

## Review Article



## A Review on Pharmacognostic and Pharmacological Effects and Action of Anthracene, Cardiac, and Saponin Glycosides

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### ABSTRACT

Anthracene or Anthraquinone glycosides have an aglycone group, derivative of anthraquinones, and usually occurs as O-glycoside or C-glycosides common in a large number of plants and plant products that are important in human and animal nutrition as well as in some diseases. Several pharmacognostic effects like biological source, Microscopical characteristics, preparation, uses and pharmacological effects (Purgative, Bitter stomachic, antiseptic, anti-depressant, coloring agent, anti-inflammatory, anticancer) have been described to anthracene glycosides. It gets the information about the pharmacognostic and pharmacological effects which are related to the anthraquinone glycosides. Cardiac glycosides are a unique group of secondary metabolites that they are considered one of the most useful drugs in therapeutics. In this review, cardiac glycosides and their pharmacognostic effect and pharmacological action are presented. The cultivation and isolation as well as chemical test of cardiac glycoside are shown. In addition, the pharmacological activities, Overdose and Poisoning are discussed. Saponins are steroid or triterpenoid glycosides, common in a large number of plants and plant products that are important in human and animal nutrition. Several pharmacognostic (biological source, active chemical constitute, uses) and pharmacological effects (Fungicidal, antimicrobial, antiviral, anti-inflammatory, anticancer, antioxidant and immunomodulatory effects) have been described to saponins. It is involved identification test of saponin glycosides.

**Keywords:** Pharmacological activities, pharmacognostic properties, anthraquinone glycosides, cardiac glycosides chemical test, chemical structure, saponin glycosides etc.

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### INTRODUCTION

**Glycosides:** - It may be defined as the organic compounds obtained from plants or animal sources which on enzymatic acid hydrolysis give one or more sugar moieties along with non-sugar moiety.<sup>1</sup>

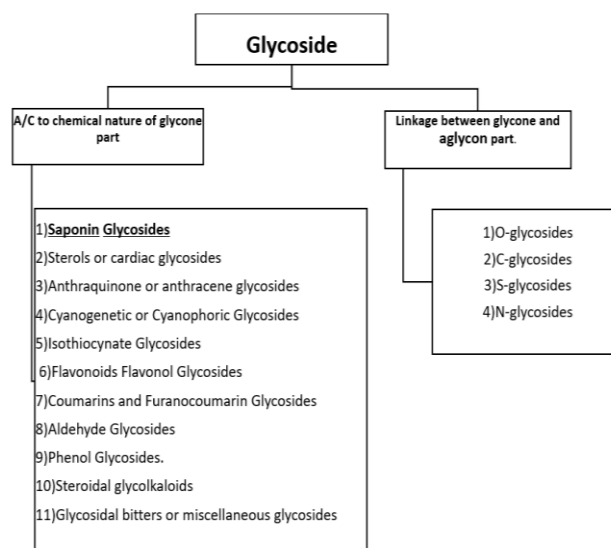
**Glycone-** sugar part and **Aglycone-** non-sugar part

**Glycosidic linkage-** linkage between Glycone and aglycone.<sup>1</sup>

#### Objectives:

- To study the pharmacognostic profile of Anthracene, Cardiac and Saponin Glycoside.
- To know about the pharmacological action of Anthracene, Cardiac and Saponin glycoside.
- To know about the pharmacognostic and pharmacological action of Anthracene, Cardiac and saponin Glycosides.

### Classification of glycosides



**Figure 1:** Classification of Glycoside

### Anthracene Glycosides

These constitute a major class of glycosides. They are mainly found in the dicot plant families like Euphorbiaceae, Ericaceae, Lythraceae, Polygonaceae, Rhamnaceae, Leguminosae, Verbenaceae, etc.

