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Preliminary Phytochemical Evaluation for Glycosides in Bark of Selected Local Trees of Korba and Janjgir-Champa District Border Region

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ABSTRACT
Herbal biomolecules are chemicals that have definite biomolecules including alkaloids, terpenoids carbohydrates,proteins,lipids, glycosides,essential oils etc. Herbal glycosides are secondary metabolites including cardiac glycosides , anthraquinone glycosides ,coumarin glycosides , cyanogenic glycosides, flavonoid glycosides, phenolic glycosides and saponin glycosides . Herbal glycosides are used as medicines and therapeutic agent. Present investigation was undertaken with the main objective to preliminary phytochemical screening of herbal glycosides in the bark of selected local trees Pongamia pinnata, Terminalia arjuna, Bridelia retusa, Soymida febrifuga and Cassia fistula in 50% ethanolic-hydro extract.

Keywords
Herbal glycoside, Aglycone, phytomedicines, cardiac glycosides,ethanomedicinal.

I. INTRODUCTION

A glycoside is an organic compounds usually of plants origin and comprising a sugar portion linked to a non-sugar moiety in a particular manner. The non-sugar moiety is called aglycone or genin,whereas sugar part is known as glycone. The linkage between the sugar and the aglycones is a hemiacetal linkage formed by the reducing group (usually aldehydes or keto group) of the sugar and alcoholic or phenolic hydroxyl group of the aglycone. The aglycone part is responsible for physical, chemical,therapeutic and pharmacological activity. Whereas sugar facilitates the solubility and absorption of the glycoside helping it to reach the site of action (Amul Kumar Dhara et.al. 2022 and pharmacotutor org.) Glycosides are soluble in water and dilute alcohol and easily hydrolysed by mineral acid, water and enzyme (glycoside hydrolases, glycosyl transferases).Classification of the glycosides is given based on linkage and aglycone part in table 1.1 and 1.2 respectively.

Table – 1.1
Classification of Glycosides based on linkage

Types of Glycoside	Glycone + Aglycone	Glycosidic linkage	Examples
C- Glycosides	Glycone –**OH** + **HC**-Aglycone	Glycone-**C**-Aglycone + H_2O	Cascaroside (Anthraquinone glycoside)
O- Glycoside	Glycone –**OH** + **HO**-Aglycone	Glycone-**O**-Aglycone + H_2O	Senna, Rhubarb
S- Glycoside	Glycone –**OH** + **HS**-Aglycone	Glycone-**S**-Aglycone + H_2O	Sinigrin (Isothiocynate Glycoside)
N- Glycoside	Glycone –**OH** + **HN**-Aglycone	Glycone-**N**-Aglycone + H_2O	Nucleosides of **DNA** and **RNA**

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Table – 1.2
Classification of Glycosides based on Aglycone (Genin)

Types of Glycoside		Glycone	Aglycone	Examples
Cardiac glycosides		Sugar (Digitoxoe)	steroidal nucleus	Digitoxin (Digitalis)
Anthraquinone glycosides		Sugar	Derivative of polihydroxy anthraquinone	Senna, Rhubarb and Aloes
Coumerin glycosides		Sugar	Coumerin (Benzopyrone ring)	Psoralin, Corylitolin (Psoralia corylifolia)
Cynogenic glycosides		Sugar	Cynide (CN) (Benzaldehyde cyanohydrin)	Amygdalin (Almonds)
Flavonoids glycosides	Nesperidin	Rutinose	Hesperetin	Hesperedin
	Naringrin	Rutinose	Naringenin	Naringrin
	Rutin	Rutinose	Quercetin	Rutin
	Quercitrin	Rhamnose	Quercetin	Quercitrin
Phenolic glycoside		Sugar	Simple phenolic	Arbutin (Berberry)
Thioglycosides		Sugar	Sulpher	Sinigrin (Black musterd)
Saponin glycosides		Sugar	Steroidal or Terpenoidal nucleus	Diosgenin (Dioscorea bark)

Herbal glycosides are widely used as phytomedicines for the treatment of a variety of diseased conditions. flavonoids contained in berries may have a positive effect against parkinson's disease and may help to improve memory in elderly people (Shashank Kumar and Abhay Kumar Pandey:2013).Long term users of digioxin appear to have a significantly reduced risk to develop prostate cancer (Oliverkeep et al:2012). The border region of Korba and Janjgir- Champa district is speciefic for its vegetation including various herbs, shrubs and trees. The bark of some trees are being used as medicines and therapeutic agent for a long ago. The main aim of the present investigation is to explore alternative valuble sources of herbal glycosides in selected plant in the border region of Korba and Janjgir- Champa district . Some important glycosides are listed with their mechanism of action in table 1.3

