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A Comparative Phytochemical Study of *Aloebarbadensis* Miller Collected From Two Different Habitats

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ABSTRACT

Aloe barbadensis Miller is considered as an important plant since years ago. Egyptians used to draw pictures of Aloe vera plant on walls of temples. They had even elevated the plant to 'god like' status. Plant had also earned the name as "Plant of immortality".This drug contains many chemical constituents likevitamins A, C and E, B_1, B_2, B_3, B_5, B_6, B_{12}, folic acid and choline, essential amino acids like alanine etc., enzymes like aliiase, alkaline phosphatase, amylase etc., minerals likecalcium, chromium etc.,monosaccharides, polysaccharides, anthraquinones,fatty acids,auxins and gibberellins, salicylic acid, lignins and saponins. It is xerophytic plant, grown in warm tropical areas (104^0F). Slightly acidic, sandy, loamy soil, moderately fertile soil and fast draining,natural rainfall are required for its cultivation, Jaipur is warm tropical region with sandy soil and less rainfall. This region is most suitable for cultivation of xerophytic plant. Jogindernagar(H.P.) is 4000 to 5000 ft. high from sea level, having heavy rainfall and colder temperature. Keeping in mind its value in therapeutics, this study was done to evaluate the differences or similarities in its chemical constituents, for betterment of its efficacy. Mature leaves of drug were collected from two different habitats i.e.,, first sample from herbal garden of national institute of Ayurveda Jaipur, India and second from herbal garden Jogindernagar H.P. India. Drugs obtained from both gardens were morphologically similar but H.P. species was not fully nourished. Phytochemical analysis showed that sample procured from Jaipur city was richer

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in carbohydrates, anthraquinones, proteins and cardiac glycosides than H.P. drug. Hence the drug grown in its natural habitat is better than adapted environment and habitat.

KEYWORDS

Aloe barbadensis, Cultivation, Habitats, Phytochemicals, Anthraquinones,

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INTRODUCTION

Aloe barbadensis Miller is considered as a important plant since years ago. Aloe vera had arrived to India and Persia in 600 BC. The Arabians called Aloe the 'Desert Lily' for its internal and external uses. They discovered a method to separate the inner gel and the sap from outer rind. With their bare feet they crushed the leaves and then they put the pulp into bags which were made up of goat skin. The bags were set in the sun to dry and the Aloe would become a powder[1].

This drug contains many chemical constituents like vitamins A, C and E, B_1, B_2, B_3, B_5, B_6, B_{12}, folic acid and choline, amino acid, essential amino acids like alanine, arginine, etc.,10 enzymes: aliiase, alkaline phosphatase, amylase etc. Minerals like calcium, chromium, selenium, magnesium, manganese, zinc, copper, iron, potassium, phosphorus and sodium, monosaccharides,polysaccharides,12 anthraquinones4 plant steroids like cholesterol, campesterol, β-sisosterol,lupeol. auxins and gibberellins ,salicylic acidlignin and saponins[2].

It grows in dry land. It isxerophytic plant, grown in warm tropical areas (104^0F) and cannot survive in freezing temperatures because its vital nutrients can be damaged at temperatures of 40^0F or below. It can even handle severe drought conditions. Slightly acidic, sandy, loamy soil, moderately fertile soil is the best suited for it. Fast draining is must as Aloe vera plant as it itself contains lot of water and it will wilt if the soil is not fast draining. Natural rainfall or 1-2 irrigations in hot seasons are required for its cultivation[3].

Jaipur is warm tropical region with sandy soil and less rainfall. This region is most suitable for cultivation of xerophytic plant. Jogindernagar h.P. is 4000 to 5000 ft. high from sea level, having heavy rainfall and colder temperature. But this plant is grown in every yard due to its medicinal properties. Keeping in mind its value in therapeutics, this study was done to evaluate the differences or similarities in its chemical constituents, for betterment of its efficacy.

MATERIALS AND METHODS

Collection of drug

After proper identification of species, samples of drug were collected from two different habitats i.e., first sample from herbal garden of national institute of Ayurveda Jaipur, India and second from herbal garden Jogindernagar H.P. India.

Preparation of extracts[4]

Five millilitre of the gel obtained from Jaipur was weighed accurately and 100 ml of distilled water was added to it. It was stirred intermittently in the initially~~period~~and then kept covered overnight. The next day it was filtered and 25 ml of thisfiltrate was poured in already weighed evaporating dish with the help of pipette.Then this water was evaporated by placing evaporating dish on a water bath. After that it was dried in an oven, cooled and residue was weighed immediately to obtain the percentage of water soluble extractive which is expressed as % w/w. Similarly extracts of methanol, petroleum etherwerealsoprepared. Similar method of preparation was followed for extracts of sample from H.P.

Qualitative Phytochemical Tests[4]

- **Tests for carbohydrates-**

Fehling's test- To observe brick red colour, Fehling's A and Fehling's B reagents were mixed and few drops of sample were boiled with it.

Molisch's test- To observe purple to violet colour ring at the upper end of test tube, sample was treated with few drops of alcoholic alpha naphthol and pouring 0.2ml of concenterated sulphuric acid slowly through the sides of the test tube.

Benedict's test- To observe reddish brown precipitate, few drops of Benedict's reagent were put into sample and boiled on water bath.

Test for Alkaloids

Wagner's test- To observe reddish brown precipitate, sample was treated with 0.5 ml Wagner's reagent

Hager's test- To observe yellow precipitate, sample was treated with 0.5 ml Hager's reagent.

- **Test for Phenolic Compounds**

Ferric chloride test- To observe blue green colour, sample was treated with 2-3 drops of ferric chloride

- **Test for Flavonoids**

Alkaline reagent test- To observe formation of an intense yellow colour, which turns to colourless on addition of few drops of dil. acid, when sample isaddedto few drops of sodium hydroxide solution.

