Examining six medicinal plants for sickle cell disease management through preliminary phytochemical screening

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Abstract

Sickle cell disease (SCD) can be managed with the use of medicinal herbs. Because they are culturally alignment and cannot afford care provided by conventional medical practitioners, the states lower classes mostly rely on traditional medicine. Six species of medicinal plants from SCD prone regions of the states have been chosen for analysis of their Preliminary phytochemical content, which are now being utilise to treat the illness. Alkaloids, Anthocyanins, Anthraquinones, Anthracene glycosides, Aucubins, Coumarins, Fatty acid, Iridoids, Phenol, Phlobatanins, Saponins, Steroids, Tannins, and Terpenoids are amongs the phytochemical elements that are qualitatively analysed

Key words : Medicinal plants, sickle cell disease, phytochemical content,

Sickle cell disease (SCD) is monogenic illness that is autosomal recessive inheritance and one of most prevalent in world¹. In 1910 Grenadan medical student's distinctive sickleshaped red cells were originally identified by physician James Herrick. Sickle haemoglobin (HbS) was initially identified as molecular illness in 1949 by Linus Pauling and others who demonstrated that the protein had change electrophoretic mobility. One amino acid alteration between the haemoglobin molecule was cause of sickle cell haemoglobin as,

Vernon Ingram found a few years later in 1957.^{2,3}. The disease results from A single base A>T mutation in the triplet encoding the sixth residue of the β -globin chain cause the disease when value substituted for glutamic acid and resulting in aberrant the abnormal haemoglobin S (HbS). One of the diseases that primarly affect people in Africa, South America and Asia is Sickle-cell disease (SCD), also known as sickle-cell anaemia⁴. It is an autosomal recessive genetic blood disorder with over dominance that is characterized by

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red blood cells that have a banana, crescentmoon or sickle shaped and become abnormal rigid. The sickle gene is common in northern Satpura mountain in some area of Marathawada and in all eastern districts Maharashtra, India which is commonly referred to as Vidarbha region. Additionally it is anticipated that there will be over 5000 cases sickle cell anaemia in the district of Chandrapur, Gadchiroli, Bhandara, Nagpur, Yavtmal, and Nandurbar⁵. Hydroxyurea, piracetam, calcium antagonists are potential treatments for allopathy that can raise the foetal haemoglobin rate (HbF). However they can be harmful especially if used over an extended period of times^{5,6}. This research has been on going to ascertain the possible therapeutic benefits of natural goods including nutritional supplement, medicinal herbs, in treating sickle cell disease. Even though some researchers are oppose the use of natural supplements to treat sickle cell disease⁷. Many SCD patients successfully manage their sickling erythrocyte in Gadchiroli by using variety of natural products made from plants that are readily available in their local area. In this study, six medicinal plants were chosen since phytochemical characterization is crucial for SCD patient health. The ability of ethanomedicinal plant extracts to stop erythrocytes

from de-forming and losing its integrity has been discovered⁸. Documented the antisickling properties of aqueous fractions and crude methanol extracts of *Plumbago zeylanica* and *Uvaria chamae* root *in vitro*.

Collection of plant materials :

With assistances Department of Botany, M. G. college Armori & Department of Botany, N. H. College, Bramhapuri six medicinal plants parts were gathered from various localities in Gadchiroli and identified. List of plants (Table-1) species chosen for present study. After being cleaned, washed and sliced into bits, the plant components were allowed to air dry at room temperature. After that the samples were ground into powder using plant material and an electrical mechanical grinding equipment.

Extraction :

Each of dry powdered plant components weight 5g, and they were soaked in 50 ml of methanol for 24 hours at room temperature to create methanol extracts. Onces a day had passed, the extract were first filtered using a 125 mm Whatmann filter paper No. 42. For ten minutes, the filtered was centrifuged at

Sr. No.	Botanical name	Common name	Family	Part used
1.	Acacia catechu (L.f.) Willd	Khatta	Mimosaceae	Bark
2.	Adansonia digitata L Gorkhchich Malvaceae		Malvaceae	Bark
3	Cajanus cajan L.	Tur	Fabaceae	Leaf
4.	Carica papaya L.	Рарауа	Caricaceae	fruit
5.	Terminalia arjuna L.	Arjuna	Combretaceae	Bark
6.	Terminalia catappa L.	Badam	Combretaceae	Leaf

Table-1. Details of six therapeutic plant species that the tribal people of Gadchiroli district utilized to treat sickle cell disease

(1238)

Sr.no.	Phytoconstitutent	Test	Observation	
1	Alkaloids tests			
	1. Wagner's Test	2ml extract+5 ml of aqueous HCl then	Brown precipitate with	
	2. Mayer Test	filtered and divided into four test tubes	Wagner's reagent	
	3. Dragendroff's	each tested with wagner's, Mayer's,	Yellowish white	
	Test	Dragendroff's reagent and fourth	precipitate with	
		served as blank	Mayer'sreagent	
			Orange precipitate with	
	4. Hager's Test	2ml extract + few drops of Hager's	Dragendroff's reagent	
		reagent	Yellow precipitate with	
			Hager's reagent	
	Aucubins	Aucubins2ml Extract + a few drops of ferric		
	aluminum chloride	chloride solution (FeCl ₃).		
	(AlCl ₃) tests	Shake gently		
	Iridoids (Bornträger's Test)	2ml Extract + 2ml of dilute sulfuric acid (H ₂ SO ₄) shake mixture gently then add few drops chloroform (CHCl ₃)	A red or pink color in the chloroform layer	
2	Anthraquinones (Borntrager's Test)	3ml extract + 3ml Benzene + 5ml NH ₃ (10%)	Pink, Violet or Red coloration inammonical layer	
3	Anthocyanins	2ml extract + 2ml HCl (2N) + NH ₃	Pinkish red to bluish violetcoloration	
4	Anthracene glycosides	Evaporated residue + 5 ml of ethanol+25% NH ₄ OH	Red color	
5	Coumarins	2ml extract + 3ml NaOH (10%)	Yellow coloration	
6	Fatty acid and lipid	A portion of extract was evaporated on filter paper	Translucent spot on Filter paper	
7	Flavonoids	Evaporate extract collect residue + Magnesium powder +conc. HCl	Red or Yellow coloration	
8	Phenol	4ml extract + 2ml ethanol + 2-3 drops FeCl ₃ (5%)	Red coloration	

