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A REVIEW ARTICLE: THE ROLE OF GLYCOSIDES IN MEDICINAL PLANTS, ISOLATION OF GLYCOSIDES, AND DESCRIPTION OF ANTHRACENE GLYCOSIDES IN ALOES

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ABSTRACT
The glycosidic residues found in plant glycosides' structure are largely responsible for their wide range of medicinal properties. In particular, the sugar moiety, chains/saccharide units, glycosidic connections, and aglycones can all be used to categorize medicinal glycosides into a variety of compounds. The commonly used pharmacological classification is based on the aglycones attached to the glycoside molecule, although there are other types as well. Plant glycosides are further categorized into twelve distinct categories based on their non-sugar moiety (aglycones), in addition to the recently discovered new (cannabinoid) glycosides. The origin, structure, and widespread prevalence of each plant glycoside within a particular plant family have all been covered in this work. Additionally, a detailed description of these plant glycosides' therapeutic functions is provided to confirm their effectiveness in the human healthcare system. Glycosides, on the other hand, remain inert until their active aglycone is released by enzymatic hydrolysis, which allows for tailored drug administration. This procedure improves the stability and solubility of aglycones, increasing their bioavailability and medicinal effectiveness. By focusing on particular receptors or enzymes, they reduce side effects and improve pharmacological results. Glycosides, which are derived from plants, provide a variety of chemical structures for the production of drugs. They are essential to both conventional medicine and contemporary drugs, used in everything from antibacterial treatments to cardiology.

KEYWORDS: Glycosides, Aloes, medicinal plants, Anthracene, sugar

INTRODUCTION

Food production systems are under the dual pressure of enhancing productivity whilst conserving nature and protecting
Several medicinal plants contain complex organic molecules that are in conjugation with sugar moieties, mostly monosaccharides. The number of these sugar molecules may be one or more. Such compounds are called glycosides and exert therapeutically significant effects on humans and animals. Many glycosides are used in traditional and modern medicines because of their cardiotonic, purgative, analgesic, anti-rheumatic, demulcent, and other useful actions.
Glycosides may be defined, in general, as the organic compounds from plant or animal sources which, on enzymatic or acid hydrolysis, give one or more sugar moieties along with a non-sugar moiety. The former is called the glycone and the latter the aglycone or genin. Chemically, they are the acetals or sugar ethers, formed by the interaction of the hydroxyl group of each of the non-sugar and sugar moieties, with a loss of a water molecule. The hydroxyl group of aglycones may be alcoholic or phenolic and, in some cases, from amines also. The sugars involved in glycosides are of different types, but most commonly, it is β-D-glucose. The other sugars found are galactose, mannose, rhamnose, digitoxose, cymarose, etc.
Stereochemically, these are alpha and beta glycosides, which may be considered as a theoretical aspect, because the plants contain only beta glycosides. The linkage between glycone and aglycone is called a glycosidic linkage, and based on this linkage, alpha and beta stereoisomers are assigned. In the simplest form, the glycoside with these two isomers can be synthesized from the union of methyl alcohol and glucose.
The classification of glycosides is based either on the chemical nature of the aglycone part or the therapeutic activity exhibited by the same. Another mode of classification is based on the type of linkage existing between the glycone and aglycone part. A brief description of all these methods of classification is given below.
According to the chemical nature of the aglycone moiety, they are grouped into the following:
1. Anthraquinone or anthracene glycosides,
2. Sterols or cardiac glycosides,
3. Saponin glycosides,
4. Cyanogenetic or cyanophoric glycosides,
5. Isothiocynate glycosides,

6. Flavonoids, flavonol glycosides,
7. Coumarins and Furanocoumarin glycosides,
8. Aldehyde glycosides,
9. Phenol glycosides,
10. Steroidal glycolkaloids,
11. Glycosidal bitters or miscellaneous glycosides.

Classification of Glycosides:

Glycosides are also classified on the basis of the type of sugar or the glycone part of their structure. Accordingly, there are glycosides with glucose, rhamnosides with rhamnose, pentosides with pentose like ribose, and so on. The sugars involved in the structure are normally the common types of sugars. Only in a few cases are sugars like digitoxose and cymarose present.

