

Alkaloids: A Medicinal compound of Plants

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Abstract - Plants are the natural sources having different medicinal properties like anti-carcinogenic, anti-oxidative, anti-mutagenic properties for treatment of human diseases. Among these plants also contains alkaloids, a phyto-compound present in plants. Phyto-compounds are those compounds that are derived from plants consists of macronutrients and micronutrients which protects plants from different disease. Alkaloids constitute nitrogen atom present in heterocyclic ring, and they are derived from amino acids. Alkaloids also provide chemical defense to plants and 60% of plant derived drugs are made from alkaloids compounds. This review includes the study on sadabahar (Catharanthus roseus), quinine (Cinchona officinalis), coffee (Coffea arabica) and opium poppy (Papaver somniferum) and their alkaloid compounds having different medicinal properties against diseases.

Index Terms - Alkaloids, phyto-compounds, medicinal plants.

INTRODUCTION

Alkaloids of plants have largest group of natural compounds which represents diverse group of chemical structure. The consumption of plant alkaloids by man is about the last 3000 years as medicines for the treatment of different diseases.¹ Alkaloids are phyto- compounds that occur naturally, and they contain nitrogen atom. The group of these compounds includes some related compounds which have neutral and weakly acidic properties.² Phyto-compounds are plant derived compounds which protects the plant from the resistance of bacteria, virus, fungi. This review includes the study on sadabahar (Catharanthus roseus), quinine (Cinchona officinalis), coffee (Coffea arabica) and opium poppy (Papaver somniferum) and their alkaloid compounds having different medicinal properties against diseases.

Sadabahar (Catharanthus roseus):

Sadabahar (Catharanthus roseus) belongs to the Apocynaceae family. This plant is 1m in height. It is an important medicinal herb commonly grown in India.³ There are wide variety of alkaloids of this plant are clinically used for example, Ajmalacine- antihypertensive alkaloid, and vincristine and vinblastine- antineoplastic bisindole alkaloid. Vincristine and vinblastine are the important components of chemotherapy process.⁴

Quinine (Cinchona officinalis):

Cinchona belongs to the family Rubiaceae, and the most common alkaloids which are present in this herb are quinine, chichonine, quinidine and cinchonidine.⁵ Quinine is a member of quinolone alkaloid which is obtained from the bark of Cinchona ledgeriana and Cinchona officinalis. This compound is mainly poisonous to Plasmodium vivax and also for the single- celled organisms or protozoans which causes malaria.⁶

Coffee (Coffea arabica):

Coffee is the most popular beverage grown in 80 countries all over the world.⁷ The most popular alkaloid found in coffee is caffeine, a purine alkaloid. The purine alkaloid is carried out by the species which belongs the common genera Camellia and coffea.⁸

Opium poppy (Papaver somniferum):

It is the most common medicinal herb belongs to the family Papaveraceae. Morphine, codine and thebaine are the alkaloids found in the plant opium poppy. Pain relieving is the common medicinal property of this plant and for this property this plant is used by early civilization till now.⁹

Alkaloids:

Phyto-compounds are biologically active compounds which are derived from different parts of plants like

fruit, stem, leaves, and they are beneficial for human health. They also contain macronutrients and micronutrients too and protect plants from different disease and damages and it also responsible for colour, aroma and flavour.¹⁰ Alkaloids are type of phyto-compounds compounds which are derived from plants and contains ring structure and nitrogen atom. Nitrogen atom is also located inside the heterocyclic ring structure.¹¹ Alkaloids are extracted from chromatographic techniques; the techniques which are commonly used are paper chromatography, thin layer chromatography, high-performance liquid chromatography (HPLC).¹² These are the chemical defence to plants due to cyclic compound which contain nitrogen in negative oxidation state. There are 60% plant derived drugs which are obtained through alkaloids.¹³ Alkaloids have medicinal properties like they fight from oral intoxication, they are antitumorals like vincristine and vinblastine as well as they are neuroactive like caffeine and nicotine.¹⁴

Alkaloids are found in plant tissue as water soluble salts of organic acid like tartaric, acetic, oxalic, citric, malic, and lactic acid or esters like atropine, cocaine, aconitine or sugars like glycoalkaloids. Most of the alkaloids are found in plant matrices in the form of crystalline, amorphous, non- hydrous, and non-volatile compounds.¹⁵

Plants alkaloids and their medicinal property:

Plant	Alkaloids	Medicinal property	Reference
Sadabahar (Catharanthus roseus)	Vincristine and vinblastine	Leukaemia, lymphomas and testicular cancer	16
Quinine (Cinchona officinalis)	Quinine	Malaria	17
Coffee (Coffea arabica)	Caffeine	Cardiovascular, gastrointestinal, dermatological	18
Opium poppy (Papaver somniferum)	Morphine, codine, thebaine	Pain reliever	19

Plants are the natural sources and also have different medicinal properties for the diseases. Plants contain alkaloids, a phyto- compound which is present in plants. Phyto- compounds are those compounds which are present in plants for curing the diseases and protect plants from the resistance of bacteria, fungi, and viruses. It is the main compound which is responsible

in curing the diseases. Plants have different alkaloids which have different medicinal properties. Sadabahar (Catharanthus roseus) have alkaloids like vincristine and vinblastine, these alkaloids have anti- tumor properties like they protect from leukaemia, lymphomas, and testicular cancer whereas quinine (Cinchona officinalis) have quinine alkaloid which is poisonous to Plasmodium vivax and protects from malarial diseases. Like this coffee (Coffea arabica) prevents the cardiovascular, gastrointestinal, dermatological diseases due to caffeine, an alkaloid compound whereas opium poppy (Papaver somniferum) has morphine, codine and thebaine like alkaloid compounds which are pain relieving compounds used from early civilisation to till now.

Conclusion:

In this review, it is concluded that plants have different phyto- compounds, especially the alkaloid which heals different diseases. Plants have different alkaloids which cures different diseases like sadabahar (Catharanthus roseus) have alkaloid vincristine and vinblastine which cures leukemia, lymphomas, and testicular cancer like diseases whereas quinine (Cinchona officinalis) which protects from malaria due to the alkaloid named quinine which is poisonous to the microbe Plasmodium vivax. Similarly, coffee (Coffea arabica) has caffeine alkaloid which cures diseases like cardiovascular, gastrointestinal, dermatological diseases whereas opium poppy (Papaver somniferum) has pain relieving property due to the presence of different alkaloids like morphine, codine and thebaine.

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