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# Organoleptic evaluation of the plant *Solanum nigrum* L. of the family Solanaceae

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**Abstract**
**Objective:** To evaluate the organoleptic screening of the plant *Solanum nigrum* L. of the family solanaceae.
**Methods:** The fresh whole plant of *Solanum nigrum* L. were studied by morphology, preliminary phytochemical screening, and florescence analysis of powdered drug
**Results:** The dried powder were investigated by morphology. The results of physic-chemical parameters such as loss on drying and ash values percentage of extractive values were obtained.
**Conclusion:** The present information on the pharmacognostic evaluation of the plant drug *Solanum nigrum* L. delivered the qualitative and quantitative parameters serve the important information to the identity and to determine the quality and purity of the plant material in the future. It also signify the important information of the closely related other species and varieties.

**Keywords:** *Solanum nigrum* L., Physico-chemical evaluation, Phyto-chemical screening, species

## 1. Introduction

Evaluation of drug means confirmation of its identity and determination of its quality and purity and detection of nature of adulteration. The evaluation of a crude drug is necessary because of these main reasons:

i. Biochemical variation in the drugs
ii. Detoriation due to treatment and storage, and
iii. Substitution and adulteration, a result of carelessness, ignorance or fraud.

Over the years the nature and degree of evaluation of crude drugs has undergone a systematic changes. Initially, the crude drugs were identified by comparison only with the standard description available. Due to advancement in the chemical knowledge of crude drugs, at present, evaluation also includes method of estimating active constituents present in the crude drug, in addition to its morphological and microscopic analysis. With the advent of separation techniques and instrumental analysis, it is possible to perform physical evaluation of a crude drug, which could be both of qualitative and quantitative in nature. The plant may be considered a biosynthetic laboratory not only for the chemical compound such as carbohydrate, proteins and lipids that are utilized as food by man but also for a multitude of compounds like glycosides, alkaloids, volatile oils, tannins etc. that exerts a physiologic effect. The compounds that are responsible for therapeutic effect are usually secondary metabolite. The plant material may be subjected to preliminary phyto-chemical screening for the detection of various plant constituents.

*Solanum nigrum* L. (Kaambal) (Kashmiri) has been traditionally used to treat pathological ailments like fever, ulcers, bacterial infections, fungal infections, jaundice and liver disorders (Creasy *et al.*, 1981; Capizzi *et al*., 2003; Sudhir *et al.*, 2000 and Borgia *et al*., 1981) [2].

The history of *Solanum nigrum* L. dates back to ancient China and the Mediterranean region as a highly popular laxative drug and a general tonic (Dashputre *et al.*, 2010) [5]. It is used as purgative and astringent tonic; its stimulating effect combined with apparent properties renders it especially useful in tonic dyspepsia (Chintana *et al*., 2012). Powdered roots are sprinkled over ulcer for healing. Leaf and berries are eaten either raw or boiled, sprinkled with salt and pepper. Some workers have worked out anticancerous activity of *Solanum nigrum* L. (Anindyajati *et al*., 2010) [1] but very little is known about the mechanisms involved.

## Material and Methods

### Collection and Extraction of plant material

In the present investigation the whole plant of *Solanum nigrum* L. was collected from the local surrounding at Bhopal district of (M.P) during the months of October-November, 2012. A voucher specimen was submitted in the herbarium at the P.G. Department, Unique College, Bhopal, M.P, India, where it was authenticated by Dr. Jagrati Tripathi, Professor and head department of biotechnology and a herbarium number 280 was assigned to it. The specimen was kept in the herbarium of the said department for future references.

### Systematic position of plant

| | |
|---|---|
| Kingdom | Plantae |
| Division | Angiospermae |
| Class | Dicotyledoneae |
| Order | Tubeflorae |
| Sub order | Solanales |
| Family | Solanaceae |
| Genera | *Solanum* |
| Species | *nigrum.* |

Showing *Solanum nigrum* L.

### Preparation of plant extract

The plant *Solanum nigrum* L. was collected and washed thoroughly under running tap water and then rinsed in distilled water and allowed to dry for some time. Then the plant was shade dried without any contamination for about 3 to 4 weeks. The powder was extracted according to (Rashmi *et al*., 2010). The dried plant was powdered (coarse) and subjected to Soxhlet appratus (Figure 2) using petroleum ether, ethyl acetate and chloroform respectively. Almost all the chlorophyll and lipid is deposited on the side of the flask and was removed carefully. The extraction was done with each solvent until the supernatant in the Soxhlet became transparent for 36 hours. Every time before taking the solvents of higher polarity to remove the traces of previous solvents, exhausted marc was completely dried. All the extracts were filtered, dried and weighed.

