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PHYTOCHEMISTRY AND MEDICINAL PROPERTIES OF *MANDRAGORA OFFICINARUM*: A REVIEW

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ABSTRACT: *Mandragora officinarum* (MO) is thought to be one of the magical herbs since the classical period. The plant belongs to the Solanaceae family and popular in Greeks, the Romans, the Arabs and Hebrews. Earlier, it was believed that the plant has evil power. Different ethnic groups worked closely to establish its profound benefits in the traditional medical field. After thorough research on this plant, it was found that the plant has several medicinal properties and has a powerful intoxicating nature. Even, it is familiar for its narcotic and anesthetic characteristics. Not only that the plant can be used in hallucination, but mania, delirium and can also relieve certain joint pains and acts as a healing agent. It's diversified phytochemistry consisting of alkaloids, nonalkaloids and some sugars. The current article demonstrates its several pharmacological benefits such as narcosis, anesthetic, aphrodisiac, natural healer and hallucinating quality along with its different phytochemical constituents like atropine, hyoscyamine, cuscohygrine, scopolamine, belladonnine, some sugars.

Keywords: *Mandragora officinarum*, Phytoconstituents, Aphrodisiac, Surgical anesthetic

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INTRODUCTION: *Mandragora officinarum* (MO) is one of the more mysterious and less explored plants from ancient period¹. Locally the plant is well known as mandrake². Basically, the word Mandragora has been derived from the Greek word known as "hurtful to cattle". In Arabic it is called "Satan's apple". There are many species available for the Mandragora genus, i.e. *M. acaulis*, *M. autumnalis*, *M. caulescens*, *M. officinarum*, *M. turcomanica*, and *M. vernalis*³.

However, among all six species, only two (*M. officinarum* and *M. turcomanica*) were explored extensively in terms of their chemical constituents. Another two like (*M. vernalis* and *M. autumnalis*) were just evaluated superficially not in-depth. The rest two were remained totally untouched. Thus, the researcher might focus intensively to identify many of the pharmacological benefits of the Mandragora species. Some of the general properties of this include hallucinogenic, healing, fertility enhancer. The plant has intoxicating nature as well as known to have aphrodisiac properties. It can be also utilized for having its narcotic characteristics⁴. Furthermore, it is well known as a surgical anesthetic.

The present study summarizes the history, phytochemical constituents, toxicological effect

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and pharmacological benefit of *Mandragora officinarum* with its enormous medical blessings/advancement around the globe.

History: Mandrake is a medium-sized plant with approximately 90 genera and 3000-4000 species⁵. It is a variable perennial herbal plant with an extended thick root, usually branched. It has almost no stem, and therefore the elliptical or simple leaves that modify long are borne during a basal rosette. The flowers seem from season to spring. They are light-green white to blue or violet. In diameter, these are near about two inches. The fruit forms in late season to early summer. The berry is yellow or orange and resembles a tomato. The mandrake is toxic, particularly the roots and leaves which can be because of tropane alkaloids⁶. The

young plants had a thick tapering root-like as parsnip which may go down in the ground for a distance of two or more. Whenever it gets mature, the shape of the roots turns into more bulbous.

Distribution: The plant has for hundreds of years been native to several of the Mediterranean countries, including Spain, Crete, Sicily, Asian country and North Africa, although apparently to not Egypt⁷. Mandrakes were found within the spot of King Tut-ankh-amen, and should consequently are foreign into the country, a little question from Asian country within the fifth century B.C. it absolutely was mentioned by Hippocrates, and at the start of the epoch, it absolutely was enclosed by dioscorides in his list of toxic herbs.



FIG. 1: A. PLANT B. ROOT C. JUICE

Taxonomical Class:

Binomial Name: *Mandragora officinarum* L.

Scientific Class:

Kingdom	:	Plantae
Subkingdom	:	Viridiplantae
Infrakingdom	:	Streptophyta
Superdivision	:	Embryophyta
Division	:	Tracheophyta
Subdivision	:	Spermatophytina
Class	:	Magnoliopsida
Superorder	:	Asteranae
Order	:	Solanales
Family	:	Solanaceae
Genus	:	<i>Mandragora</i> L.
Species	:	<i>Mandragora officinarum</i> L

Synonyms: *Atropa acaulis* Stokes, *Atropa humilis* Salisb. *Atropa mandragora* L., nom. illeg.,

Mandragora acaulis Gaertn., *Mandragora autumnalis* Bertol., *Mandragora foemina* Garsault, *Mandragora haussknechtii* Heldr., *Mandragora hispanica* Vierh., *Mandragora mas* Garsault, *Mandragora microcarpa* Bertol., *Mandragora neglecta* G. Don ex Loudon, *Mandragora praecox* Sweet, *Mandragora vernalis* Bertol.

