Research Article

Pharmacognostic study of *Rosa damascena* petals

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Abstract

Objective: The purpose of the present study was to explore the Pharmacognostic parameters for standardization of *Rosa Damascena* Petals. **Material and Methods:** The flowers of *Rosa Damascena* were authenticated and shade dried. Petals were separated and powder characteristics, behavior and fluorescence analysis, physiochemical assessment, and micrometric investigation were carried out. Dried *Rosa Damascena* Petals powder was then extracted with aqueous, alcoholic, chloroform, petroleum ether, and ethyl acetate solvents and their extractive values were calculated. The phytochemical screening of *Rosa Damascena* petals was carried on all the different extracts. **Results:** The characteristic macroscopic and microscopic features of petals include the presence of wavy epidermal cells, spirally thickened xylem vessels, lignified fibers, oil globules, prismatic, acicular clusters and conglomerate *crystals* of *calcium* oxalate and Cystoliths crystals of calcium carbonate. Powder showed characteristic fluorescent property when treated with different reagents. Physicochemical exploration showed values for moisture content, moisture sorption capacity, ash values and extractive values which are within the limits of World Health Organisation standards for the crude drug from medicinal plants. Micromeritic analysis of petal powder reveals good flowability. Aqueous and ethanolic extractive values were found to be higher when compared to that of extractive values of chloroform, petroleum ether, and ethyl acetate. Preliminary Phytochemical exploration indicated the presence of carbohydrates, glycosides, alkaloids, flavonoids, amino acids, and triterpenoids. **Conclusions:** The current research would be useful in order to supplement the information regarding pharmacognostical characteristics, physiochemical evaluation, micrometric analysis and phytochemical exploration in Ayurvedic system of medicine for its identification.

Keywords: *Rosa damascena*, physicochemical evaluation, fluorescence analysis, phytochemical screening

Introduction

Nowadays there is a renewed interest in drugs of natural origin merely because they are deliberated as green medicine and green medicine and are thought to be safe. In addition to safety, tolerability, effectiveness, expenditures especially in long-term treatment, serum drug monitoring etc. are other limitations with synthetic drugs. The advantage of drugs from natural sources is their easy availability, economic and less or no side effects but the disadvantage is that they are the victims of adulteration. The more effective the natural drug more is its demand and the chances of non-availability upsurges. To meet with the growing demand, the natural drugs are easily adulterated with low-grade material. Pharmacognostic studies ensure that the drug identity lays down standardization parameters which will help and prevents the adulterations. Such studies will help in authentication of the plants and ensures reproducible quality of herbal products which will lead to safety and efficacy of natural products (Sumitra, 2014).

Rosa damascena, known as Damask rose, a perennial bushy shrub, is the most famous ornamental plant and the holy ancient herb with novel applications belonging to the Rosaceae family. Its vernacular names include Gulab in Hindi, Gulaabi poovvu in Telugu and Mahakumari or Satapatri in Sanskrit. Chemical composition revealed the presence of Citronellol, geraniol, nerol, phenyl ethyl alcohol; nonadecane, nonadecene, eicosane, heneicosane, tricosane, a-guaiene, geranyl acetate, and eugenol have been reported (Mohaddese, 2016). The most beneficial effects of *R.*

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damascena in ancient medicine are including treatment of abdominal and chest pain, strengthening of the heart, treatment of menstrual bleeding and digestive problems, and reduction of inflammation, especially of the neck, cough remedy for children, gentle laxative as well as Rose oil heals depression, grief, nervous stress, tension, allergies, headaches, and migraine. Some of the proved pharmacological properties include anti-HIV, antibacterial, antioxidant, antitussive, hypnotic, antidiabetic, and relaxant effect on tracheal (Mohammad et al., 2011). Apart from this gel of *Rosa damascena has been proved for* UV Protective activity (Patil et al., 2011).

