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Phytochemical constituents of some Algerian medicinal plants

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ABSTRACT

Some chemical compounds distribution in three plantsbelonging toLamiaceaefamilywere assessed and compared. The medicinal plants investigated were Saccocalyxsatureioïdes, Teucriumpolium, Salvia verbenacawhich*were found to contain flavonoids, tannins, and volatiloils. Saponins and alkaloids were found presente in* Saccocalyxsatureioïdes, Teucriumpoliumbut absent in Salvia verbenaca.

Key words: Medicinal plants, phytochemical constituents, *Saccocalyxsatureioïdes*, *Teucriumpolium*,*Salvia verbenaca*.

INTRODUCTION

Chemical compounds that occur naturally in plants, are responsible for color and organolepticproperties. The term is generally used to refer to those chemicals that may have biological significance but are not established as essential nutrients. Scientists estimate that there may be as many different phytochemicals having the potential to affect diseases such as cancer, stroke or metabolic syndrome[1].

For centuries, plant and plant products have been used for treating various illnesses. Today, several medicinal plants and their products are still in use, being employed as home remedies, over the counter drugs as well as raw materials for the pharmaceutical industry and they represent a substantial proportion of the global drug market [2].

Plants belonging to the Labiatae family are rich in polyphenolic compounds and a large number of them are well known for their antioxidant properties[3,4].

The plant family Lamiaceae Martinov (= LabiataeAdans., the mint family) has a world-widedistribution and comprises more than 7200 species across approximately 240 genera which areclassified in seven subfamilies[5].Among them:

Saccocalyxsatureioides Coss.et Dur., called Zaater or Azir El-ibel[6] by locals It grows naturally on the dunes of the predesertic area [7]in the Ainsefra region of Naâma south western Algeria, with a blossoming period in March. This medicinal plant is used as an ingredient in numerous local traditional medicines and mostly in the care of diabetes[8].

*Teucriumpolium*L. or Jaadah as it is known in west Algeria is a dwarf, pubescent, aromatic shrub possessing oval leaves with enrolled margins and dense heads of white flowers [9]. It is mainly Mediterranean and west Irano-Turanian and can be found in countries such as Iraq, Saudi Arabia and Egypt [10].

It is well known for its antinociceptive[11], antioxidant[12], hypolipidemic[13], anti-inflammatory, anti-rheumatoid[14], and hypoglycemic [15]properties.

Salvia is an important and diversified genus of the Lamiaceae family, with more than900 species. Commonly found in the Mediterranean regions, salvia is widely cultivated[16]and used in flavouring and folk medicine for the treatment of coronary heart diseases[17],cerebrovascular diseases[18],hepatitis, hepatocirrhosis[19]and chronic renal failure[20]. In Algerian traditional medicine, decoctions of its aerial parts werereportedly used as a cholagogue, antiseptic, diuretic and astringent[21]. *S.verbenaca* locally namedEssaffaya is particularly using in the healing of wounds[22].

The present study was designed to investigate the pharmacognosticandphytochemical properties of *Saccocalyxsatureioïdes*, *Teucriumpolium* and *Salviaverbenaca.*

MATERIALS AND METHODS

Plant materials

The aerial parts of *Saccocalyxsatureioïdes*, *Teucriumpolium*, *Salviaverbenaca* and were collectedin April, 2007were analyzed. Thereshly-cut plants were dried in a dry and shady place atambient temperature.

Plants were identified at the laboratory of Ecology and Management of Natural Ecosystems of the University of Tlemcen (Algeria).

Phytochemical tests are performed on different extracts prepared from the dried leaves and ground, using three solvents of different polarities: water, ethanol and diethyl ether. The detection method of the different families of chemical compounds co-existing is aprecipitation reaction or staining reagents. These reactions result in the appearance of turbidity, flocculation or a color change which may, depending on the intensity of the result, the concentration of certain constituents [23,24].

Preparation of ethanolic extract: The ethanolic extract was prepared by a mixture of 50 g dried powdered samples in 300 mL of ethanol under reflux for1h. The extract is filtered by using Whatman filter paper. The filtrate was used for phytochemical screening**.**

Test offlavonoids: Treat 5 mL of alcoholic extract with a few drops of concentrated HCl and 0.5 g of magnesium turnings**[**25].