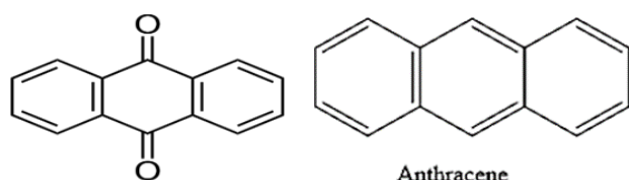
The family Liliaceae from monocots also shows the C-glycosides. Some of the fungi and lichens also contain



anthraquinone glycosides B, observed that lower plants like Bryophytes, Pteridophytes and Gymnosperms are devoid of glycosides. It is postulated that the aglycone part of these glycosides is formed by head to condensation of acetate units. This group of glycosides comprises of different aglycone moieties anthraquinone, anthrone, anthranol, dianthranol, oxanthrone and dianthrone. In different drugs like aloe, senna, rhubarb, cascara, aglycones are present in their des forms. The parent molecule for all these aglycones i.e. anthraquinone is present in different for along with methyl, hydroxymethyl, carboxyl, dihydroxy phenol, trihydroxy phenol or carboxylic acid groups. In a reduced form, anthraquinone is present as anthranol or anthrone which are isomeric with each other. Anthrone is pale yellow substance and without any solubility in all while anthranol is brownish-yellow and soluble in alkali. Anthranol shows strong fluorescence is alkali, but anthrone is non fluorescent by nature<sup>2</sup>.

Some plants contain oxanthrone which is the intermediate substance from anthraquinone to anthranol. In some plants, the anthrone molecule orients in bimeric form called dianthrone which therapeutically more important<sup>3</sup>

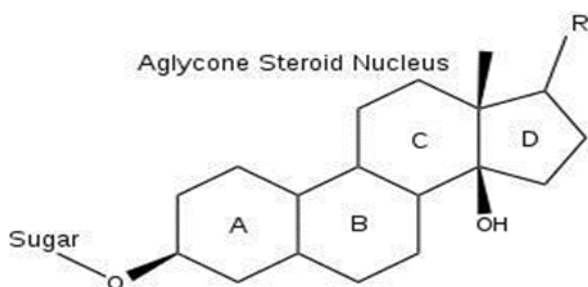
The reduced anthraquinone are biologically more active. In a fresh drug, these aglycones are present in reduced form, but are hydrolyzed and oxidized during their storage. They are present long with different sugars like glucose, rhamnose, arabinose and primeverose<sup>3</sup>



**Figure 2:** Chemical structure of Anthraquinone and Anthracene

### Cardiac Glycoside

Cardiac glycoside is a class of organic compounds that increase the output force of the heart and decrease its rate of contractions by inhibiting the cellular



**Figure 3:** General structure of cardiac glycoside

Sodium - potassium ATPase pump. They are chemical compounds responsible for the poisoning applied to poison arrows in Africa, Asia, and South America for use in hunting and fighting<sup>3</sup>

The basic structure of cardiac glycosides is composed of a sterol nucleus and an unsaturated conjugated lactone ring attached to the C17 position, then formed by condensation of a hydroxyl group at the C3 position of the nucleus with a sugar. Common monosaccharides found in cardiac glycosides are glucose, rhamnose and 6-deoxy monosaccharide. Although the glucosyl moiety does not have a strong cardio tonic effect, it can affect the pharmacokinetic properties of the cardiac glycosides. The four rings of the core of the cardiac glycoside are fused differently than the sterol, wherein the B/C ring is Trans, and the C/D ring and the A/B ring are mostly cis. According to the type of unsaturated lactone ring attached to the C17 position of the cardiac glycoside, the cardiac glycoside can be classified into two types: type A (a five-membered unsaturated lactone ring) and a type B (a six-membered unsaturated lactone ring)<sup>3</sup>.

### Saponin Glycoside

Saponins are the glycoside compounds often referred to as natural detergent because of their foamy texture.