The objective of the present study is to evaluate various pharmacognostical parameters such as macroscopic, microscopy, physicochemical, fluorescence and phytochemical studies of the *Rosa damascena* petals.

Materials and methods

Collection and authentication of plant material

The fresh flowers of the deciduous shrub of *Rosa damascena* were collected in bulk from the local area of Warangal, Telangana, India. The flowers were authenticated by Dr. P. Veera Reddy, Professor, Government Ayurvedic College, Warangal, Telangana. The petals were separated from the sepals and shadow dried.

Macromorphological description of *Rosa damascena* petals

The *Rosa damascena* petals were subjected to macroscopic studies which comprised of organoleptic characteristics such as color, odor, taste, texture, shape, and size of the drug (Anita et al., 2016).

Microscopic characteristics of *Rosa damascena* petals

Microscopic sections of *Rosa damascena* petals were cut by freehand cross-sectioning, temporary mounts of the sections of the petals were stained with saffranine, mounted with glycerine water and observed under a microscope (Harinarayan et al., 2007).

Powder characteristics of *Rosa damascena* petals

On the clean glass slide, fine powder of *Rosa damascena* petals was stained with Phloroglucinol-HCl and Sodium hypochlorite solution mounted with glycerin water. The slide was then placed and observed under the magnifying lenses of 10x, 40x and 100x magnification of the microscope (Zhongzhen, 2010).

The behavior of *Rosa damascena* petals Powder with chemical reagents

The behavior of *Rosa damascena* petals with different chemical reagents was performed to detect the occurrence of phytoconstituents along with color changes under ordinary daylight by a standard method (Pratt and Chase, 1949).

Fluorescence analysis of *Rosa damascena* petals

The *Rosa damascena* petals powder was placed on a clean microscopic slide and 2 to 3 drops of freshly prepared reagents (acids such as 1 N HCl and 50% H2SO4; and alkaline solutions such as aqueous sodium hydroxide, alcoholic sodium hydroxide; and other solvents such as nitric acid, picric acid, acetic acid, ferric chloride, and nitric acid with ammonia) were added and mixed by gentle tilting the slide. They were then exposed to fluorescence analysis in the ultraviolet (UV)-light (254 nm and 365 nm) (Dharamveer et al., 2013; Kokashi et al., 1958)

Physico-Chemical evaluation of *Rosa damascena* petals

Physiochemical parameters such as moisture content, pH, ash constants (Saroja, 2009) and soluble extractive values (Sundar and Justin, 2016) on *Rosa damascena* petals were performed according to the official method prescribed and the WHO guidelines on quality control methods for medical plants Material (Prathapa et al., 2015).

Micromeritic evaluation of *Rosa damascena* petals

The micromeritic characteristics of *Rosa damascena* petals powder like Bulk density, Tapped Density, Angle of repose,

Table 1. Macrmorphological description *of Rosa damascena* flowers

Hausner's ratio and Carr's index was determined according to the official standard procedures to study the flowability of the drug (Martin, 1994).

Preparation of extracts of *Rosa damascena* petals

The dried powder material (100 g) of the *Rosa damascena* petals was powdered and passed through sieve no.16. These powder petals were macerated with water, ethanol, chloroform, ethyl acetate, and petroleum ether for 7 days with occasional shaking in between. The extracts were filtered through muslin cloth, then the filtrate was evaporated under reduced pressure, vacuum dried and stored. The preliminary Phytochemical screening of the different extracts was then carried out (Mohanty et al., 2011).

Preliminary phytochemical screening of *Rosa damascena* petals

The preliminary phytochemical screening was carried out on the different extracts of *Rosa damascena* petals for the detection of various phytochemicals such as Carbohydrates, Alkaloids, Glycosides, Saponins, flavonoids, proteins, amino acids, tannins, fixed oil, fats, steroids and terpenoids (Khandelwal, 2008; Mohammad et al., 2013).