Vernacular names: Soudi-Arab: Master of the life breath, Love Apple, Mad Apple; Sweden: Alrune; Egypt: Apemum; Rome: Ciceron; Russia: Trava

Phytochemical Composition: Although, Mandrake plant has profound medicinal benefits and the root of the plants is extensively utilized as traditional ailments; however its phytochemistry is still unexplored. Scientists are not confident to work on any particular compound that is responsible to show the pharmacological effects⁸. Even from time to time *Mandragora officinarum* was analyzed but there is some controversy always.

Afterward, scientists began to explore two species of Mandrake *i.e.* *M. autumnalis* and *M. officinarum* L. to distinguish the constituents. Primarily, the roots and rhizomes are the basic interest of analysis⁹. From the analysis, it is evident that mostly alkaloid compounds like hyoscyamine, cuscohygine, apoatropine and 3a-tigloyloxytropene are present in both species. In root belladonine was also detected and reported. Some non-alkaloids are also identified such as sitosterol and beta-methylesculetin and have reported the presence of four free sugars, namely rhamnose, glucose, fructose and sucrose¹⁰. Even though this work did

not demonstrate any distinctions in the constituents between two Mandragora species roots, it yielded data of significant enthusiasm for the more extensive chemotaxonomic field inside the family Solanaceae. Among these genera, it is just a single other, in particular, scopolia, in which the presence of both tropic and tiglic corrosive esters has been accounted. Moreover, Daturae and Salpiglossideae, are incorporated several other genera in which both types of esters found. Below table enlisted some of the important chemical constituents that exert basically the medicinal benefits:

TABLE 1: DIFFERENT CHEMICAL CONSTITUENTS OF *MANDRAGORA OFFICINARUM*

S. no.	Name of the Constituents	Chemical Structure	S. no.	Name of the Constituents	Chemical Structure
Alkaloids					
01	Hyoscyamine		02	Beta-methylesculetin	
02	Cuscohygine		Sugars		
03	Apoatropine		01	Rhamnose	
04	3a-tigloyloxytropene		02	Glucose	
05	Belladonine		03	Fructose	
Non-Alkaloids					
01	Sitosterol		04	Sucrose	

Pharmacological Properties: From ancient times, the medicinal quality of the Mandrake plant has drawn the attention of many researchers to treat many of the symptoms even in a remote place. However, this sector was thought to be untouched and suspicious, thus little work has been conducted¹¹. Although the amount of research performed to demonstrate its medicinal properties, still some of the worthy evidence has been established showing the blessing of different parts of the mandrake plant. Mandrake is well known to exert its narcotic properties throughout its usage period since ancient Greece and Rome period. Additionally, it has intoxicating properties¹². However, it is not shown to engage as a purgative or an emetic at all. Actually, the narcotic properties of the plant are rendered through its fruit which can be considered to have a love-charm. Even its narcotic constituents were such that when consuming excessively, it may lead to some of the adverse effects like nausea, rigor and general malaise. Alternatively, its root has vigorous potency to exhibit narcosis¹³.

Another important property of the plant is that it can be considered as a potent stimulant for venery by barren women. The root of the mandrake was

found to enhance fertility in women and placed on the body or in clothing as a talisman. The plant can be used to facilitate pregnancy in sterile women and there is thinking likewise it may balance hormone constituency of the blood. The mandrake plant is also familiar and known for its magic, aphrodisiac properties and its fruit is called love apples¹⁴. Moreover, the crushed root of the mandrake plant was possessed hallucinations which may cause death-like trance and sleep. The root may also cause insanity as well as can be used in flying potion.

Another worthy blessing of mandrake is that it can be employed as a surgical anesthetic. Over many years this anesthetic and soporific properties of a mandrake have been discussed. Some of the other medicinal properties of the mandrake were noted and found that little amount of mandrake infusion can potentially change the numbness of the tongue, dryness of mouth, confusion vision, restlessness and exaggerated sensitivity to sounds. Considering these findings, it was claimed that if alkaloid constituents can be isolated from the plant it can be potentially used as an anesthetic and thus can be superseded atropine as a mydriatic¹⁵.