Most of the plants containing saponin glycosides are medicinally and commercially important. As the name indicates, the aglycone part of these glycosides has soap like action. They exhibit some physical properties like foaming action by shaking with water and yielding colloidal solutions.

They are generally considered as haemotoxic, because they cause haemolysis of erythrocytes. Due to this activity, some of them are used fish poisons. Saponins have a bitter and acrid taste; they cause irritation of mucous membrane. They are mostly non - crystalline substances soluble in water and alcohol, but insoluble in non - polar organic solvents. Chemically, they contain aglycone called as sapogenin. Sapogenins are high molecular weight substances which by acetylation give crystalline forms the harmful sapogenins are called as sapotoxins<sup>3</sup>.

### Saponins are categorized into 2 groups.

1. Steroidal saponins (Tetracyclic triterpenoid saponins)
2. Pentacyclic triterpenoid saponins

#### 1. Steroidal Saponins (natural C-atom is C27)

Commercially, steroidal saponins material for the synthesis of various medicinally useful steroids like vitamin D, cardiac glycosides, corticoids like betamethasone and cortisone acetate, sex hormones like progesterone, testosterone and oestradiol, oral contraceptives such as mestranol and norethisterone; and spironolactone which is a diuretic steroid. Steroidal sapogenins viz. diosgenin and hecogenin can be considered as a representative example of this group of saponins. Due to their pharmaceutical importance, many plants have been screened for detection of steroidal saponins. Their distribution is limited to plant kingdom. In dicot plants, important sources are from Leguminosae, Solanaceae, Apocynaceae, etc.

They are mainly obtained from monocot plants like Liliaceae, Dioscoreaceae and Amaryllidaceae.

Example: Dioscorea<sup>4</sup>.

## 2. Pentacyclic Triterpenoid Saponins (acidic, and the C-atom is C30)

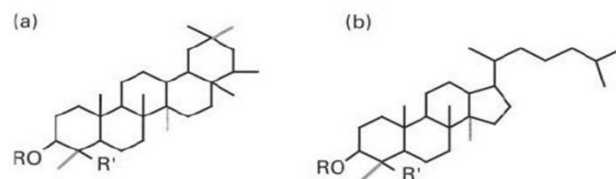
The biological and pharmacological activities of synthetic saponins in recent studies were collected and categorized with the saponins structural characteristics. This group contains the sapogenin with pentacyclic triterpenoid nucleus which is linked with sugars or uronic acids.

The sapogenin is further differentiated into

(a) A- amyrin type;

(b) B- amyrin type;

(c) Lupeol. An important derivative of this group is triterpenoid acids. These acids are present in various drugs formed by substitution of carboxylic group at C<sub>4</sub>, C<sub>17</sub> and C<sub>20</sub>. Example: - licorice, senega, ginseng<sup>5</sup>



**Figure 4:** Basic structures of sapogenins: (a) a triterpenoid and (b) a steroid<sup>5</sup>.

**Table 1:** Pharmacognostic actions of anthracene glycosides

Drug Name	Synonym	Biological Source	Active Constituent	Chemical Tests	Uses
Aloe	Kumari	Dried juice of leaves of <i>Aloe vera</i> , <i>Aloe barbadensis</i> , <i>Aloe ferox</i> , Liliaceae	Barbaloin, aloë-Emodin	General Test Special Test	Anti-inflammatory, Anti-cancer Antiseptics
Cascara	Sacred Bark	Dried bark of <i>Rhamnus purshiana</i> , Rhamnaceae	Cascarosides A,B,C,D	Borntrager Test	Mild purgative
Hypericum	Goat-weed	Dried aerial parts of <i>Hypericum perforatum</i> , Hypericaceae	Hypericin, Hyperforin	-	Anti-Depressant
Rhubarb	Rheum	Dried rhizome of <i>Rheum palmatum</i> , Polygonaceae	Rhein Aloe-Emodin	Addition of Alkali Borntrager Test	Purgative, Bitter stomachic
Senna					
1) Alexandrian senna	Senna leaf	Dried leaflets of <i>Cassia acutifolia</i> , Leguminosae.	Sennoside A and B	Borntrager Test	Purgative
2) Indian senna	Senna leaf	Dried leaflets of <i>Cassia angustifolia</i> , Leguminosae	Sennoside A and B		Purgative
3) senna pods	Senna fruit	Dried nearby ripe fruit of <i>Cassia acutifolia</i> , Leguminosae	Sennoside A and B		Purgative
Cochineal	Red Scale insect	Dried full grown female insects enclosing young larve of <i>Coccus Cacti</i> (Coccidae)	Carminic acid	-	Coloring agent

