SO in mice. In the result of the study, Phytochemical screening of berries of SO showed that they contain carbohydrates,flavonoids, saponins, tannins, alkaloids, phenols and steroids. The study suggested that the ethanol berry extract of SO was safe and possessed anticonvulsant activity in PTZ-induced seizure in mice <sup>[42]</sup>.

#### Antifungal study:

Prakash and Jain (2011) conducted a study to evaluate the possibility for the presence of novel bio-active compounds against fungal pathogens. The preliminary phytochemical screening of the leaves revealed the presence of Alkaloids, Flavonols, Flavones, Flavanols, Saponins and Steroids. The results of the study showed presence of these bio-active compounds of SO against fungal pathogens [<sup>43</sup>].

#### Antiulcer study:

Jainu and Devi (2006) studied on the antiulcerogenic activity of the methanolic extract of SO berries on aspirin induced ulceration in rats with respect to antioxidant status in the gastric mucosa. The results of the study indicated that berries of the SO might exert its gastroprotective effect by a free radical scavenging action <sup>[44]</sup>.

#### Hepatoprotective study:

Kuppuswamy *et al.*, (2003) carried out a study on aqueous and methanolic extracts of SO for hepatoprotective activity in rats injected with 0.2 ml/kg carbon tetrachloride (CCl<sub>4</sub>) for 10 consecutive days. The results of the study showed remarkable hepatoprotective activity of the methanolic extracts of SO <sup>[45]</sup>.

#### Antioxidant study:

Jainu & Devi (2004) studied on the antioxidant activity of methanolic extract of berries of the plant SO by tissue biochemical antioxidant profile. The results of the study showed that the extract of

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berries exhibited significant (p<0.001) antioxidant activity as evident from the cardiac tissue biochemical antioxidant profile. It was showed that the methanolic extract of berries of the plant SO possessed antioxidant activity <sup>[46]</sup>.

Rawani *et al.*, (2010) evaluated the antioxidant and cytotoxic activity of ethanolic extract of the dried fruit of SO. In the qualitative antioxidant assay using DPPH (1, 1- diphenyl-2-picryl hydrazyl) the extract showed free radical scavenging properties. The results showed positive antioxidant activity of the dried fruit of SO <sup>[47]</sup>.

## Cardio protective study:

Bhatia *et al.*, (2011) evaluated the cardio protective activity against global *in vitro* ischemia reperfusion injury of methanolic extract of berries of the plant SO by using doses of 2.5 and 5.0 mg/kg for 6 days per week for 30 days. The results of the study showed that the extract exhibited significant (p<0.001) cardioprotective activity against global *in vitro* ischemia reperfusion injury. The results of the study showed cardioprotective activity of the methanolic extract of berries of the plant SO <sup>[48]</sup>.

### Analgesic study:

Kaushik *et al.*, (2009) evaluated the analgesic activity of ethanolic extracts of SO by using Eddy's hot plate and acetic acid induced writhing, respectively. The study was carried out using doses of 100, 250 & 500 mg/kg orally. The results of the study showed significant analgesic activity of the extracts of SO at the dose of 500 mg/kg (P<0.01) as compared to standard drug Diclofenac sodium (50 mg/kg) <sup>[49]</sup>.

### Antiinflammatory study:

Ravi *et al.*, (2009) carried out a study to evaluate the phytochemical and pharmacological activity of ethanolic extract of SO in experimental animal models. The results of the study showed that ethanolic extract of SO produced significant anti-inflammatory (P < 0.01) and anticonvulsant (P < 0.05) effect in dose dependent manner. Thus, it was concluded that the flavonoids present in the berries might be responsible active constituent for anti-inflammatory activity <sup>[50]</sup>.

### Anti Seizure study:

Noel *et al.*, (2008) evaluated anti seizure activity in chicks, mice and rats of aqueous extract of the leaves of *S. nigrum*. The results of the study suggested that aqueous leaf extract produced a significantly (P<0.05) dose dependent protection against electrically induced seizure in chicks and rats, pentylenetetrazole induced seizure in mice and rats and picrotoxin induced seizure in mice and rats <sup>[51]</sup>.

### Nutritional study:

Akubugwo *et al.*, (2007) studied the nutritional potential of the leaves and seeds of Solanum nigrum L. var *virginicum*. The results indicated protein content of the leaves and seed as 24.90% and 17.63% respectively. Levels of cyanide were found higher in the leaves as compared to the seeds. The results of the study suggested that despite the presence of some anti-nutritive components like oxalate, *Solanum nigrum* L. Var *virginicum* to be nutritive <sup>[52]</sup>.

### Anthelmintic study:

Elias *et al.*, (2013) conducted a study on leaves of SO for its pharmacognostical, phytochemical and anthelmintic activity. The results of the study showed that ethanol and water extracts exhibited significant anthelmintic activity as compared to the standard drug whereas petroleum ether and chloroform extracts of the SO showed less significant activity as compared with the standard drug <sup>[53]</sup>.

#### Anticancerous study:

Li *et al.*, (2008) carried out a study on the antitumor activity of aqueous extract of seeds of S0. The results of the study showed that SNL-AE could inhibit U14 cervical carcinoma growth. SNL-AEincreased the number of CD4+ T lymphocyte subsets and the ratio of CD4+/CD8+ T lymphocyte and decreased the number of CD8+ T lymphocyte subsets of tumor bearing mice and PCNA positive cells. These results of the study indicated that the acqueous extract of seeds of S0 could suppress the cervical carcinoma via modulating immune response of the tumor bearing mice and causing tumor cell cycle arrest in G0/G1 phase <sup>[4]</sup>.

#### Antiproliferative study:

Gabrani *et al.*, (2012) evaluated antiproliferative activity on leukemic cell lines for Jurkat and HL-60 (Human promyelocytic leukemia cells)of organic solvent and aqueous extracts obtained from berries of SO. The results of the study indicated increased cytotoxicity with increasing extract concentrations of berries of SO <sup>[54]</sup>.

# In vitro Antibacterial Activity:

Sridhar *et al.*,(2011) studied on six solvent extracts from leaf, seed and roots of SO for *in vitro* antibacterial activity and phytochemical Analysis. The organic solvent extracts of seeds of SO had strong antibacterial activity as compared to leaf and root solvent extracts. On the basis of the study, strong activity of the ethyl acetate seed extracts of SO were found against *Pseudomonas, Proteous vulgaris, Klebsiella* <sup>[55]</sup>.

# CONCLUSION

There is vast experience-based evidence of Unani drugs have been mentioned in Unani classical literature. The Unani drug *Makoy* or blacknight shade has been used for various ailments. Many studies found its various activities such as astringent, carminative, diuretic, anti inflammatory, anti microbial, hepatoprotective, analgesic as well as a very strong hepatoprotective activity. The Unani physicians have prescribed *Makoy* in various diseases like ascites, piles and chronic cirrhosis of the liver, gonorrhoea, rheumatic & gouty joints, inflammatory swellings & chronic cirrhosis of the liver and spleen, and various skin diseases. In present time many phytochemical and pharmacological studies have been performed on this drug. Therefore, more researches can be done to exploit the unexplored potentials of *Makoy* which have already been mentioned in Unani classical literature.

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