 Table-2.
 Initial screening tests for phytochemical in plant extracts

9	Phlobatanins	2ml extract + 2ml HCl (1%) + heat	Red precipitate	
10	Saponins	a) 5ml extract + 5ml H_2O + heat	Froth appears	
	(Foam Test)	b) 5ml extract + Olive oil (few drops)	Emulsion forms	
11	Steroids	2ml extract + 2 ml CHCl ₃ + 2 ml	Reddish brown ring at	
	(Salkowski Test)	H_2SO_4 (conc.)	junction	
12	Tannins	2ml extract + 2 ml H ₂ O + 2 - 3 drops	Green precipitate	
		FeCl ₃ (5%)		
13	Terpenoids	2ml extract + 2 ml (CH ₃ CO) 2 O + 2 - 3	Deep red coloration	
		drops conc.		

Table-3. Finding from the initial phytochemical analysis of six medicinal plants

	Ŭ T	4 .	4 1		<i>a</i> .		<i>T</i>
		Acacia	Adan-	Cajanus	Carica	Termi-	Termi-
Sr.	Plant name with	catechu	sonia	cajan	рарауа	nalia	nalia
no.	its part	(L.f.)	digitata	L.	L.	arjuna	catappa
		Willd	L.			L.	L.
	Part usedTest	(Bark)	(Bark)	(Leaf)	(Unripe	(Bark)	(Leaf)
					Fruit)		
1	Alkaloids						
	1.Wagner's Test	+	+	+	+	+	+
	2.Mayer Test	+	+	+	+	+	+
	3.Dragendroff's Test	+	-	-	+	+	+
	4. Hager's Test	+	+	+	+	+	+
2	Aucubins	-	+	-	-	+	+
3	Iridoids	-	+	-	-	+	+
4	Anthraquinones	-	+	+	-	+	+
5	Anthocyanins	+	+	+	-	+	+
6	Anthracene glycosides	+	-	-	-	+	+
7	Coumarins	-	-	-	-	-	-
8	Fatty acid and lipid	+	+	+	+	+	+
9	Flavonoids	+	+	+	+	+	+
10	Phenol	+	+	+	+	+	+
11	Phlobatanins	+	+	-	-	+	-
12	Saponins	+	+	+	+	+	+
	(Foam Test)						
13	Steroids	+	-	-	-	+	-
	(Salkowski Test)						
14	Tannins	+	-	+	-	+	-
15	Terpenoids	+	+	-	-	+	-

3000 rpm and supernatant was kept in refrigerator in amber colour sterile glass vials for additional phytochemical analysis.

Preliminary Phytochemical Screening :

The aforementioned six extract were first screened for different phytochemical constituents using standard technique as detailed in (Table-2) ^{9,10}.

Methanolic extracts of various portion of six medicinal plant species have undergone Preliminary phytochemical screening using the procedure outline in (Table-2) of the literature. Alkaloids, Anthocyanins, Anthraguinones, Anthracene glycosides, Aucubins, Coumarins, Fatty acid, Iridoids, Phenol, Phlobatanins, Saponins, Steroids, Tannins, and Terpenoids were among the many phytoconstituent found in observed data. Provided a summary of the findings examined in (Table-3). These substances are all well known for their physiological effects¹¹. Alkaloids, tannins and flavonoids are classes of compound that have shown to increase tissue regeneration, reduce blood capillaries permeability and increases haemolysis resistance. Additionally, its antibacterial activity, an-inflammation capability and antioxidant quality have all been emphasised in research^{12,} ^{13,14,15}. Polyphenols and their derivatives are among these substances that have shown to have antisickling properties¹⁶. Their uses in traditional medicine may be partially examined by the presences of sterols polyterpenes, polyphenols, flavonoids, catechic tannins and alkaloids.

Preliminary phytochemical test result of plants part utilised by tribal people in Gadchiroli area to treat sickle cell illness were documented in this study. This study's first phytochemical screening verified that they contain variety primary and secondary metabolites. According to the finding this study several secondary metabolites with antisickling quality found in all plants have been documented by different researcher. Additionally this research provide fundamental information for workers interested in treating sickle cell disease.

Authors are thankful to Dr. Prasant Jakhi, Principal & Mr. Amar Kuril, Assistant Professor, Department of Botany, Government Science College. Authors are also thankful to Mr. Devilal Watahkere, Assistant Professor, Department of Botany, RMG College Saoli. Authors are also thankful to Tribal people (Vaidu) for providing information of plants. Authors are again thankful to Dr. V.N. Kahalkar, Department of Botany, Mahatma Gandhi College, Armori for identification of plants.

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