**Table 2:** Pharmacognostic properties of cardiac glycoside

Name of drug and synonym	Biological source	Active Constituents	Uses
1. Digitalis (fox glove leaves) Digitalis	Dried leaves of <i>Digitalis purpurea</i> , Scrophulariaceae and dried leaves of <i>Digitalis purpurea</i> , Scrophulariaceae.	Purpurea glycoside A,B, digitoxin lanatosides A,B and C, digoxin thevetin	Cardio tonic
2. European squill	dried sliced bulbs of <i>Urginea amara</i> , Liliaceae	Scillaren A and B	Cardio tonic
3. Indian squill (Urginea)	dried bulbs of <i>Urginea indica</i>	Scillaren A and B	Cardio tonic
4. Ouabain	dried seeds of <i>Strophanthus gratus</i> , Apocynaceae	Ouabain	Cardio tonic
5. Strophanthus (Arrow-poison)	dried ripe seeds of <i>Strophanthus kombe</i> , Apocynaceae	Strophanthidin	Cardio tonic

**Table 3:** Pharmacognostic properties of saponin glycosides

Sr.No	Name of Drugs	Biological Source	Chemical Constitute	Uses
1	<b>Brahmi</b> (Bacopa)	leaves and stems <i>bacopamoniera</i> , Scrophulariaceae	Bacosides A and B	Nervine tonic
2	<b>Dioscorea</b> (yam)	Dried tubers of <i>dioscorea deltoidea</i> , Dioscoreaceae	Diosgenin (steroidal sapogenin)	Synthesis of medicinal steroids
3	<b>Ginseng</b> (panax)	Dried root of <i>Panax ginseng</i> , Araliaceae	Ginsenosides & panaxosides (triterpenoid saponins)	Adoptogen, tonic & stimulant
4	<b>Gokhru</b> (Tribulus)	Dried fruits <i>Tribulus terrestris</i> , zygophyllaceae	Steroidal saponins	Diuretics
5	<b>Jalbrahmi</b> (centella)	Dried herb of <i>centella asiatica</i> , umbelliferae	Asiaticoside	nervine tonic
6	<b>Momordica</b> (kerala)	Dried fruits of <i>momordica charantia</i> , cucurbitaceae	Charantin momordicin	hypoglycemic
7	<b>Quillaia</b> (soapbark)	Dried inner bark of <i>quillaia saponaria</i> , rosaceae	Quillaia sapotoxin (triterpenoid saponin)	Reflex expectorant
8	<b>Safed musali</b> (musali)	peeled tuberous roots of <i>chlorophytum borovillianum</i> , Liliaceae	Hicogenin	General tonic
9	<b>Senega</b> (milkwort, rattle snakeroot)	Dried roots of <i>polygala senega</i> , polygalaceae	senegin, polygallic acid (triterpenoid saponin)	stimulant expectorant
10	<b>Shatavari</b> (shutmul)	Dried roots and leaves <i>asparagus racemosus</i> , liliaceae	Shatavarin I, II	Galactagogue
11	<b>Yasti</b> (Glycyrrhiza)	Dried root and stolon of <i>glycyrrhiza glabra</i> , leguminosae	Glycyrrhizin (triterpenoid saponin)	Expectorant, treatment of peptic ulcer