Table 1.3
Glycosides with their mechanism of action

Glycosides	Action
Cardiac glycosides	Great efficacy in numerous heart ailments, for example – congestive heart failure, arrhythmia, cardiotonic
Anthraquinone glycosides	Laxative and purgative
Flavonoids glycosides	Strengthen blood capillaries by decreasing its fragility, antioxidant
Coumerin glycosides	Dilate coronary arteries, block calcium channels antispasmodics, antibiotics, antileprotic
Phenolic glycoside	Urinary antiseptic effect
Alchoholic glycoside	Antiinflamatory, antipyretic and analgesic
Saponin glycoside	Expectorant, Antiinflamatory, diuretics, urinary tract disinfectants
Cynogenic glycosides	Sedative and hypnotic

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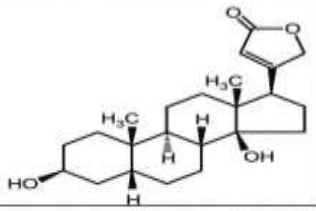
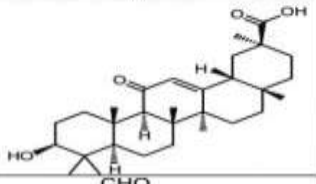
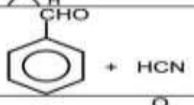
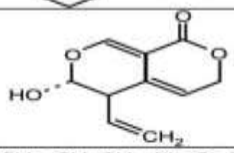
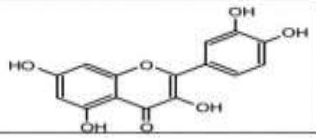
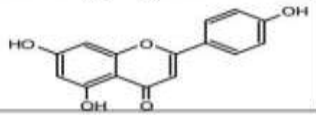
Molecular structure of glycosides

Type of glycoside	Aglycone part	Structure	Examples	Constituents
Sterol or cardiac	Digitoxigenin		Digitalis	Digitoxin
Saponin	Glycyrrhetinic acid		Liquorice	Glycyrrhizin
Cyanogentic	Benzaldehyde and Hydrocyanic acid		Bitter Almond	Amygdalin
Bitter	Mesogentiogenin		Gentian	Gentiopicrin
Isothiocynate	Allylisothiocyanate	CH_2-CH-CH_2-N=C=S	Black Mustard	Sinigrin
Flavonoid	Quercetin		Ruta	Rutin
Coumarin glycoside or furano coumarine	Apigenin		Celery	Apiin

II. MATERIAL AND METHODS

Plant material

All the selected plants ware collected from Sukhari Kala Village (22° 2″N 82° 44′40″E) Kartala tehsil of Korba district chhattisgarh state India during 3rd week of October 2022. These plants were identified, authenticated and classified by Prof. Neelima Pandey, Department of Botany Govt. M.M.R.P.G.College Champa (Janjgir-Champa) Chhattisgarh, India. Description of the trees are given in the table 1.4

Table – 1.4
Description of the trees

SN	Local Name of the Trees	Hindi Name of the Trees	Botanical Name of the Trees	Family
1	Karan	Karanj	Pongamia pinnata	Fabaceae
2	Kauha	Arjuna	Terminalia arjuna	Combretaceae
3	Kasahi	Kassi	Bridelia retusa	Phyllanthaceae
4	Rohina	Indian Redwood	Soymida febrifuga	Meliaceae
5	Bhalumusar	Amaltas	Cassia fistula	Fabaceae

Washing and Drying

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The bark of collected plants were washed thoroughly 3 times in running tape water and dried in shade at room temperature for 24 days. The dried bark of each selected trees were ground well separately to a fine powder with mechanical grinder and kept in polythene lock bags until further experiment.

Preparation of extract

5 gm. of powdered bark sample of each selected trees were macerated separately in 100 ml. of water: ethanol solvent (1:1) for 48 hours with vigorously agitated many time and filtered using filter paper no.1

Preliminary phytochemical screening of bark extract of selected trees sample

Chemical tests for cardiac glycoside

(A) Keller Killiani Test

To 2mL of extract 2mL of glacial acetic acid add cone H_2SO_4 carefully, appearance of brownish-green ring at the junction of two reagents indicates the presence of cardiac glycoside (de-oxy sugar of cardenolids).

(B) 2mL of extract add 2mL pyridine and a few drops of 2% sodium nitropruside and 20% of NaOH, appearance of pink or red or deep red or brownish colour indicates the presence of cardiac glycoside.

(C) Salkowski Test

To 2mL of extract was dissolved with 2mL of chloroform and conc. H_2SO_4 Carefully added, appearance of yellow coloured ring turn to red or reddish brown at the interface, indicates the aglycone portion of the cardiac glycoside.

(D) Liebermann's Burchard's Test –To 2mL of extract, 2mL of acetic acid and conc. H_2SO_4 carefully added and cool appearance of brownish green colour indicates presence of cardiac glycoside (steroidal nucleus).

(E) Raymond's Test – To 2mL of extract, add 0.1mL of 1% m- Dinitrobenzene in ethanol and add 2-3 drop of 20% NaOH, appearance of violet colour indicates the presence of cardiac glycoside (active methelene group).

