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A Review on “Hetero Alkaloids as An Important Therapeutic Compound from Plants”



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ABSTRACT

Alkaloids are classified as a category of molecules extract from nature around. It contains very complex chemicals. Alkaloids have very important biological activity such as anticholinergic, antitumor, diuretic, antiviral, antihypertensive, antiulcer, analgesic, and anti-inflammatory biological activity. Basically, all alkaloids are soluble in water and dilute alcohols but some alkaloids are not soluble in organic solvents except in rare cases. Alkaloids are extracted from plants and Plants had a basis for the traditional medicine systems for thousands of years. Therapeutic applications of plants are very known to each other. Alkaloids are important secondary metabolites. Alkaloids are classified as per hetero atoms (heterocyclic chemistry) such as piperidine, tropane, purine, pyrrolizidine, imidazole, quinolines, isoquinoline, and pyrrolidine alkaloid. Several studies on alkaloids have been done in evaluation from various plants for their wide range of pharmaceutical activities. . In this review; the researcher gets information about the classification of alkaloids and an overview of alkaloid drugs that are derived from the various plants and potential against various diseases.



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INTRODUCTION:

Natural products of alkaloids and their derivatives have been recognized for many years as a source of potential therapeutic agents. Primary advantages of using plant-derived medicines having major effect as compared to synthetic product¹. They give health benefits. The Alkaloids have the largest group of primary and secondary metabolites present in the living organism. Some alkaloids contain hetero atoms in the structure. Alkaloids contain a hetero atom such as Nitrogen, sulfur and oxygen etc². Some alkaloids have various structure types, properties and pharmacological activities such as anticholinergic, antitumor, diuretic, antiviral, antihypertensive, antiulcer, analgesic, and anti-inflammatory biological activity³. Most alkaloids contain nitrogen and sulphur, oxygen and phosphorus in addition to carbon, hydrogen. Some Alkaloids are prepared by synthetic procedure and they are having similar structures. In addition to carbon, hydrogen and nitrogen, alkaloid molecules may contain sulfur and rarely chlorine, bromine, or phosphorus⁴. Alkaloids are formed or prepared by a wide range of species, including bacteria, fungi, plants, and animals. The example of plant alkaloids, such as narcotic analgesics, morphine, and codeine, Apomorphine (it's a morphine derivative) used in Parkinson's disease, muscle relaxant papaverine, and sanguinarine and berberine antimicrobial agents. In market there are several Alkaloidal drug are available for the treatment of cancer⁵⁻⁶.

HISTORY

Plant containing alkaloids have been used for medicinal and recreational purposes by humans since ancient times. Medicinal plants were known at least around 2000 BC. Some plants gives toxicity-like side effect to the brain. Alkaloid studies started in the 19th century. The modern name "morphine" was given by the French physicist Joseph Louis Gay-Lussac⁷. In 1820 and in 1818; the French researchers Pierre Joseph Pelletier and Joseph Bienaime Caventou, was discovered quinine and strychnine respectively⁸. They made a significant contribution to the chemistry of alkaloids in the early years of their growth. The German scientist Albert Ladenburg performed the first complete synthesis of an alkaloid with the help of acetaldehyde to 2-methylpyridine⁹⁻¹⁰. The German scientist Albert Ladenburg performed another experiment like with the help of 2-propenyl pyridine; he developed coniine¹¹.

CLASSIFICATION OF ALKALOIDS:

Alkaloids are classified into 3 class's like¹²⁻¹⁵;

True alkaloid: It contains a heterocyclic structure with different heteroatoms like nitrogen examples; Atropine, Nicotine, Morphine.

Proto alkaloid: It contains no heterocyclic ring with Nitrogen and is derived from amino acids examples; Ephedrine, Mescaline, Adrenaline.

Pseudo alkaloid: It contains heterocyclic ring with Nitrogen but not derived from amino acids examples; Caffeine, Theobromine, Theophylline.

Alkaloids are classified with help of chemical structures like heterocyclic chemistry.


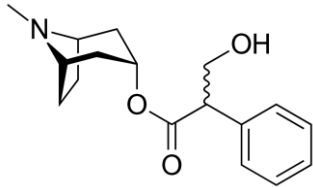

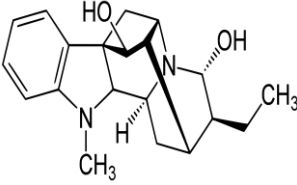

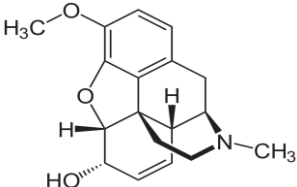

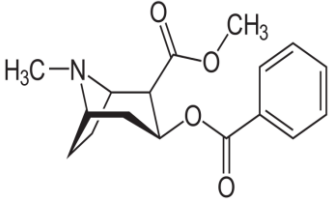

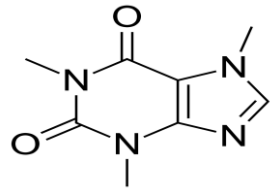
Table 1: Chemical classification of alkaloids


