



Distribution and biological activity of alkaloids in some Indigenous plants.

Author: - Ms. Jyoti S.Dudhane*, Mrs. A S.Babar , Dr. Santosh A. Payghan.

Pharmacognocny Department

Vasantidevi Patil Institute of Pharmacy, Kodoli Tal- Panhala, Dist – Kolhapur (MH)

Abstract:

Plants have always been a basis for the normal medicine systems and that they have provided continuous remedies to the mankind for thousands of years. Therapeutic application of plants having anti-tumor, anti-viral, anti-inflammatory, anti-malarial activities. Knowledge of the plants for the preparation of different drugs has been of great significance. Plants are considered as a rich source of wide variety of ingredients which can be used for the event of drug. Alkaloids are the important secondary metabolites that are contain therapeutic properties. On the aim of their biosynthetic precursor and heterocycle system, the compounds areclassified into different categories which include indole, piperidine, tropane, purine, pyrrolizidine, imidazole, quinolozidine, isoquinoline and pyrrolidine alkaloids. Alkaloids are able to prohibit the onset of various degenerative diseases by radical scavenging or binding with the oxidative reaction catalyst. Several studies are wiped out evaluation of alkaloids from various plants for its wide selection of pharmaceutical activities. This review provides an summary of alkaloid drugs that are derived from the numerous plants and potential against various diseases.

Keywords: alkaloid drugs, distribution and biological activity, plant alkaloids, therapeutic compounds

Introduction:

Alkaloids are a category of basic, present organic compounds that contain a minimum of one nitrogen atom. This group also having several connected compounds with neutral and even weakly acidic properties. Some synthetic compounds of comparable structure also be termed alkaloids. including to carbon, hydrogen and nitrogen, alkaloids can also carry oxygen, sulfur and, more rarely, other elements like chlorine, bromine, and phosphorus. Alkaloids are produced by an outsized sort of organisms including bacteria, fungi, plants, and animals. They are often purified from crude extracts of those organisms by acid-base extraction, or solvent extractions followed by silica-gel chromatography. Alkaloids have a superior range of pharmacological activities of antimalarial (e.g. quinine), antiasthma (e.g. ephedrine), anticancer (e.g. homoharringtonine), cholinomimetic (e.g. galantamine), vasodilatory (e.g. vincamine), antiarrhythmic (e.g. quinidine), analgesic (e.g. morphine), antibacterial (e.g. chelerythrine), and antihyperglycemic activities (e.g. piperine).

There many have found use in traditional or modern medicine, or as starting points for drug discovery. Other alkaloids possess psychotropic (e.g. psilocin) and stimulant activities (e.g. cocaine, caffeine, nicotine, theobromine), and are to take advantage in entheogenic rituals or as recreational drugs. Alkaloids are often toxic too (e.g. atropine, tubocurarine). Although alkaloids act on an assortment of metabolic systems in humans and other animals, they almost uniformly evoke a bitter taste.

Generally, alkaloids are excessively toxic though they have a marked therapeutic effect in small quantities. They ensure plant survival against micro-organisms insects and herbivores, and also against other plants by means of allelopathically active chemicals. That is why they are used for medicinal purpose. They are optically active substances, bitter in taste, colorless, crystalline or liquid at room temperature. The alkaloid quinine for instance is one among the bitterest tasting substances known and is already significantly bitter at a molarity of 1×10^{-5} Pure, Segregatede plant alkaloids and their synthetic derivates are used as basic medicinal agents all over the world for their analgesic, spasmolytic, and bactericidal effects. In humans, most of the alkaloids affects the

nervous system, specially action of chemical transmitters like acetylcholine, epinephrine, norepinephrine, gama aminobutyric acid, dopamine and serotonin . Some alkaloids are used as an antiseptics thanks to its antibiotic activity e.g. berberine used in ophthalmics and sanguinarine used in toothpastes . On the basis of their biogenesis precursor and heterocycle system, the compounds have been classified into various categories which include indole, piperidine, tropane, purine, pyrrolizidine, imidazole, quinolizidine, isoquinoline and pyrrolidine alkaloids.

Many researchers have planned completely different classification for alkaloids. one in all favored categorifications that divide whole class of compounds into 3 classes.

- True-alkaloids: are the compounds that derive from amino acid that is not neighborhood of the heterocycle with gas e.g. atropine, nicotine, etc.
- Proto-alkaloids: ar the compounds that contain gas atom derived from AN aminoalkanoic acid that is not a part of the heterocycle e.g. adrenaline, ephedrine, etc.
- Pseudo-alkaloids: compounds, that don't originate from amino acids e.g. caffeine, theobromine, etc.
- Polyamine alkaloids : derivatives of ptomaine, • spermidine, and spermine.
- Amide and cyclopeptide alkaloids.