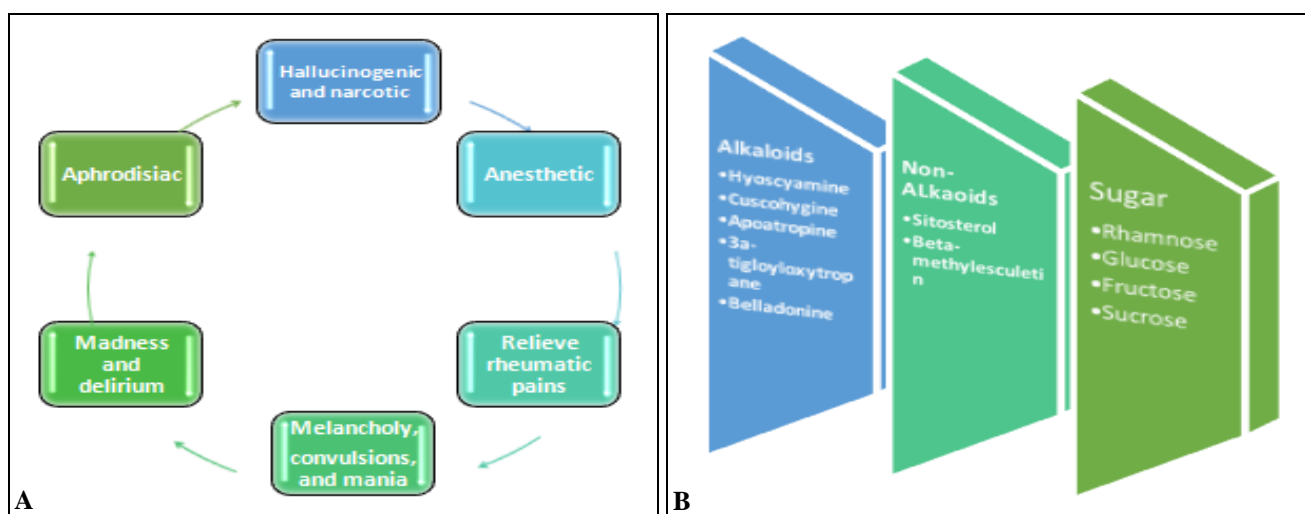


FIG. 2: A. MEDICINAL PROPERTIES B. PHYTOCHEMICAL COMPOSITION

Toxicological Evaluation: *Mandragora officinarum* is very poisonous. Its toxicity is extreme in cases of plant ingestion. Some of the toxicological side effects include vomiting, diarrhea, slowing of heartbeat and death. *Mandragora* species contains extremely biologically active alkaloids, tropane alkaloids particularly. Approximately eighty substances are identified among which 37 are explored.

Alkaloids are found within the contemporary plant or the dried root enclosed antispasmodic, poisonous substance, hyoscyamine (hyoscyamine), scopolamine, cuscohygrine, apoatropine, 3- α -tigloyloxytropane, 3- α , 6- β -ditigloyloxytropane and belladonnines. Non-alkaloid constituents included sitosterol and beta-methylesculetin (scopoletin)^{10, 16}. The alkaloids create the plant, particularly the foundation and leaves, poisonous, via

anticholinergic, psychoactive, and hypnotic effects. Anticholinergic properties will result in asphyxiation. Ingesting root is probably going to own different adverse effects like innate reflex and diarrhea. The organic compound concentration varies between plant samples, and accidental poisoning is probably going to occur. Clinical reports of the results of consumption of herb (as asterid dicot genus autumnalis) embrace severe symptoms like those of antispasmodic poisoning, together with blurred vision, dilation of the pupils (mydriasis), waterlessness of the mouth, issue in urinating, dizziness, headache, vomiting, blushful and a fast pulse (tachycardia). upset and hallucinations conjointly occurred within the majority of patients.

CONCLUSION: The present article revealed numerous medicinal properties of *Mandragora officinarum* that could help in several medical ailments. In addition to that, the focus of the study is to enlist several chemical constituents which actually exerts diversified pharmacological effects on different diseases. Although different compounds have been isolated from the Mandrake plant, it is difficult to confirm the medicinal properties according to their constituents. However, it seems like the alkaloid compounds can exhibit many of the pharmacological effects. Hence, scientists have still open fields to explore the blessing of the plants more extensively.

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