**Chemical tests for cardiac glycosides:**

- **Raymond's test:** To the drug, add a few ml of 50% ethanol and 0.1 ml of 1 % solution of m-dinitrobenzene in ethanol. To this solution, add 2-3 drops of 20% sodium hydroxide solution. Violet colour appears, this is due to presence of active methylene group to the drug, add few ml of pyridine and 2 drops of nitroprusside and a drop of 20% sodium hydroxide solution. A deep red colour is produced.
- **Killer killani test:** Glycoside is dissolved in a mixture of 1 % ferric sulphate solution in (5%) glacial acetic acid. Add one or two drop of concentrated sulphuric acid. A blue colour develops due to the presence of deoxy sugar<sup>6</sup>
- **Xanthidrol test:** The crude is heated with 0.1 to 5% solution of Xanthidrol in glacial acetic acid containing 1% hydrochloric acid. A red colour is produced due to the presence of 2-deoxysu
- **Baljet test:** Take a piece of lamina or thick section of the leaf and add sodium picrate reagent. If glycoside is present yellow to orange colour will be seen<sup>6</sup>
- **Kedde test:** A solution of glycosides is treated with a small amount of Kedde reagent. Development of a blue or violet colour that faded out in 1 to 2 hrs. shows its presence of cardinoids<sup>6</sup>
- **Antimony trichloride test:** To a solution of glycoside add a solution of antimony trichloride and trichloroacetic acid, and then heat the mixture.

Appearance of blue or violet colour show presence of Cardinolides and bufanolide<sup>6</sup>

**Chemical Test for Saponin Glycosides**

- **Standard foam test:** 3g of each dry plant powder were weighed and extracted with 300ml of hot distilled water in a beaker. After filtration, the aqueous extracts were cooled, stirred and stored at 4°C in an automated refrigerator for 24h. About 5ml of the plant extract was transferred into a test tube and diluted with 5ml of distilled water. The mixture was shaken vigorously for 2 minutes. Persistent appearance of foam lasting for at least 15 minutes or the forming of an emulsion when olive oil was added confirmed the presence of saponins<sup>7</sup>.
- **Wet foam test:** The test solution was diluted by water and shaken vigorously for 1-2min, a stable foamy lather appeared in the top of the test tube of the sample<sup>8</sup>
- **Dry foam test:** About ~ 0.5 gram of crude powder of the plant was shaken with 5ml distilled water in a test tube and warmed in a water bath, the stable persistent froth, was mixed with 3 drops of olive oil and shaken vigorously. The formation of emulsion indicates the presence of saponins<sup>8</sup>
- **Foam test for fresh samples:** About ~2gram of fresh plant sample (leaves) was added to 20ml distilled water (w/w = 1:10), mixed together by electrical mixer, the mixture was filtered, the filtrate was concentrated by evaporation in a water bath to half





of the original volume, then transferred into a test tube. The stable persistent froth was mixed with 3 drops of olive oil and shaken vigorously than observed for the formation of the emulsion, indicate the presence of saponins<sup>9</sup>.

- **Haemolysis test:** - a drop of blood on slide was mixed with few drops of aqueous saponin solution, RBCs becomes ruptured presence of saponins<sup>10</sup>.