Properties:

Most alkaloids contain atomic number 8 in their molecular structure; those compounds ar typically colorless crystals at close conditions. Oxygen-free alkaloids, like alkaloid or coniine, ar usually volatile, colorless, oily liquids. Some alkaloids ar coloured, like berberine (yellow) and sanguinarine (orange).

Most alkaloids ar weak bases, but some, like theobromine and Slo-Bid, ar amphiprotic. several alkaloids dissolve poorly in water however without delay dissolve in organic solvents, like ether , chloroform or one, a pair of -dichloroethane. Caffeine, cocaine, analgesic and alkaloid ar slightly soluble in water (with a solubility of ≥ 1 g/L), whereas others, also as analgesic and yohimbine ar terribly slightly soluble (0.1–1 g/L). Alkaloids and acids type salts of varied strengths. These salts ar typically freely soluble in water and fermentation alcohol and poorly soluble in most organic solvents. Exceptions embody hyoscyne hydrobromide, that is soluble in organic solvents, and so the soluble antimalarial salt.

Distribution in nature :

Alkaloids ar generated by numerous living organisms, particularly by higher plants – concerning ten to twenty fifth of these contain alkaloids. Therefore, among the past the term "alkaloid" was related to plants. The alkaloids content in plants is sometimes among many of of % and is heterogenous over the plant tissues. Looking forward to the sort of plants, the utmost concentration is determined among the leaves (black henbane), fruits or seeds (Strychnine tree), root (Rauvolfia serpentina) or bark (cinchona). Furthermore, {different totally completely different completely different} tissues of an equivalent plants might contain different alkaloids.

Beside plants, alkaloids ar found in sure varieties of fungi, like psilocin among the plant of the genus Psilocybe, and in animals, like bufotenin among the skin of some toads and kind of insects, markedly ants. several marine organisms conjointly contain alkaloids. Some amines, like neurotransmitter and 5-hydroxytryptamine, that play a crucial role in higher animals, ar virtually like alkaloids in their structure and biogenesis and ar generally known as alkaloid.

Extraction and estimation of alkaloids :


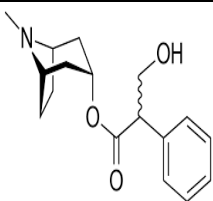

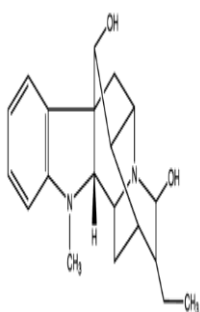

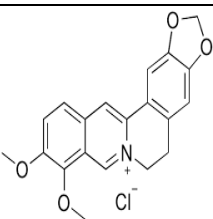

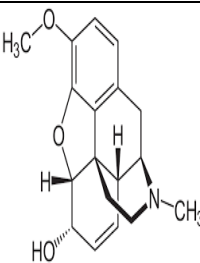

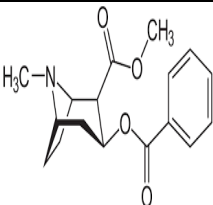

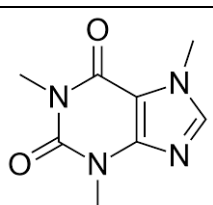

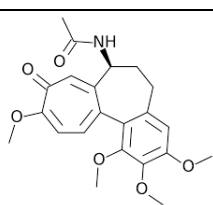
Due to the high worth of alkaloids, worldwide researches have tried to hunt out new and technique ways for extraction and estimation of these compounds. Extraction of alkaloids started with the action . it had been the higher manner for extraction of alkaloids. This technique was speedy and cheaper. additional skinny layer action was used . it had been a consistent technique and has low detection limit as compare to the action . Shanghai dialect and Wittick according the earliest technique for isolation of organic compound by HPLC. Brochmann-Hanssen and Svendsen (1962) 1st report the booming estimation of alkaloids by Gas action. alternative vital ways used for organic compound extraction ar ultrasound power-assisted technique, microwave power-assisted technique, critical CO₂ extraction technique and so the mixture of ultrasound and surfactants for the extraction of alkaloids . the foremost natural process techniques utilized for the alkaloids estimation ar laptop, TLC, HPLC and GHZ.