Test oftannins: In a test tube,1 mL of ethanolic solution was added to 2 mL of water and 2-3 drops of diluted solution of $FeCl_3$and observed for a green, a blue black or a blue - green coloration, which shows the presence of tannins[26].

Test for alkaloids: 20mL of the extract was added to 5mL of HCl (10%). At this acidic medium heated in a water bath,was added a volume of NH_4OH (10%) until obtain a medium of pH= 9which was extracted with diethylic ether and concentrate with a rotary evaporator.The residue will be taken in 0.5 mL of HCl (2%),divide into two equal parts. The first was treated with a few drops of Mayer's reagent and the second with Wagner's reagent. Observation: turbidity or precipitation[27].

Test for steriods: After evaporation of 10mLof the ethanolic solution, the residue was taken in 10mL of $CHCl_3$, filtrates and added to 5mLof acetic anhydride and some drops of H_2SO_4.

The mixture was agitated.Thecolour changed from violet to green indicating the presence of steroids[28].

Test for sterolicheterosides and triterpenicheterosides: Amixture of 0.5mLof acetic anhydride and 0.5mLof $CHCl_3$ was added to the residue obtained after evaporation of ethanolic solution (10mL). The filtrate was treated with Liebermann's reagent Burchardt. If a solution is blue - green appears, it indicates the presence ofsterolichetero sides if it is violet- green, it indicates the presence of triterpenicheterosides[29]**.**

Test for reducing compounds:2 mL of aqueous solution was added at 1 mL of the alcoholic solution and 20 drops of Fehling's solution, heat the solution. A brick red precipitate marks the presence of carbohydrates [26].

Test of coumarins:15mL of HCl (10%) was added to 25mL of ethanolicsolution, and heated under reflux for 30min and strain the mixture. The residue was extracted with 15 mL of etherin triplicate. Divide the filtrate into three equal

parts, evaporate the first in a rotary evaporator, dissolve the residue in 1mL of water and divide the volume into two parts, treat the first with 0.5mLNH_4OH (10%), examined under ultra-violet light, fluorescence intensity indicates the presence of coumarins.

The second one was used as control [30].

Test of anthracenosides: 8 mLof the ethereal solution was treated by extractive reagent Bornträger. A positive test is revealed by the appearance of a color ranging from bright orange - red to purple – purple[30].

Test of anthocyanosides: The acidic aqueous solution was treated with NaOH. The presence of anthocyanins was confirmed by a red color at pH under 3 and blue color at a pH between 4 and 6 [30].

Preparation of diethyl etherextract: The extract was prepared by a mixture of 50 g dried powdered samples in 300 mL of diethyl ether under reflux for 1h. The extract is filtered by using Whatman filter paper. The filtrate was used for phytochemical screening.

Test of volatile oils: The residue obtained after evaporation of 20 mL of ethereal solution was dissolved in ethanol and concentrated.a residual aroma reveal a positive test[31].

Test of alkaloids bases: The resulting residue obtained was dissolved after evaporation of 10 ml of the ethereal solution in 1.5 mLof HCl 2% and add 1-2 drops of Mayer or Wagner reagent. The appearance of yellowish white precipitate indicates the presence of alkaloid bases[27].

Test of fattyacids: The alkaline aqueous solution was acidified, and then extracted with diethyl ether. The ethereal solution is then concentrated to dryness. A positive test is revealed by obtaining a greasy residue[31].

Test of emodols: 3 mL of ethereal solution was evaporated and added1 mL of NH_4OH to the resulting residue. A red orange color appears below a violet one after addition of Bornträger react if indicates the presence of emodols[30].

Preparation of aqueous extract: The extract was prepared by a mixture of 50 g dried powdered samples in 300 mL of diethyl ether under reflux for 1h. The extract is filtered by using Whatman filter paper. The filtrate was used for phytochemical screening.

Test of tannins: 1 mL of the aqueous solution was treated with 1 mL of water and 1-2 drops of dilute solution of$FeCl_3$. The appearance of a dark green color or blue-green indicates the presence of tannins[26].