Another approach for their classification is by considering the linkage across glycone and aglycone parts. Basically, all types of glycosidic linkages occur by interaction of the - OH group of the glycone and hydrogen coming through any of the radicals like CH, OH, SH, and - NH present on the aglycone part. Hence, by elimination of one water molecule, a linkage or a bridge is formed, and the type of glycoside formed is named by putting the element as a prefix, like C-glycoside, N-glycoside, O-glycoside or S-glycoside.

Individual pattern of glycosides :

(1) C-glycosides (when sugar moiety is linked to carbon atom): Some of the anthraquinone glycosides such as cascarosides from cascara and aloin from aloe, as well as some members of flavone type of glycosides show the presence of C-glycosides.

Glycone-OH + HC-aglycones glycone-C - aglycones + H_2O

C-glycosides, which are also called aloin-type glycosides, are mainly present in members of Liliaceae, e.g. Aloe. They are not hydrolysed by heating with dilute acids/alkalies, but by oxidative hydrolysis with ferric chloride. Cochineal contains C-glycosides in the form of a colouring matter called carminic acid,

(2) O-glycosides (when sugar moiety is attached to oxygen atom): They are very common in higher plants, e.g. senna, rhubarb, frangula, etc. They are hydrolysed by treatment with acid or alkali into aglycones and sugar, i.e., glucoranillin, amygdalin.

Glycone - OH + HO aglycones glycone O-aglycones + H_2O.

3) 5-glycosides (when sugar is linked to sulphur atom): Their occurrence is restricted to isothiocynate glycosides like sinigrin from black mustard.

CHC-S-CH11 Os N-O-SO, K

They are formed by interaction of the sulfhydryl group of aglycones and hydroxyl group of glycone. Glycone-OH+H S-aglycones glycone-5-aglycones + H_2O

(4) N-glycosides: The most typical representative example of N-glycosides is nucleosides, where the amino group of the base reacts with the - OH group of ribose/deoxyribose and ultimately gives N-glycosidic form.

Glycone-OH + HN - Glycone Glycone-Naglycones + H_2O

Glycosides are crystalline or amorphous substances which are soluble in water and dilute alcohol with the exception of resin glycosides, but insoluble in organic solvents like chloroform or ether. The aglycone moiety is soluble in non-polar solvents like benzene or ether. Glycosides are easily hydrolysed by water, mineral acids and enzymes. They show optical activity, normally with laevo rotatory effects. Glycosides do not reduce Fehling's solution until they are hydrolysed. They are believed to participate in growth regulation and protection of plants.

Glycone-OH + HC-aglycones glycone-C - aglycones + H_2O

METHOD OF ISOLATION

Glycosides are usually accompanied by specific enzymes (usually emulsion and maltase) capable of causing their hydrolysis. Emulsion causes hydrolysis of B-Glycosides, while maltase causes hydrolysis of a-glycosides and therefore enzymatic hydrolysis is one of the criteria to ascertain the nature of linkages in the glycosides.

Sta-Otto Method

The general method of extraction of glycosides is outlined here. The drug-containing glycoside is finely powdered, and the powder is extracted by continuous hot percolation using Soxhlet apparatus with alcohol as solvent. During this process, various enzymes present in the plant parts are also deactivated due to heating. The thermolabile glycosides, however, should be extracted at a temperature preferably below 45°C. The extract is treated with lead acetate to precipitate tannins and thus eliminate non-glycosidal impurities. The excess lead acetate is precipitated as lead sulphide by passing hydrogen sulphide gas through the solution. The extract is filtered, concentrated to get crude glycosides. From the crude extract, the glycosides are obtained in pure form by making use of processes like fractional solubility, fractional crystallization, and chromatographic techniques such as preparative thin layer and column chromatography. The characterization of isolated purified compounds is done by IR, UV, visible, NMR, mass spectrometry, and elemental analysis.