Results and discussion

Macrmorphologcal description of *Rosa damascena* petals

The *Rosa damascena flowers* are light to moderate pink to light red with relatively small flowers grow in groups. The results of macromorphology were shown in table 1. The Fresh Petals, Dried, and powdered *Rosa damascena flowers* were illustrated in figure 1 whereas microscopy of the flower is shown in figure 2.

Behavior and Fluorescence analysis of *Rosa damascena* petals

Fluorescence is the significant phenomenon exhibited by many chemical constituents existing in the natural products. Some display fluorescence in the visible range in daylight. The ultraviolet light produces fluorescence in many plant materials

Figure 2. Microscopy of *Rosa damascena* petals

which do not markedly fluoresce in daylight. If the plant material is not fluorescent in nature it can show fluorescence after treated with different reagents, henceforth it can be used as an important parameter for qualitative assessment in the pharmacognostical evaluation. The results of Behavior and fluorescent analysis of *Rosa damascena* petals of powder and different extracts showed characteristic coloration in treatment with various chemical reagents.

The consistency and extractive values of different extracts of *Rosa damascena* petals

An extractive value signifies the number of constituents present in the given amount of plant material extracted with different solvents. It provides an indication of the extent of polar, medium polar and non-polar constituents present in the crude drug. In the present study water-soluble extractive value and alcohol soluble extractive values were found to be more when compared to petroleum ether, chloroform, and ether soluble extractive values, which denotes that *Rosa damascena* petals contain more quantity of polar compounds.

Physicochemical parameters of *Rosa damascena* petals

Loss drying is used to estimate the amount of volatile matter including water that is present in the plant material. Percent

Table 1. Macrmorphological description *of Rosa damascena* flowers

S. No	Characters	Observation
Organoleptic Characters		
1.	Colour	Magenta on base and light yellow near to apex
2.	Odor	Aromatic Distinct
3.	Taste	Distinct tongue sensitizing aromatic taste with pleasant mild sweetness
Quantitative Macromorphology of Fresh petals		
4.	Width	0.9-3.8cm
5.	Length	1.8-4.2cm
Extra Features		
6.	Shape	Heart/ Pear Shape
7.	Texture	Soft and smooth