Chemical Test for flavonoid glycoside

(A) Shinoda Test-To 2mL of extract add a pinch of zinc turings and dil. HCL ,appearance of deep red colour turns to magenta colour indicate the presence of flavonoid glycoside.

(B) 2mL of extract add 2mL of dil. NaOH appearance of reddish golden colour ppt. indicates the presence of flavonoid glycoside.

(C) 2mL of extract add 2mL of 10% Lead acetate solution appearance of light yellowish green ppt. indicates the positive result of flavonoid glycoside.

Chemical Test for coumarin glycoside

(A) Fluorescence Test-2mL of extract add 1M-NaOH solution generation of blue- green fluorescence indicates presence of coumarin glycoside.

(B) 2mL of extract add few drops of alcoholic $FeCl_3$ solution appearance of dark green colour turns to yellow after some time on addition of conc. HNO_3 indicates the presence of coumarin glycoside.

Chemical Test for Anthraquinone glycoside

(A) **Borntrager's Test**-2mL of extract add 10mL of benzene filter and add 5mL of 10% ammonia solution appearance of reddish colour indicates presence of anthraquinone glycoside.

(B) **Combined anthraquinone Test**-2mL extract add dil. H_2SO_4 filtered add benzene and ammonia solution red colouration of ammonia phase indicates the anthraquinone glycoside.

Chemical Test for Saponin glycoside

(A) Foam Test -2mL of extract add 10 to 20mL of distilled water and shake well generation of foam indicates the presence of saponin glycoside.

(B) Benedicts Test-2mL of extract add 2mL of Benedict's reagent appearance of blue black ppt. indicates the presence of saponin glycoside.

Chemical Test for Cyanogenic glycoside

(A) Ferriferrocyanide Test-2mL of extract add 2mL of alcoholic KOH then transfer it to aqueous solution of $FeSO_4$ and $FeCl_3$ solution keep it on room temperature for 10 minutes then transfer the content 60-70 centigrade to 20%HCL appearance of Prussian blue colour indicates the presence of cyanogenic glycoside.

Chemical Test for Phenolic glycoside

2mL of extract add $FeCl_3$ solution drop by drop appearance of bluish black ppt. indicates the presence of phenolic glycoside.

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Table 1.5
Preliminary phytochemicals screening for herbal glycosides of bark extract of selected trees

Types of glycosides	Chemical test	Pongamia pinnata	Terminalia arjuna	Bridelia retusa	Soymida febrifuga	Cassia fistula
Cardiac glycoside	Keller Killiani Test	+	+	+	+	+
	Legal Test	-	+	+	+	+
	Salkowski Test	+	+	+	+	+
	Liebermann's Burchards Test	+	+	+	+	+
	Raymond's Test	-	-	-	-	-
Flavonoid glycosides	Shinoda Test	-	-	-	-	-
	NaOH Test		+	+	+	+
	10% Lead Acetate Test	+	+	+	+	+
Coumarin glycosides	Fluorescence Test	-	-	-	-	-
	Alcoholic $FeCl_3$ Test	-	+	+	+	+
Anthraquinone glycosides	Borntrager's Test	-	+	-	-	-
	Combined Anthraquinone Test	-	-	-	+	-
Saponin glycoside	Foam Test	+	+	+	+	+
	Benedict's Test	+	+	+	+	+
Cynogenic glycosides	Ferriferrocyanide Test	-	-	-	-	-
Phenolic glycoside	$FeCl_3$ Test	-	+	+	+	+

(+) = Present/Positive result and (-) = Absent/Negative result

III. RESULT AND DISCUSSION

Preliminary phytochemical screening of plants is important in presence or absence of certain important bioactive compounds.The detection of bioactive principles which is a new source of therapeutically and industrially valuble compound that may lead to discovery of glycoside based new and modified drugs.In the present study the presence of seven glycosides in ethanolic extract of bark of Pongamia pinnata,Teminalia arjuna,Bredelia retusa,Soymida febrifuga and Cassia fistula and results are shown in Table 1.5.

In the ethanolic extract of bark of selected trees showed the presence of cardiac glycoside,flavonoid glycoside and saponin glycosides in all selected samples.Coumarin and phenolic glycosides are present in all samples except Pongamia pinnata.Anthraquinone glycosides are present in only Terminalia arjuna and Soymida febrifuga.Wheares cynogenic glycosides are absent in all selected samples.

IV. CONCLUSION

The selected ethanomedicinal trees are source of herbal glycosides.These trees play vital role in preventing and curing various diseases.The above mentioned trees are used for discovering and screening of phytochemical constituents which are very helpful for manufacturing herbal glycoside based new drugs.Border region Janjgir-Champa and Korba district are rich in these trees source and rich sources of the hebal glycoside.This sources are required to grow and conserve for future prospect.

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