- **Test for Proteins & Amino Acids**

Millons test- To observe white precipitate which turns red upon gentle heating, sample was treated with 2ml of Millons reagent.

Ninhydrin test- To appear violet colour, when sample is boiled with 0.2% solution of Ninhydrin.

- **Test for Saponin Glycosides**

Froth Test- 1ml solution of sample was put in water in and shaken well and noted for a stable froth.

Foam Test- 2 ml of aqueous extract was shaken well and noted the foam which should remain as it is when test tube is allowed to stand still.

- **Test for Anthraquinone Glycosides**

Borntrager's test- To observe rose pink to red colour sample was Boiled with 5ml of ferric chloride for 5min and then added equal amount of benzene in it and shake well then allowed it to stand still for 5 min followed by separating the benzene layer and adding ammonia solution to it.

- **Test for Cardiac Glycosides**

Legal's Test- To observe pink to blood red colour, 2 ml of ammonia solution is added in sodium nitropruside then mixed sodium hydroxide in it, allowed to stand still for few minutes then added 2 ml of sample in it.

- **Test for Sterols &Triterpenoids**

Salkowski test- To observe red colour for presence of Steroids and formation of yellow coloured lower layer which indicates the presence of Triterpenoids, sample is treated in chloroform with few drops of conc. Sulphuric acid, shaken well and allow standing for some time

- **Tests for Aloe**[5]

For these tests, 1 g of aloe powder was boiled with 10 ml of water and filtered.

Bromine test- To observe pale yellow precipitate of tetrabromaline, freshly prepared bromine solution was added to a small quantity of above filtrate.

Borax test- To observe green fluorescence little quantity of above filtrate was treated with borax, shaken well till then few drops of this solution were added to a test tube nearly filled with water.

OBSERVATIONS AND RESULTS

Qualitative Phytochemical Tests of Jaipur sample and H.P. sample of *Aloe barbadensis*Miller (Table 1 and 2)

Table 1 Phytochemical Tests of Jaipur sample and H.P. sample

	EXPERIMENT	OBSERVATION				INFERENCE
		Jaipur sample		H.P. sample		
		A.E.	W.E.	A.E.	W.E.	
1.	**Extractive Values**	32.36%	66.4%	30.6%	61%	More extractive value of jaipur sample
2.	**Tests for Alkaloids**					
	Wagner's test	-	-	-	-	No Presence of Alkaloids in both samples

	Hager's test	-	-	-	-	No Presence of Alkaloids in both samples
3	**Tests for Glycosides**					
	Borntrager's test	+	+	-	-	Glycosides present in jaipur sample but absent in H.P. sample
	Legal's test	+	-	+	-	Glycosides present in methanol extract of both samples
4	**Tests for carbohydrates**					
	Molisch's test	-	+	-	-	Carbohydrates were present in water extract of jaipur sample
	Benedict's test	-	-	-	-	Reducing sugars were absent in both samples
	Fehling's test	-	-	-	-	Glycosides present in jaipur sample but absent in H.P. sample
5	**Tests for Tannins & phenolic compounds**					
	Gelatin test	-	-	-	-	Tannins & phenolic compounds were absent in both samples
	Ferric chloride test	-	-	-	-	Tannins & phenolic compounds wereabsent in both samples
6	**Tests for saponins**					
	Foam test		+		+	Saponins were present in both samples
	Froth test		-		-	
7	**Tests for Flavanoides**					
	Alkaline reagent test	-	+	-	+	Flavanoides were present in water extracts of both samples
8.	**Tests for Proteins &amino acids**					
	Millon's test	-	-	-	-	
	Ninhydrin test	+	+	-	+	Proteins &amino acids were present in both samples
9	**Tests for phytosterols**					
	Salkowski test	+	-	+	-	Phytosterols showed their presence in alcoholic extracts of both samples

Table 2 Chemical Tests of Jaipur sample and H.P. sample

	General tests for aloe	Jaipur sample	H.P. sample
1.	Bromine test	-	-
2.	Borax test	+	-

DISCUSSION

Phytosterols were present in alcohol extract of both Jaipur sample and H.P. sample, suggestive of the solubility of phytosterols in alcohol but not in water[6].**Fehling's test and Benedict's test** were negative in both extracts of Jaipur sample and H.P. showing absence of **reducing sugars**. This includes all **monosaccharide** and many **disaccharides**. **Molisch's test** is significant

for **monosaccharides, disaccharides and polysaccharides** which was positive in aqueous extracts of Jaipur sample but not in H.P. sample which is suggestive of solubility of polysaccharides in water only and enrichment of carbohydrates in natural habitat. **Flavanoides** were presents in aqueous extracts of both samples, **alkaloids** may be absent in the both samples, **Protiens and cardiac glycosides** were present in aqueous extracts of H.P. sample but in both extracts of Jaipur sample, **Saponins** were positive in both samples. **Anthraquinones** gavered colour in both extracts of Jaipur sample but pink colour in H.P. sample that may be due to less quantity of anthraquinones in H.P. sample. **Phenolic compounds and Tannins** were absent in both samples. General tests for aloe showed negative results in H.P. sample but positive in Jaipur sample, it may be present in less quantity in H.P. sample.

CONCLUSION

Drug obtained from both gardens was in mature stage and morphologically similar but H.P. species was not fully nourished. Phytochemical analysis showed that jaipur sample was richer in carbohydrates, anthraquinones, proteins and cardiac glycosides than H.P. drug. Hence drug grown in its natural habitat is better than adapted environment and habitat.

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