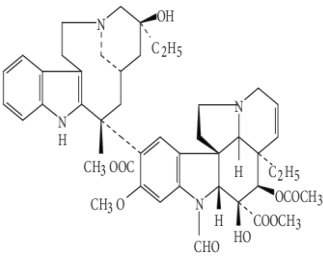

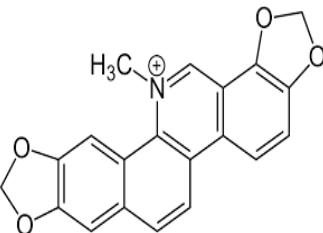

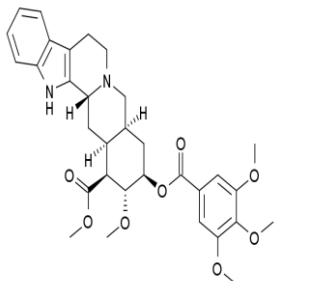

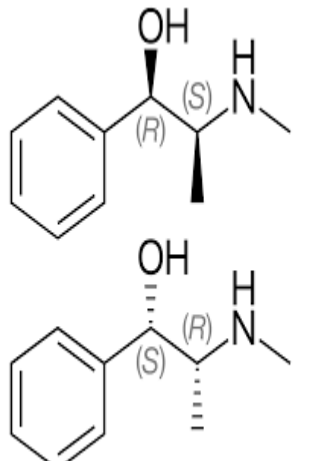
Sr.No.	Heterocyclic Alkaloids	Sr.No.	Non-heterocyclic Alkaloids
1	Pyrrole	1	N-Methyltramine
2	Pyrrolidine	2	Ephedrine
3	Pyridine	3	Pachysandrine
4	Tropane	4	Mescaline
5	Quinine–Quinoline	5	Erythromycin
6	Isoquinoline	6	Colchicine
7	Aporphine	7	Jurubin
8	Purine	8	Taxol
9	Indole		


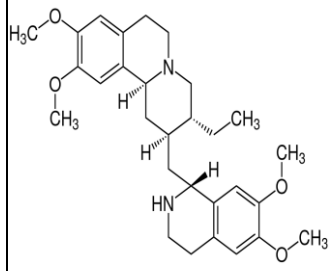

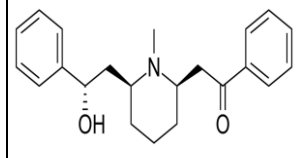

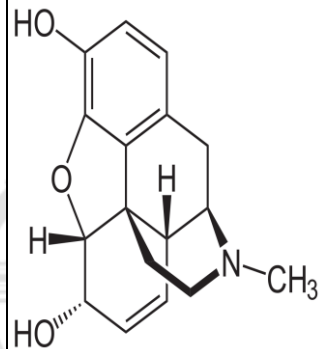

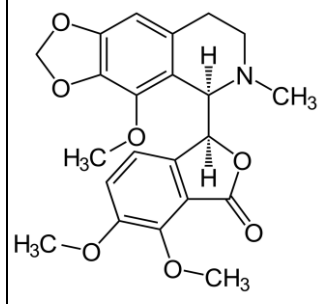
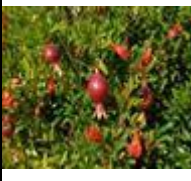
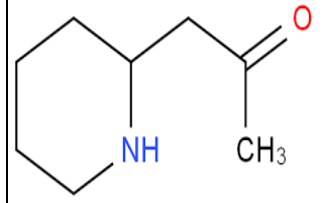
ALKALOID DRUGS FROM PLANT SOURCE:


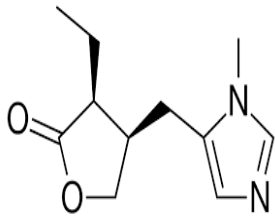

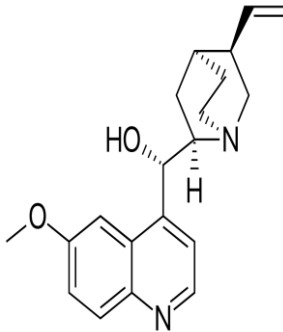
There are many heterocyclic compounds in plant source¹⁶⁻¹⁸. They are given in the following table;

Table 2: Heterocyclic alkaloid drugs from plants source

Sr.no.	Alkaloid drug	Biological name	Plant picture	Chemical structure	Biological Activity
1.	Atropine	<i>Atropa belladonna</i>			Antidote for nerve gas poisoning
2.	Ajmaline <i>Rauwolfia serpentine</i>	<i>Rauwolfia serpentine</i>			Antiarrhythmic
3.	Codeine	<i>Papaver somniferum</i>			Analgesic
4.	Cocaine	<i>Erythroxylum coca</i>			Localanesthetic
5.	Caffeine	<i>Coffea arabica</i>			Central nervesystemstimulant

6.	Vincristine	<i>Vinca rosea</i>			Anticancer
7.	Sanguinarine	<i>Sanguinaria canadensis</i>			Antibacterial activity.
8.	Deserpidine	<i>Rauwolfia canescens</i>			Antihypertensive agent
9.	Ephedrine	<i>Ephedra sinica</i>			Antihistaminic

10.	Ementine	<i>Carapichea ipecacuanha</i>			Antiprotozoal
11.	Lobeline	<i>Lobelia inflata</i>			Expectorants
12.	Morphine	<i>Papaver somniferum</i>			Pain relief and diarrhea
13.	Noscapine	<i>Papaver somniferum</i>			Antitussive drug
14.	Pelletierine	<i>Punica granatum</i>			Anthelmintics drug

15.	Pilocarpine	<i>Pilocarpus pennatifolius</i>			Mycotic agents
16.	Quinidine	<i>Cinchona officinalis</i>			Antiarrhythmic agents

CONCLUSION:

Alkaloids are the important classes of secondary metabolites. The present drug analysis concluded that with the help of examples was explained the past and biological source of alkaloids, the actual chemical distribution of alkaloids, and different classes of alkaloids. Alkaloids are derived from different plants. There are many different classes of alkaloid like indole alkaloids, tropane alkaloids, quionoline alkaloids, pyrrole alkaloids and piperidine alkaloids etc. These alkaloids show several different pharmacological behaviors such as anticancer, carcinogenic, anti-microbial, and cytotoxic activities. Some alkaloids give serious side effects like asphyxia, paralysis, or in some extreme conditions patient death also.

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