Glycoside Containing Crude Drugs

1. Anthracene Glycosides

S.no.	Name of Drugs	Biological Source	Active Constituents	Uses
	. Aloe (Kumari)	Dried juice of leaves of Aloe vera, Aloe barbadensis, Aloe ferox,	Barbaloin, aloe-Emodin	Purgative

		Liliaceae		
	Cascara (Sacred bark)	Dried bark of Rhamnus purshiana, Rhamnaceae	Cascarosides A, B, C and D	Mild purgative
	Hypericum (Goat-weed)	Dried aerial parts of Hypericum perforatum, Hypericaceae	Hypericin, Hyperforin	Anti-depressant
	Rhubarb (Rheum)	Dried rhizome of Rheum palmatum, Polygonaceae	Rhein, aloe emodin	Purgative, bitter stomachic
	Alexandrian senna Senna leaf	Dried leaflets of Cassia acutifolia, Leguminosae	Sennoside A and B	Purgative

II. Steroidal Glycosides or Cardiac Glycosides

1.	Digitalis (foxglove leaves)	Dried leaves of Digitalis purpurea, Scrophulariaceae, and dried leaves of Digitalis lanata, Scrophulariaceae.	Purpurea glycoside A B, digitoxin, lanatosides A, B and C, digoxin	Cardiotonic
2.	European squill (scilla)	Dried sliced bulbs of Urginea maritima, Liliaceae	Scillaren A and B	Cardiotonic
3	. Indian squill (Urginea)	Dried sliced bulbs of Urginea	Scillaren A and B	Cardiotonic
4.	Ouabain	Dried bulbs of Urginea indica	Scillaren A and B	Cardiotonic
5.	Strophanthus (Arrow-poison)	Dried ripe seeds of Strophanthus kombe, Apocynaceae	Strophanthidin	Cardiotonic

III. Saponin Glycosides

1.	Brahmi (Bacopa)	Leaves and stems Bacopa moniera Scrophulariaceae	Bacosides A and B	Nervine tonic
2.	Dioscorea (yam)	Dried tubers of Dioscorea deltoidea, Dioscoreaceae	Diosgenin (steroidal sapogenin)	Synthesis of medicinal steroids
3.	Ginseng (Panax)	Dried root of Panax ginseng, Araliaceae	Ginsenosides & panaxosides (triterpenoid saponins)	Adaptogen, tonic and stimulant
4.	Gokhru (Tribulus)	Dried fruits Tribulus terrestris Zygophyllaceae	Steroidal sapogenins	Diuretic
5.	Jalbrahmi (Centella)	Dried herb of Centella asiatica umbelliferae	Asiaticoside	Nervine tonic

IV. Cyanogenetic or Cyanophoric Glycosides

1.	Bitter almond	Dried ripe seeds of Prunus amygdalus, Rosaceae	Amygdalin	Demulcent, sedative
2.	Wild cherry (Wild black cherry)	Dried bark of Prunus serotina, Rosaceae	Prunasin	Mild sedative, flavoring agent

V. Isothiocyanate Glycosides

1.	Mustard seeds (Black mustard)	Dried ripe seeds of Brassica nigra, Cruciferae	Sinigrin	Counter irritant, rubefacient externally and emetic internally

VI. Flavonoids

1.	Buck wheat	Dried fruits of Fagopyrum esculentum, Polygonaceae	Rutin (also from Ruta graveolens)	Treatment of capillary bleeding
2.	Citrus fruits	Rind of unripe, green lemon fruits, citrus lemonis or orange fruits citrus aurantium, Rutaceae	Hesperidin	In capillary fragility
3.	Gingko	Gingko biloba Gingkoaceae	Gingkolide A, B, C	Vascular disorders

VII. Coumarin and Furanocoumarin Glycosides

1.	Ammi	Dried fruits of Ammi majus, Umbelliferae	Xanthotoxin	Treatment of vitiligo
2.	Psoralea fruit (Bavchi)	Dried ripe fruits of Psoralea corylifolia, Leguminosae	Psoralen, corylifolin	Treatment of leucoderma

VIII. Aldehyde Glycosides

1.	Anantmul (Sariva)	Dried roots of Hemidesmis Indicus Asclepiadaceae	Iso-vanillin	Anti-inflammatory, flavouring agent
2.	Vanilla (Vanilla pods)	Unripe fruits of Vanilla planifolia, Orchidaceae	Gluco-vanillin	Flavouring agent