#### Pharmacological Effect of Anthracene Glycosides

**Anti-Inflammatory Action:** The anti-inflammatory activity of Aloe vera gel has been revealed by a number of in vitro and in-vivo studies through bradykinase activity.<sup>9, 10</sup> The peptidase bradykinase was isolated from aloe and shown to breakdown the bradykinin, anti-inflammatory substance that induces pain. A novel anti-inflammatory compound, C-glucosyl chromone, was isolated from gel extracts.<sup>[11]</sup> Aloe vera inhibits the cyclooxygenase pathway and reduces prostaglandin E2 production from arachidonic acid. Fresh Aloe vera gel significantly reduced acute inflammation in rats (carrageenin-induced paw oedema), but not in chronic inflammation.<sup>11</sup> In croton oil-induced oedema in mice, three Aloe vera gels were able to reduce inflammation by up to 37%. Lupeol, the most active anti-inflammatory sterol, reduced inflammation. The data suggest that specific plant sterols may also contribute to the anti-inflammatory activity of gel.<sup>12</sup> The aloe sterol includes campesterol,  $\beta$ -sitosterol, lupeol, and cholesterol which are anti-inflammatory in nature, helps in reducing the inflammation pain and act as a natural analgesic. Other aspirin-like compound present in Aloe is responsible for anti-inflammatory and antimicrobial properties.<sup>13</sup> Even, Aloe vera extract (5.0% leaf homogenate) decreased inflammation by 48% in a rat adjuvant-induced arthritic inflammatory model.<sup>12, 13</sup>

**Anticancer:** The role of Aloe in carcinogenicity has not been evaluated well. The chronic abuse of anthranoid containing laxative has been hypothesized to play a role in colorectal cancer, however, no causal relationship between anthranoid laxative abuse and colorectal cancer has been demonstrated and<sup>14, 15</sup> Aloe vera juice enables the body to heal itself from cancer and also from the damage caused by radio and chemotherapy that destroys healthy immune cells crucial for the recovery. Aloe vera emodin, anthraquinone, has the ability to suppress or inhibit the growth of malignant cancer cells making it to have anti-neoplastic properties.<sup>16</sup>

**Antiseptic:** The antiseptic property of Aloe vera is due to presence of six antiseptic agents namely lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and sulphur. These compounds have inhibitory action on fungi, bacteria and viruses. Though most of these uses are interesting controlled trials are essential to determine its effectiveness in all diseases.<sup>17</sup>

#### Pharmacological Actions of Cardiac Glycosides

- **Regulation of cytosolic calcium concentration:** The mechanism of action of cardiac glycosides involves inhibiting the Na<sup>+</sup> K<sup>+</sup> ATPase enzyme, also known as the sodium-potassium pump. This causes sodium to build up inside the heart cells, decreasing the ability of the sodium-calcium exchanger to push calcium out of the cells, consequently causing calcium to build up in the sarcoplasmic reticulum.



**Figure 5:** Regulation of cytosolic calcium concentration

Increased intracellular calcium results in a positive inotropic effect, which in turn has the effect of increasing the force of the heart's contractions. By inhibiting the Na<sup>+</sup>/K<sup>+</sup>-adenosine triphosphatase (ATPase) enzyme, digoxin reduces the ability of the myocyte to actively pump Na<sup>+</sup> from the cell. This decreases the Na<sup>+</sup> concentration gradient and, consequently, the ability of the Na<sup>+</sup>/Ca<sup>2+</sup>-exchanger to move calcium out of the cell.<sup>18</sup>

- **Increased contractility of the cardiac muscle:** Digoxin increases the force of cardiac contraction, causing cardiac output to more closely resemble that of the normal heart.<sup>19</sup>
- **Neuro hormonal inhibition:** Low-dose digoxin inhibits sympathetic activation with minimal effects on contractility.<sup>20</sup>

#### Pharmacological Effects of Saponin Glycosides

- **Hypo lipidaemic activity:** The mechanism involved in the hypolipidemic activity is, saponins are high fiber content in the different plant extracts. The fiber significantly binds to cholesterol hence aiding its excretion. Saponins have also been shown to possess a high degree of hypolipidaemic activity. The combined activity of saponins and fiber content of the plant extract brings about their additions in plasma concentration of cholesterol and the lipids. Thus reducing the possible occurrence of coronary heart disease such as atherosclerosis.<sup>21</sup>
- **Anti fungal activity:** The antifungal activity of the steroidal saponin is associated with their aglycone moieties. *M. Sativa* plant extracts rich in saponins showed strong antifungal potential to successfully check the growth of *Candida albicans* along with certain clinical pathogenic fungal strains mainly by inhibiting the germ tube formation, retarded the growth of fungal hyphae, and lessened the adherence of yeast cells and eradication of biofilm development.

at 24 hours after treatment. It is further stated that saponin extracts of *M. Sativa* in a dosage range harmful to check the growth of fungi are least toxic to the mice fibroblast L929 cells, which showed them being safe to use for human antifungal conditions<sup>22</sup>.