Test of saponins: 2 mL of the aqueous solution was added to a little of water and then stir in a strong way[30].Persistent foam confirmed the presence of saponins.

Abandon the mixture for 20 minutes and classify content saponins:
- No foam = Negative test.
- Foam less than 1 cm = weakly positive test.
- Moss 1-2 cm = positive test.
- Foam over 2 cm = very positive test.

Test of starch:5 mL of solution prepared was treated with the reagent for starch. The appearance of a purplish blue color indicates the presence of starch [32].

RESULTS AND DISCUSSION

Qualitative analysis carried out for ethanolic, diethyl ether and aqueousextract**s**of the aerial parts of *Saccocalyxsatureioïdes*, *Teucriumpolium*, *Salviaverbenaca*showed the presence of somemedicinally activeconstituents (tables 1,2,3).

Phytochemical screening of our plant's aerial parts revealed the absolutely absence of anthocyanosides, anthracenosides, reducing compounds, steriods,triterpenicheterosides and coumarins (table 1), while Peter Y et al., (1983)[33]mentionedthat the aerial part of *Teucriumpolium* L. var. *polium*containtwo new clerodanediterpenoids, teupolin IV and teupolin V.

Alkaloids are present in *Saccocalyxsatureioïdes* and*Teucriumpolium*,but absent in *Salviaverbenaca*(tables 1, 2).

The presence of tannins in the aerial parts of ourplants was confirmed by a positive reaction with ferric chloride solution giving a dark green color, so this tannins catechists(tables 1, 3).

Table 1:Tests carried out onethanolic extracts.

compounds	***Saccocalyxsatureioïdes***	***Teucriumpolium***	***Salvia verbenaca***
Flavonoids	+++	+++	+++
Taninns	+	++	+
Alkaloids	+	+	-
Sterolicheterosides and triterpenicheterosides	-	-	-
Coumarins	-	-	-
Anthracenosides	-	-	-
Anthocyanosides	-	-	-
reducing compounds	-	-	-

Essential oils were present in significant quantity in *Saccocalyxsatureioïdes*, as reported Biondi et *al*. (2006) and Laouer et *al*. (2006) [34, 35],in less quantity in *Teucriumpolium*as found (Aburjai et al. 2006)and(Kabouche et al.,2007)[36, 37],and in more less quantity in *Salviaverbenaca* (table 2).

Table 2:Tests carried out on diethyl ether extracts

compounds	***Saccocalyxsatureioïdes***	***Teucriumpolium***	***Salvia verbenaca***
Volatile oils	+++	++	+
Alkaloids bases	+	+	-
Fatty acids	-	-	-
Emodols	-	-	-

Saponinswere found to be present in *Saccocalyxsatureioïdes*, in little quantity in *Teucriumpolium*, but absent in *Salviaverbenaca* (table 3).

Table 3:Tests carried out on aqueous extracts.

compounds	***Saccocalyxsatureioïdes***	***Teucriumpolium***	***Salvia verbenaca***
Tannins	+	++	+
Saponins	+	+	-
Starch	-	-	-

Table 4: Final results

Phytochemicalcompound		**Résultats**		
		Saccocalyxsatureioïdes	***Teucriumpolium***	***Salviaverbenaca***
Phenoliccompound	Flavonoids	+++	+++	+++
	Tannins	+	++	+
	Anthocyanosides	-	-	-
	Anthracenosides	-	-	-
	Coumarins	-	-	-
Alkaloids	Alkaloids	+	+	-
Stéroïds	Saponins	+	+	-
	Stérols and triterpènes	-	-	-
Fatty acids	Fatty acids	+	+	+
Volatile oils	Volatile oils	+++	++	+
reducing compounds	reducing compounds	-	-	-

CONCLUSION

The plants studied here can be seen as a potential source of useful drugs. Further studies are going on these plants in order to isolate, identify, characterize and elucidate the structure of the bioactive compounds. The antimicrobial activities of these plants for the treatments of the diseases as claimed by traditional healers are also being investigated.

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