IX. Phenol Glycosides

1.	Bearberry (Uva ursi)	Dried leaves of Arctostaphylos uvaursi, Ericaceae	Arbutin	Diuretic in urethritis

X. Steroidal Glycoalkaloids

1.	Solanum	Dried fruits of Solanum khasianum Solanaceae	Solasodine	For steroidal synthesis

XI. Glycosidal Bitters and Miscellaneous Glycosides

1.	Chirata (chirayata)	Dried plant of Swertia chirata, Gentianaceae	Gentiopicrin from sweroside	Stomachic, antipyretic
2.	Garcinia	Dried de-seeded fruits Garcinia combogia Family: Guttiferae	Hydroxy citric acid, tartaric acid	Anti-rheumatic condiment

1. ANTHRACENE GLYCOSIDES

These constitute a major class of glycosides. They are mainly found in dicot plants and families like Euphorbiaceae, Ericaceae, Lythraceae, Polygonaceae, Rhamnaceae, Rubiaceae, Leguminosae, Verbenaceae, etc. The family Liliaceae from monocots also shows the presence of C-glycosides.

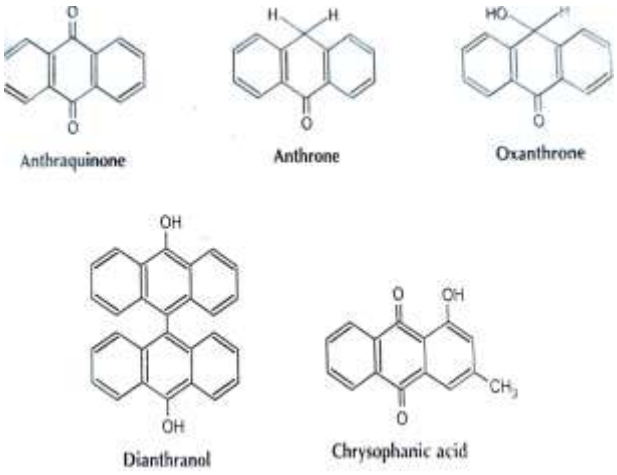
Some of the fungi and lichens also contain anthraquinone glycosides. But it is observed that lower plants like bryophytes, pteridophytes, and gymnosperms are devoid of such glycosides. It is postulated that the aglycone part of these glycosides is formed by head-to-tail condensation of acetate units.

This group of glycosides comprises different aglycone moieties like anthraquinone, anthrone, anthranol, dianthranol, oxanthrone, and dianthrone.

In different drugs like aloe, senna, rhubarb, and cascara, aglycones are present in their derivative forms. The parent molecule for all these aglycones, i.e., anthraquinone, is present in different forms along with methyl, hydroxymethyl, carboxyl, dihydroxy phenol, trihydroxy phenol, or free carboxylic acid groups. In a reduced form, anthraquinone is present as anthranol or anthrone, which are isomeric with each other.

Anthrone is a pale yellow substance without any solubility in alkali, while anthranol is brownish-yellow and soluble in alkali. Anthranol shows strong fluorescence in alkali, but anthrone is non-fluorescent by nature.

Some plants contain oxanthrone, which is the intermediate substance from anthraquinone to anthranol. In some plants, the anthrone molecule orients in an isomeric form called dianthrone, which is therapeutically more important. The reduced anthraquinones are biologically more active. In a fresh drug, these aglycones are present in reduced form but are hydrolyzed and oxidized during their storage. They are present along with different sugars like glucose, rhamnose, arabinose, and primrose.



Borntrager's Test

Anthraquinone derivatives are generally detected by Borntrager's test. In this test, the drug is powdered and further extracted with ether or any water-immiscible organic solvent. The filtered ethereal extract is made alkaline either with caustic soda or ammonia, by which the aqueous layer shows, after shaking, a pink, red, or violet color. Borntrager's test is negative in the case of anthranol (reduced forms). Anthrones are detected with their fluorescence tests.

ALOES

Synonyms: Aloe, Musabbar, Kumari

Biological Source: Aloes is the dried juice of the leaves of Aloe barbadensis Miller, known as Curacao aloes; or of Aloe perryi Baker, known as Socotrine aloes; or of Aloe ferox Miller and hybrids of this species with Aloe africana Miller and Aloe spicata Baker, known as Cape aloes, all belonging to the family Liliaceae.

Geographical Source

Aloe is indigenous to eastern and southern Africa and is grown in the Cape Colony, Zanzibar, and the island of Socotra. It is also cultivated in the Caribbean islands, Europe, and many parts of India, including the Northwest Himalayan region.