- **Anti microbial activity:** The saponins show the antimicrobial activity by inhibiting the growth of Gram +ve or Gram -ve microorganism. Some saponins are not effective against Gram –ve micro organisms because they are not able to penetrate into the cell membranes of the microorganisms<sup>23</sup>
- **Virucidal activity:** Some saponins and sapogenins are capable of deactivating viruses, for example, purified saponin mixture from *Maesalan ceolata*. The triterpenoid sapogenin oleanolic acid inhibits HIV-1 virus replication probably by inhibiting HIV-1 protease activity<sup>24</sup>.
- **Effect as an anti – inflammatory:** The significant supportive activity of the saponins may be due to inhibition of the mediators of inflammation such as histamine, serotonin and prostaglandin along with its antioxidant property which inhibits the formation of ROS which also plays a major role in inflammation.<sup>25</sup>
- **Effects on animal reproduction:** The negative effects of saponins on animal reproduction have long been known and have been ascribed (credit) to their anti-implantation properties. Saponins are found to be extremely strong stimulators of luteinizing hormone release from cultured hypophysial cells. However, saponin-rich extracts from *Combretum africanum* injected into female rats, stimulate deterring growth, lowered luteinizing hormone release and blocked the oestrous cycle. The steroid saponin was found to directly inhibit the genes responsible for steroidogenesis, and also suppress the proliferation of follicle-stimulating hormone-modulated granulosa cells in the ovarian follicle. The mechanism of suppression of cell proliferation might be through a similar mechanism as saponin-induced proliferation of tumor cells. Saponins have been shown to have both positive and negative effects on the viability of human sperm cells in vitro with some ginseng saponins increase in motility as well as progression of sperm<sup>26</sup>
- **Effects on cell membrane permeability:** The large number of the pharmacological effects of saponins has been associated to their action on permeability of cell membranes. They have a specific ability to form pores in membrane. Saponins have a lytic action on erythrocyte membranes. The hemolytic action of saponins is believed to be the result of the affinity of the aglycone moiety for the phospholipids present in the cell membrane with which they form insoluble complexes. The amount of glycosides permeabilisation required for is much lower for cholesterol - rich lipid layers than cholesterol - free

membranes<sup>27</sup>.