## Results

### Organoleptic Evaluation of *Solanum nigrum* L.

The plant *Solanum nigrum* L. was investigated for their colour, odour and taste (Table)

**Table 1:** Showing organoleptic evaluation of *Solanum nigrum* L. extract.

| Parameters | *Solanum nigrum* L |
|---|---|
| Colour | Green |
| Odour | pungent |
| Taste | Bitter |

**Table 2:** Showing organoleptic evaluation of *Solanum nigrum* L. extract.

| Parameters | Acidified water extract |
|---|---|
| Colour | Brown |
| Odour | Pungent |
| Consistency | Semi solid |

**Table 3:** Showing plant material and its part used.

| Plant Species | Common Name | Family | Part Used | Month of Collection | Season of Collection |
|---|---|---|---|---|---|
| *Solanum nigrum* L. | Makoi | Solanaceae | Whole plant | Oct-Nov | Autumn |

**Table 4:** Showing percentage yield of crude extract of plant materials.

| Name of Plant | Solvent system used | Weight of dry powder | Volume of solvent | Weight of extract | %age yield |
|---|---|---|---|---|---|
| *Solanum nigrum* L. | P. ether | 700 gm | 1200 ml | 24 gm | 3.42% |
| | *Ethyl acetate* | 700 gm | 1200ml | 68.63 gm | 9.80% |
| | *Chloroform* | 700 gm | 1200 ml | 70.10 gm | 10.01% |

Maximum yield was obtained with chloroform and least for petroleum ether as solvent. Yield with petroleum ether was very less hence was discarded for further *in-vitro* and *in-vivo* investigation.

### Percentage loss

The weight of fresh sample and dried powder was determined and percentage loss due to drying and loss of water was calculated.The percentage loss of water was calculated. The percentage loss of the dried plant of *Solanum nigrum* L. was found to be 75% as depicted in the (Table 8)

$$\% \text{ Loss on drying} = \frac{\text{Loss in weight of the sample}}{\text{Weight of the sample}} \times 100$$

### Determination of Total Ash Values

To determine the total ash, placed about 10 gm of ground air dried drug, accurately weight in a previously ignited and crucible of silica. Spread the material in an even layer and ignite it by gradually increasing the heat to 500-600ºC until it would be white, indicating the absence of carbon. Cool in a dessicator and weight and calculated the percentage of ash with reference to air-dried drug (Table3) (Chaturvedi *et al*., 2012).

**Table 5:** Showing ash content of the plant material.

| Name of plant | Weight of powdered material | After burning in the crucible(ash) | %age of each content |
|---|---|---|---|
| *Solanum nigrum* L. | 10 gm | 0.62 gm | (0.62×100)/10 = 6.2% |

**Solubility of Extracts**

The solubility of petroleum ether, chloroform and ethyl acetate leaf extracts of *Solanum nigrum* L. was observed in different solvents (methanol, acetone, DMSO, Water).

**Table 6:** Showing Solubility of *Solanum nigrum* L. in different solvent systems.

| S.no | Solvent system | P.ether | Ethyl acetate | chloroform |
|---|---|---|---|---|
| 1. | Methanol | Insoluble | Insoluble | Insoluble |
| 2. | Acetone | Insoluble | Soluble | Soluble |
| 3. | DMSO | Soluble | Soluble | Soluble |
| 4. | Water | Insoluble | Soluble | Insoluble |

**Discussion**

Organoleptic evaluation is a technique of qualitative evaluation based on the study of morphological and sensory profiles of whole drugs. The Organoleptic studies shows the important characteristics of the drugs, the structure of the leaves, the hairy surface of the leaves, the typical tongue sensation and the odour may screen the preliminary phytochemical constituents. The percentage of active chemical constituents in crude drugs is mentioned on air-dried basis. Therefore, the loss on drying of plant materials should be determined and the water content should also be controlled. This is especially important for materials that absorb moisture easily or deteriorate quickly in the presence of water. The test for loss on drying determines both water and volatile matter.

The residue remaining after incineration of plant material is the ash content or ash value, which simply represents inorganic salts, naturally occurring in crude drug or adhering to it or deliberately added to it, as a form of adulteration. The ash value was determined by three different methods, which measured total ash, acid-insoluble ash, and water-soluble ash. The total ash method is employed to measure the total amount of material remaining after ignition. This includes both 'physiological ash' which is derived from the plant tissue itself, and 'non-physiological ash', which is the residue of the extraneous matter adhering to the plant surface. Acid-insoluble ash is a part of total ash and measures the amount of silica present, especially as sand and siliceous earth. Water- soluble ash is the water soluble portion of the total ash. These ash values are important pharmacognostic tool to standardized the crude drugs. The extracts obtained by exhausting plant materials with specific solvents are indicative of approximate measures of their chemical constituents extracted with those solvents from a specific amount of air-dried plant material. This parameter is employed for materials for which as yet no suitable chemical or biological assay exist.

**Conclusion**

The present pharmacognostic data emphasize the knowledge of quality and identity of the plant *Solanum nigrum* L. The qualitative and quantitative parameters serve the important information of the plant *Solanum nigrum* L. The plant being a morphologically variable species, these information will also be helpful to differentiate *Solanum nigrum* L. from the closely related other species and varieties of solanaceae.

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