Cultivation and Collection

The genus Aloe consists of about 200 species, some of which are used as sources of aloe. These plants have rosettes of subulate, succulent leaves. The leaves are sessile and have a strong spine at the apex and also many spines along the margins. The lower portion is rounded, and the upper portion is slightly concave. For cultivation, root suckers are used for propagation. The plants grow even in poor grades of soil and in dry climatic conditions. The root suckers are planted in rows about 50 cm apart. Waterlogging near the plant must be prevented. The roots do not penetrate much into the soil. For the purpose of manure, a mixture of nitrogen, potassium, and phosphorus is used. The leaves are cut for the first time in the second year of cultivation, and the drug is obtained from leaves for twelve years. After twelve years, the plants are completely harvested by uprooting, and once again the land is worked for replantation. During the collection of leaves, a cut is given to the leaves near their bases, by which the juice located in parenchymatous cells of the pericycle exudes out, due to the pressure exerted by mucilage cells. A single incision is sufficient for drawing out all the juice from the entire system of pericyclic cells. The preparation of various types of aloes is outlined here.

Preparation of Aloe

(i) Barbados or Curacao aloe: It is prepared in the islands of Aruba and Bonaire in the West Indies. After giving transverse cuts near the bases of the fleshy leaves of Aloe barbadensis, the cut leaves are placed along the sides of V-shaped wooden troughs. Because of the spines on the leaves, they are put into kerosene tins immediately after cutting and then brought to wooden troughs and kept in tilted positions to drain out all the juice. The juice collected in this way is allowed to boil in large copper pans. During boiling, the latex evaporates, and the juice is further thickened. The thick juice is then poured into gourds or metal containers where it hardens. It is brought in market under the name Barbados or Curacao aloe.

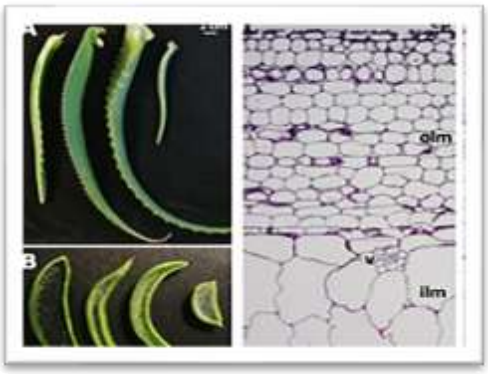
(ii) Cape aloes: It is obtained from Aloe ferox and its hybrids in South Africa. The transversely cut leaves are arranged in a circular manner in the basin-shaped depression, dug in the ground, which is lined either with goat skin or canvas. The

leaves are placed in such a way so as to overlap the cut ends. They are kept in this position for 5-6 hours, till all the juice exudes out and is collected in the goat skin.

The collected juice is transferred to a large iron kettle where it is boiled and stirred continuously with the help of a wooden paddle-type instrument. When the boiling juice attains a desired concentration, it is poured into wooden cases. It becomes a solid mass which is brought into commerce under the name of Cape aloe.
(iii) Socotrine aloes: It is prepared from Aloe perryi occurring on the island of Socotra and the mainland of East Africa. The juice of the leaves is collected in goat skin and allowed to become semisolid in nature. It is exported in a pasty condition under the name of Socotrine aloe.
(iv) Zanzibar aloes: The origin of this variety is not correctly known and sometimes, it is also regarded simply as a variety of Socotrine aloe. The juice is poured into skins of some small carnivorous animals, where it solidifies and is then packed in wooden boxes. Zanzibar aloe is also sometimes called monkey-skin aloe, although the skin is not that of monkeys.

Microscopic Characteristics of Aloe Leaf

The T.S. of the leaf exhibits an ostiole followed by epidermis, palisade tissue, and mucilaginous parenchymatous mesophyll.
Mesophyll encloses vascular bundles, which are covered with a pericyclic layer. Inside the pericycle, a few large, elongated, thin-walled aloetic cells are located. These aloetic cells contain highly viscous, yellow juice (aloe gel). The leaves are sessile, and when they are cut at the base, the juice flows down, which is to be collected. Few calcium oxalate crystals are present in the parenchyma.



Microscopic Structure of Aloe Leaves

Microscopic Characters of Aloe Powder

The microscopy of the different varieties of aloe is more significant for identification of their powdered forms. The microscopic characters are studied in lactophenol, because in this reagent the particles are gradually solubilized so that crystals are clearly and quickly observed.