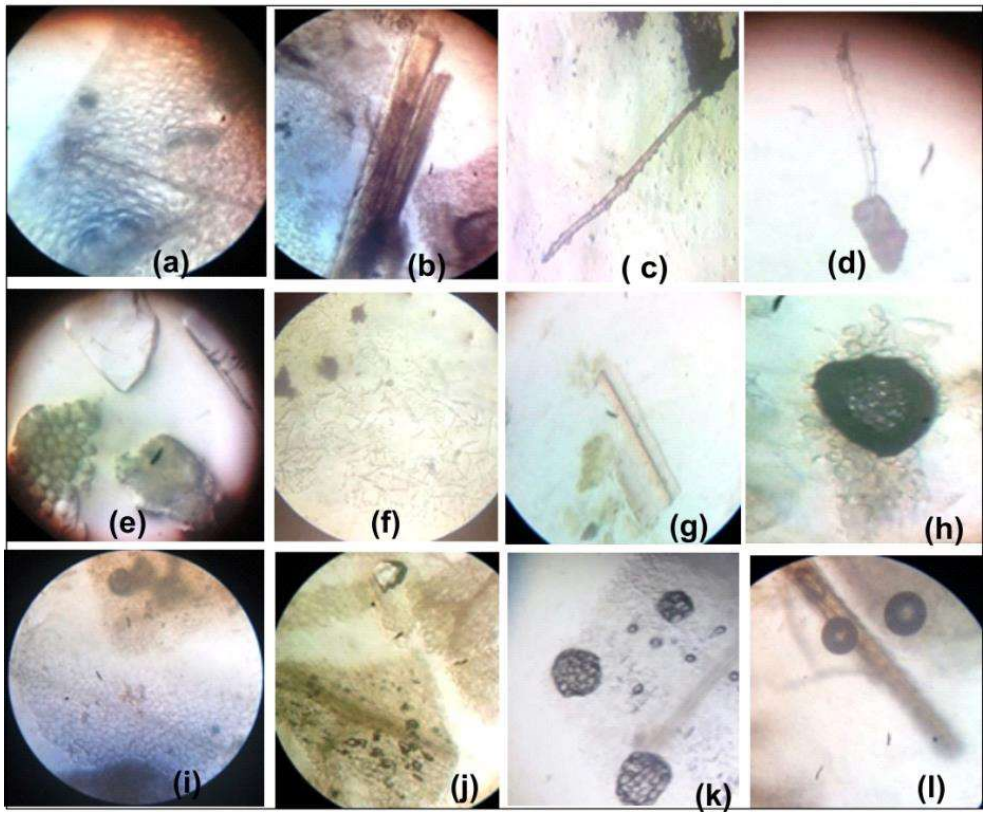

Figure 3. Powder Characteristics of *Rosa damascena* petals: (a) Spirally thickened xylem vessels, (b) Phloem fibers, (c) Lignified fibers, (d) Lignified fibers, (e) Cystoliths crystals of calcium carbonate, (f) Acicular clusters of *calcium* oxalate, (g) Conglomerate *crystals* of *calcium* oxalate, (h) Oil gland, (i) Spongy Parenchymatous cells, (j) Xylem Parenchymatous cells with crystal, (k) Pollen grains, (l) Hairy Trichome

Table 2. Behavior and Fluorescence analysis of Powder of *Rosa damascena* petals

S. No	Treatment	Day Light	UV Light (254nm)	UV Light (365nm)
1.	Powder as such	Pale violet red	Olive drab	Black
2.	Powder + Conc. HCl	Scarlet	Olive	Bister
3.	Powder + Conc.HNO_3	School bus yellow	Lawn green	Black
4.	Powder + Conc. H_2SO_4	Dark Rust	Olive drab	Dark brown
5.	Powder + Conc. NaOH	Blaze orange	Green Yellow	Black
6.	Powder + Ethanol	Pale magenta	Olive drab	Black
7.	Powder + Glacial acetic acid	Carmine	Medium Violet red	Crimson
8.	Powder +Dil. NaOH	Amber	Lawn green	Black
9.	Powder + Picric acid	Orange	Lawn green	Bister
10.	Powder +$FeCl_3$	Black	Dark Olive green	Black
11.	Powder + $NaHCO_3$	Dark olive green	Olive drab	Black
12.	Powder + 5% I_2	Burnt Orange	Olive drab	Black

Loss on drying was found to be 14.32%. The moisture content of a drug should be reduced in order to avoid decomposition of crude drugs, either due to chemical change or microbial contamination. The percentage of moisture content ranging from 10 - 20% indicates an ideal range for bacteria as well as for fungal growth. The extent of polysaccharide that is present in certain drugs is denoted by swelling index. It is one of the characteristics for identification of botanical drugs if swelling index changes it indicates that the powder has been adulterated or not properly stored. For the present drug, the swelling factor in water after 24 hours was found to be 4.9 ml. The ability of a drug to take up water is determined by

Table 3. Behavior and Fluorescence analysis of extracts of *Rosa damascena* petals

S. No	Treatment	Day Light	UV Light (254nm)	UV Light (365nm)
1.	Water	Cardinal	Dark Corel	Black
2.	Ethanol	Carmine	Bister	Black
3.	Pet Ether	Pear	Lawn Green	Olive drab
4.	Chloroform	Yellow	Bright Green	Olive
5.	Ethyl acetate	Tangerine	Green	Black

Table 4. The consistency and extractive values of different extracts of *Rosa damascena* petals

S. No.	Treatment	Consistency	Extractive values (%)
1.	Water	Sticky	13.16
2.	Ethanol	Sticky	17.24
3.	Pet Ether	Sticky	4.68
4.	Chloroform	Sticky	2.12
5.	Ethyl acetate	Powder	6.96