- **Effects on the central nervous system (CNS):** Ginseng saponins have been reported to boost memory and learning, and recent studies have shown them to play a role in the treatment of neurological diseases. For example, animal studies have demonstrated that Rb1, CK and Rg1 can prevent scopolamine-induced memory deficits. In a C57Bl/6 mice model, CK reversed memory impairment by inducing translocation of the nuclear factor Erythroid 2-related factor (nrf2), which further enhanced the cell stress response. Rb1 has also been found to increase the uptake of choline in the central cholinergic nerve endings, which have been implicated in mediating memory and learning. The use of a combination use of ginseng saponins was associated with a prolonged drug induced sleeping time in a mouse model, suggesting a central nervous system (CNS) -depressing property Caused by the mixture. Other studies have indicated that ginseng saponins also have neuroprotective effects. In one study, for example, Rb1 treatment inhibited GSK-3 $\beta$ -mediated C/EBP homologous protein (CHOP) signaling, thereby preventing neuronal apoptosis due to endoplasmic reticulum stress. In another, Rg3 pretreatment attenuated Hcy-induced neurotoxicity by reducing the intracellular  $Ca^{2+}$  elevation via N-methyl-D-aspartate receptor activation. Rg3 was also demonstrated to protect the vascular endothelial cells via the estrogen receptor, which is similar to the effect exerted by 17- $\beta$ -estradiol. Furthermore, Rg1 also exerts an estrogenic effect by activating extracellular regulated protein kinases and Akt signaling in an ER $\alpha$  phosphorylation-dependent manner, which results in memory improvement. Hence, ginseng saponins may play a CNS modulatory function by interacting with hormone receptors. Several common pharmaceuticals and supplements with antioxidant properties have been investigated as therapeutic agents for various diseases. Ginseng saponins have been proven to exert a CNS protection effect that is attributed to their antioxidant properties, which operate by increasing internal antioxidant enzymes. For example, Rb1 exerts antioxidant effects in the ischemic hippocampal neurons<sup>28</sup>.
- **Action on blood clotting:** Some saponins inhibit in vitro the aggregation induced by aggregating agents (endotoxins, collagen, arachidonic acid, adenosine diphosphate) platelets. Some observations on the mechanism of action have been made, such as increase in cAMP levels in platelets, decreased production and release of thromboxane (TBX) and inhibition of the production of prostacyclin (PGI<sub>2</sub>). Ginsenoside R0 inhibited the conversion of fibrinogen into fibrin, induced by thrombin at concentrations of 0.1-1.0 mM, since the Rb1, Rb2, Re, Rg and ginsenoside Rg2 promote the action of urokinase that activates the conversion of plasminogen into plasmin, which, in turn, degrades the fibrin network<sup>28</sup>.



- **Anti carcinogenic Activities:** The significant antitumor properties of ginseng saponins are known to be the result of their anti-inflammatory, anti-proliferation, anti-metastasis, and anti-angiogenesis effects, and reversal of multi-drug resistance. In addition, their low toxicities and few side effects make them a promising prospect for anticancer research. Ginseng saponins exert anticarcinogenic effects both in vitro and in vivo through various mechanisms, including direct cytotoxicity, growth suppression, differentiation induction, and metastasis inhibition<sup>28</sup>.

## CONCLUSION

We have collected information regarding anthracene glycosides through several articles published by various authors regarding the anthracene glycosides in different countries. In this review we try to collect pharmacognostic and pharmacological actions and effects of anthracene glycoside. These glycosides majorly used as a purgatives and besides to this it also used as an antidepressant, anticancer, anti-inflammatory, antiseptic. Also contains various uses of anthraquinone glycosides. To get the pharmacological effects of the various plants this includes in an anthraquinone glycosides.

Cardiac glycoside is important class of glycosides in terms of pharmacological action in which all the plants coming under this class including digitalis, European squill, Indian squill, Ouabain, strophanthus and thevetin shows cardio tonic activity. Cardiac glycoside are class of organic compound that increase the output force of the heart and decrease its rate of contraction by inhibiting the cellular sodium potassium ATPase pump. Cardiac glycoside are majorly classified into two types according to lactone ring present in their structure i.e. Cardiolides and bufadienolides. Digitalis is the important drug of cardiac glycoside obtained from dried leaves of the common foxglove (*digitalis purpurea*) which is most commonly used to restore adequate circulation in patient with congestive heart failure particularly caused by hypertension and also inhibiting the sodium potassium ATPase pump.

This review shows that saponin has two main parts: steroidal and pentacyclic triterpenoids saponins. Here in this review the data for pharmacognostic and pharmacological activities of saponin are collected and added the data of chemical structures. Saponins can be utilized as insecticidal, antibiotic, fungicidal, and for their other pharmacological activities like hypolipidemic activity, Anti-inflammatory, Anti carcinogenic activity. It also shows effect of saponin on Animal reproduction, Cell membrane permeability, Antioxidant potential, Blood clotting.

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