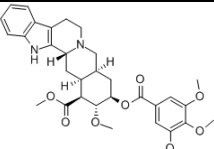

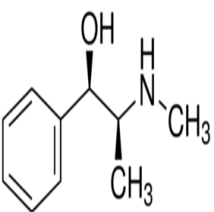

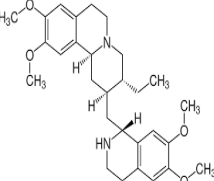

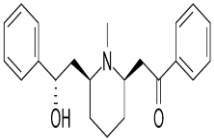

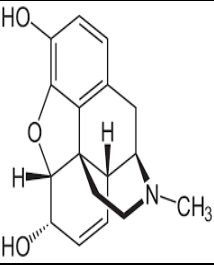

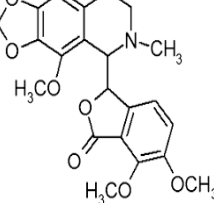

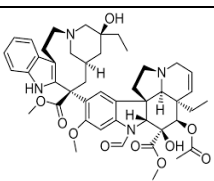

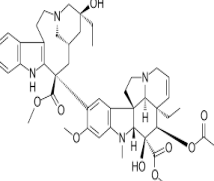
Alkaloid medicine from plants source:

In plants organic compound are not manufacture in batch in traditional circumstances. AN alternate for the big production of alkaloids has been utilized as in-vitro

cell tissue or organ culture. Tissue culture provides endless , reliable and renewable supply for larger production of alkaloids. There ar many numbers of things which can have an effect on production of plant alkaloids. For optimisation of culture condition for the utmost production changes in physical aspects and biological process parts were done. One study according that the result of salicylic acid (elicitor) enhance the assembly of Stemona alkaloids in Stemona sp. Another study according that the assembly of organic compound in belladonna increased by the employment of organic phenomenon stress that is genus Aspergillus niger extract (0.5 mg/ml) in conjunction with MS medium containing 1ml/l of NAA and BA. it had been conjointly according that the reverse tobacco liquid medium supplemented with amino acid (12.5 ml/100 ml) provides most organic compound production in field poppy Linn. plant . Rajkumar et al., 2010 according the assembly of nitidine from callus culture of Tadda lia asiatica. They incubated leaves in MS media in conjunction with completely different combination of growth hormones and so absolutely the best yield obtained at MS containing NAA (2 mg/l) and Kinetin (1 mg/l) (Table 1).

Table 1. organic compound medicine from plants supply and their activity [10–12, 21, 24–27].

Sr . no	Alkaloid medicine	plant	Plant picture	Structure	Activity	Product
1.	Atropine	Atropa belladonna			Antidote to nerve gas poisoning	Abdominal Espasmo protector.
2.	Ajmaline	Rauwolfia serpentine			Antiarrhythmic	Aritmina, Gilurytmal
3.	Berberine	Berberis vulgaris			Bacillary dysentery	Kollyr, Murine, Sedacollyre
4.	Codeine	Papaver somniferum			Analgesic (Painkiller)	Antituss, Codicaps, Tussipax
5.	Cocain	Erythroxylm m coca			Local anesthetic	Used in highly regulated clinical environments
6.	Caffeine	Coffea arabica			Central nerve System stimulant	Agevis, Thomapyrin e, Vomex A
7.	Colchicine	Colchicum autumnale			Gout remedy	ColBenemid , Colgout, Verban

8.	Deserpidine	Rauvolfia canescens			Antihypertensive, Tranquilizer	Enduronol
9.	Ephedrine	Ephedra sinica			Antiasthmatic	Amidoyne, Bronchicum, Peripherin,
10	Ementine	Carapichea ipecacuanha			Antiprotozoal	Cophylac, Ipecac, Rectopyrine
11	Lobeline	Lobelia inflata			Expectorants	Citotal, Lobatox, Stopsmoke
12	Morphine	Papaver Somniferum			Pain relief, Diarrhea	Duromorph, Oramprrh, Spasmofen
13	Noscapine	Papaver somniferum			Antitussive	Bequitusin, Degoran, Tussisedal
14	Vinca alkaloids (Vincristine)	Vinca rosea			Anticancer	Marqibo, Navelbine, Oncovin
15	Vinblastine	Catharanthus rosea			Antitumor	Periblastine, Velban, Velsar

Conclusion:

Alkaloids are one among the important classes of secondary metabolites which are found to possess important biological properties like analgesic, muscle relaxant, antioxidant, etc. These are used for the assistance of mankind and located beneficial surely life-threatening disease. Certain alkaloids have shown reverse effects like asphyxia, paralysis or in some extreme condition patient death. Large number of alkaloid extraction and estimation methods has been formulated and these make ease to the researchers to enhance the pervious methods. within the present review, it's been concluded that alkaloids from plant source can be utilized for pharmaceutical purposes.

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