Table 5. Physicochemical parameters of *Rosa damascena* petals

S. No	Constants	Yield (N=3)
1.	Foreign matter	0
2.	Moisture content(Loss on drying) %	14.32 %
3.	pH	6.56
4.	Swelling Index ml	4.9
5.	Moisture Sorption Capacity /g	0.72
6.	Total ash (% w/w)	6.34
7.	Acid insoluble ash (% w/w)	1.51
8.	Water soluble ash (% w/w)	2.48

moisture sorption capacity. Greater the moisture sorption capacity higher will be chances for bacterial or fungal contamination. In the present study moisture sorption capacity of *Rosa damascena* petals were found to be 0.72/gm in 24 hours. After three days of keeping the sample in the desiccator fungal growth was observed due to excess moistness.

Ash value is a benchmark to judge the identity or purity of crude drugs. The total ash residue remaining after incineration which usually represents the inorganic salts naturally occurring in the plant material and adhering to it, but it may also include inorganic matter added for the purpose of adulteration. Ash value is a useful tool for detecting low-grade products or exhausted products or excess of sandy or any earthy substance with the drug. Acid-insoluble ash denotes the presence of only earthy matter i.e., sand or silica in the drug whereas Water soluble ash detects the drug exhausted with water, if admixed with the exhausted material will show a much greater reduction in water-soluble ash than total ash. So, it's an important indicator when exhausted material is substituted for the genuine drug. In the present study Total ash, Acid insoluble ash and Water-soluble ash were found to be 6.34, 1.51 and 2.48 % w/w respectively.

Micrometric parameters of *Rosa damascena* petals

Bulk density, Tapped Density, Angle of repose, Hausner's ratio and Carr's index were determined as a part of the micrometric analysis. The Carr's compressibility index and Hausner's ratio gives the insight value of the difference in the bulk and tapped densities. While the Carr's index shows strength and the ability of a drug to reduce in volume, the Hausner's ratio reveals inter particulate friction in between particles. As the values, these indices decrease the flow property of the powdered drug increases. The angle of repose is a traditional characterization method for determining the flow property of powder. The result showed that the powder has good flowability as the angle of repose of powder was found to be 31.21^0.

Preliminary phytochemical screening of different extracts of *Rosa damascena* petals

Phytochemical screening of *Rosa damascena* petals showed that maximum phytoconstituents are present in ethanolic and aqueous extract extracts.

Table 6. Micrometric parameters of *Rosa damascena* petals

S. No	Constants	Yield
1.	Bulk density	0.202 g/ml
2.	Tapped Density	0.259 g/ml
3.	Angle of repose	31.21^0
4.	Hausner's ratio	0.779
5.	Carr's index	22.22 %

Table 7. Preliminary phytochemical screening of different extracts of *Rosa damascena* petals

S. No	Plant constituent	Aqueous Extract	Alcohol	Pet Ether	Chloroform	Ethyl acetate
1.	Alkaloids	Positive	Positive	Negative	Negative	Positive
2.	Glycosides	Positive	Positive	Negative	Positive	Positive
3.	Carbohydrates	Positive	Positive	Negative	Negative	Negative
4.	Flavonoids	Positive	Positive	Negative	Positive	Positive
5.	Tannins	Positive	Positive	Negative	Negative	Positive
6.	Proteins	Positive	Positive	Negative	Negative	Positive
7.	Amino acids	Positive	Positive	Negative	Negative	Positive
8.	Fixed oils	Negative	Negative	Positive	Positive	Negative
9.	Sterols	Positive	Positive	Positive	Positive	Positive
10.	Starch	Positive	Negative	Negative	Negative	Negative
11.	Cardiac glycosides	Positive	Positive	Negative	Negative	Positive

Conclusion

In conclusion, the pharmacognostical data on the *Rosa damascena* petals can assist as a relevant source of information and contribute towards the standards for its identification and authentication.

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