(i)Curacao aloe: It shows fragments consisting of a large number of very small needles or slender prisms.
(ii) Cape aloes: This variety appears as transparent, brown, angular, or irregular fragments.
(iii) Socotrine aloes: It is characterized by fragments consisting of quite large prisms either present in groups or in dispersed form.
(iv) Zanzibar aloes: It exhibits irregular lumps in which modular masses are embedded.

In commerce, aloes is available both as a crystalline and amorphous substance. It generally appears that amorphous form is cape aloe and crystalline one is curacao aloe, depending on their response to the tests. If both the varieties are mounted in cresol and viewed under polarised light, crystalline aloe, insoluble in cresol, shows a shining bright colour. Amorphous aloe, as it gets quickly dissolved, remains invisible.

Chemical Constituents

- All the varieties of aloe are the major sources of anthraquinone glycosides. The principal active component of aloe is aloin, which is a mixture of glucosides, among which barbaloin is the chief constituent. It is chemically aloe-emodin anthrone C-10 glucoside, and it is water soluble.
- Barbaloin is a C-glycoside, and it is not hydrolysed by heating with dilute acids or alkalis. Ferric chloride decomposes barbaloin by oxidative hydrolysis into aloe-emodin-anthrone, little aloe-emodin, and glucose.
- Along with barbaloin, aloes also contains isobarbaloin, ß-barbaloin, aloe-emodin and resins.
- The drug also contains aloetic acid, homonataloin, aloesone, chrysophanic acid, chrysamminic acid, galactouronic acid, choline, choline salicylate, saponins, mucopolysaccharides, glucosamines, hexuronic acid, coniferyl alcohol, etc.
- The amount of barbaloin in different commercial varieties varies to a large extent. Curacao aloes contains about 22 per cent of barbaloin. Indian variety, generally Aloe vera, contains a very small quantity. Curacao aloes contains two and a half times the quantity of aloe-emodin, as compared to Cape aloe-emodin.
- The resin of aloe principally contains Aloesin. It is a type of C-glucosyl chromone.
- Aloesin is also responsible for the purgative action of aloes.

Chemical Tests

The chemical tests for aloes are performed either for general detection or detection of a specific variety of aloes.
(a) General Tests:
For these tests, 1 g of aloe powder is boiled with 10 ml of water and filtered with the help of kieselguhr. The filtrate is used for the bromine test and Schoenteten's reaction.
(1) Bromine test: Freshly prepared bromine solution is added to a small quantity of the above filtrate. The test gives a pale yellow precipitate of tetrabromalin.
(2) Schoenteten's reaction (Borax test): Little quantity of above filtrate is treated with borax and shaken well till the borax dissolves. When few drops of this solution are added to a test tube nearly filled with water, a green fluorescence appears.

(b) Special Tests:
These tests are meant for distinguishing different varieties of aloe vera.
(1)Nitrous acid test:
Crystals of sodium nitrite along with a small quantity of acetic acid are added to an aqueous solution of aloes. The observations are as follows:
(i) Curacao aloes - sharp pink to carmine colour
(ii) Cape aloes - faint pink colour
(iii) Socotrine and Zanzibar aloes - very little change in colour

(2) Nitric acid test:
This test is carried out either by directly applying nitric acid to drug or to its aqueous solution. The observations are as follows.
(i) Curacao aloes -deep brownish-red colour
(ii) Cape aloes -brownish colour changing to green
(iii) Socotrine aloes - yellow colour
(iv) Zanzibar aloes-yellowish brown colour

(3) Cupraloin test (Klunge's isobarbaloin test):
To a very dilute aqueous solution of aloes, a drop of saturated copper sulphate solution is added, followed by a small quantity of sodium chloride and excess of 90 per cent alcohol.
The following results are observed:
(i) Curacao aloes-wine red colour persisting four hours
(ii) Cape aloes-faint colouration rapidly changing to yellow
(iii) Socotrine aloes-no colour
(iv) Zanzibar aloes-no colour

(4) Modified anthraquinone test:
This test indicates the presence of C-glycosides, viz. aloe emodin. The aqueous solution of aloes is treated with ferric chloride solution and dilute hydrochloric acid to bring out the oxidative hydrolysis of aloe-emodin. The hydrolysis sets free anthraquinones, which are collected in an organic solvent like carbon tetrachloride or ether. The organic layer is separated and shaken with dilute ammonia. The ammoniacal layer shows rose-pink to cherry red colour, indicating the presence of C-glycosides, viz, aloe emodin.

Uses
- Aloe is used as a purgative. Its effect is mainly on the colon. It has a stronger purgative action in the series of all crude drugs with anthracene glycosidal content. To counter the gripping action, it is given with carminatives.
- Aloin is preferred nowadays to aloes, both of which are official. Besides purgative property, aloes enjoys many other uses.
- It is an ingredient of compound tincture of benzoin (Friar's balsam).
- Aloe gel, formed in inner parenchymal cells of the leaf, is a slightly viscous and clear liquid. During collection, it should not get contaminated with aloe juice.
- The gel is used in topical therapeutic applications and also in many cosmetic products, but the therapeutic value, if taken orally, is questionable.
- The gel possesses good moisturizing properties and also has a formulation role for oil-in-water (approved by U.S. FDA) preparation.
- It shows anti-inflammatory properties due to the chemical contents like salicylates, carboxypeptidases (inactivating bradykinin), and magnesium lactate (interfering with the conversion of histidine to histamine in the mast cells).
- The polysaccharide and sugar content have a role in hydrocolloid dressing and also osmotic bactericides.
- Aloe gel also increases the removal of dead tissue due to its Aloctine - A content, which stimulates macrophage production.
- It is believed that only fresh gel probably has a role in the treatment of burns and wounds.
- It is also used in the treatment of pains and itchings and also to slow down ulceration and keratosis. Aloe gel is used in skin cosmetics as a protective due to its anti-wrinkle properties. Aloe is also used externally for painful inflammation.

Differentiation between aloe gel and Aloes

	Aloe gel	Aloes
Part used	Mucilaginous tissue located in leaf parenchyma of Aloe species. Family Liliaceae.	Dried leaf juice of Aloe barbadensis, A. ferox and hybrids, A. africana, A. spicata, Family Liliaceae.
Consti-tuents	Mono and polysaccharides, tannins, sterols, cycloxygenase, saponins, vitamins and minerals. Polysaccharides contain xylose, arabinose and galactose. Lipids contain cholesterol, gamolenic acid and arachidonic acid.	Anthraquinones: 30 per cent mainly C glucosides known as aloin. Mixture contains barbaloin, isobarbaloin, emodin and aloe-emodin. Resins: Aloesin, aloesone.
Use	Used externally in the form of ointments, creams to assist healing of wounds, burns, eczema, and also in psoriasis.	In the treatment of constipation

Adulterants and Substitutes

(1) Natal Aloes: It resembles Cape Aloes in microscopic characters and hence is used as a substitute. Natal aloes contains natalion, homonatalion, and resin with nataloresinotannol. It is a weak purgative.
(2) Mocha Aloes: This is a brittle, black, and glassy aloe with a strong odour.
(2)Aloe gets adulterated with black catechu, pieces of iron, and stones. Alcoholic extract of aloe under UV light gives a deep brown color, while black catechu gives a black color.

CONCLUSION

In conclusion, glycosides in medicinal plants play a multifaceted role. They have important ecological functions within the plants, contribute to the plants' medicinal properties, and offer great potential for modern pharmaceutical research. The study of glycosides in medicinal plants is an area that continues to grow, with new extraction methods being developed and new therapeutic applications being discovered. However, more research is still needed to fully understand the complex nature of glycosides and to harness their full potential in medicine. As the demand for natural and effective drugs increases, glycosides from medicinal plants are likely to play an increasingly important role in the future of healthcare. These are also very symbolic for their many roles in preserving the growth, development, and defense of plants. Many plants, including Brahmi, Senega, Aloe, Senna, Digitalis, Thevetia, and others, are grown around the world and contain glycosides. Traditionally, the abundant sources of different glycosides, such as C, N, O, and S glycosides, are found in different regions of the plant. The extraction of glycosides is demonstrated by a variety of extraction methods and chemical assays. Numerous medicinal formulations, such as Brahmi tonic, henna shampoo, and aloe gel, are available to treat a variety of issues.

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