Antioxidant and antimicrobial activity of flavonoid extracts of *Arnebia Decumbens (Vent)* growing in southeast Algeria.

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Introduction :

Arnebia Decumbens (Vent.) it called in the region of south east Algeria in the name « homaire », it is a small red pigment which is usually found in the crust of the roots of an herbaceous plant in the region of south Algeria. The size of the homaire does not exceed 25 cm. It is covered with stiff bristles of the latter turn into a semblance of thorns thin when they reach the plant and the beginning of drying Arnebia Decumbens (Vent.) elongated leaves and do not have a clear neck. The flowers are yellow in color and collects in nurat apical dense[1]. Herbal treatment for curing certain medical diseases is a common practice in Africa, statistically it is estimated that over 80% of the total population produced a wide array of phytochemical most of which are used from the plant. The main reason for preferring herbal treatment is to avoid the undesirable secondary effects that are commonly known as unwanted side effects of some synthetic chemical drugs[2]. Moreover, research has indicated that there is an inverse relationship between the dietary intake of antioxidant-rich foods and the incidence of human disease[3]. Two synthetic antioxidants namely butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA) which are more used in the food industry and also considered as a major contributor towards liver damage and carcinogenesis or toxic[4,5,6]. Thus, in order to avoid certain unhealthy circumstances, it is necessary to focus on others natural antioxidant extracts from plants. Several chemical compounds extracted from plant leaves, however, the most important is the flavonoids. Flavonoids are secondary metabolites ubiquitously distributed in all higher plants[7]. Flavonoids (or bioflavonoids) (from the Latin word flavus meaning yellow, their color in nature). Chemically, they have the general structure of a 15-carbon skeleton, which consists of two phenyl rings (A and B) and heterocyclic ring (C). This carbon structure can be abbreviated C6-C3-C6[8,9]. Contemporary studies confirmed the antimicrobial activity of flavonoids occurring in vegetable foods and medicinal plants. These antimicrobial activities facilitate in diverse ways such as anti-allergic, antimicrobial, anti-inflammatory, vasoprotector and anti-tumour agents respectively[10]. The fruits date is rich with phytochimicals like phenolic acids, sterols, procyanidins, flavanoids, carotenoids and anthocyanidin. Research has also revealed that the Arnebia decumbens (Vent.) Coss et Kral are beneficial in a biological and pharmacological viewpoint. Because Arnebia decumbens (Vent.) Coss et Kral contains antiviral, antibacterial, anti-inflammatory, antitumor, these activities strength the immunity system, also it contains anti-oxidant activity[11-15]. Although all studies conducted in appointments, in our knowledge, there is no scientific information and empirical evidence on the study of the plant, the ability of anti-oxidation of bacterial activity on the Arnebia decumbens (Vent.) Coss et Kral plant. There the current the study was conducted to estimate the chemical composition, the effect of an anti-microbial and anti-oxidant from the extraction of natural products effective "flavonoid" of Arnebia decumbens (Vent.) Coss et Kral plant that grows in the southeast of Algeria. It is expected that the obtained results can be taken as a guideline and might considered as a new source of agent antioxidant and antimicrobial .

Résultats :

-The methanol is a solvent extract significant amount of flavonoids compounds and recently used in several studies. It is considered as the best solvent of antimicrobial substances compared with the other solvents and given an elevated antioxidant activity. The results of extract yield of Arnebia Decumbens (Vent.) are mentioned in Table 3, which shows the extraction yield (g/100 g dry weight), the mass yield obtained for methanolic water extract of leaves from Arnebia Decumbens (Vent.) is found 10,25%.

- The identification of compounds flavonoids Extract the majority of plant extract Arnebia Decumbens (Vent.). HPLC was carried out based on the comparison of their retention times with those obtained for the same standard compounds. This comparison allowed us to confirm the presence of two major flavonoids isoquercitrin with a retention time of 30 701 min, and catechin with a retention time 10 326 min. Show in Figure 2 and table 4 with rates respectively 557 084 mg / 100 g of plant extract and 122 584 g / 100 g of plant extract, and in very small, we find a Querecetin compound with a retention time 12.622 min. Minor peaks were also recorded with retentions times ranging from 8597 min probably are phenolic compounds gallic acid with a rate of 63 676 µg / 100 g and compounds coumarine p-coumaric acid 24.015 min a time of retention, and coumarine at retention time of 25 848 min. with rates respectively 101.451µg / 100g and 82.478µg / 100 g of plant extract. Flavonoids rates are determined in plant extracts according to the calibration curve (peak areas as a function of the concentration of the standards).

- The results obtained are expressed as mg catechin equivalents per gram of dry mass (EC mg / g DM). The results of the quantitative analyzes of flavonoids in the extracts of the leaves of Arnebia Decumbens (Vent.). These results indicate that the extract from the leaves of Arnebia Decumbens (Vent.), the extract is rich in flavonoids; the results are shown in table 2. The reference compound used in the preparation of this curve is catechin. The curve is calculated with a correlation coefficient $R^2 = 0.988$.

- The total antioxidant activity of methanolic 80% leaves extracts from Arnebia Decumbens (Vent.) is 129.45 ± 3.43 mg GAE/g DW. These results exhibit strong values and confirmed the high antioxidant activity of leaves extract of Arnebia Decumbens (Vent.) founded in DPPH reducing power. Study estimated the total antioxidant capacity of Korkobb, Tunisian date fruit. The authors suppose that the highest level of flavanoid in this variety is responsible for the higher total antioxidant capacity36, the result are presented in Table 2.

- The DPPH radical scavenging activity of methanolic water extract of Arnebia Decumbens (Vent.) is represented in Figure 2. The crude extract of leaves displayed the high value (IC50=12.05±0.08 µg/mL). The antioxidant capacity of leaves extract is higher than the positive control BHT (IC50= 14.46 ± 0.06 µg/mL). The phenolic compounds were considered to be the most active antioxidant derivatives in plants and are well known as antioxidant and scavenger agent against free radicals. In living system, the free radicals are constantly generated and their associated with oxidative extensive damage to tissues. Different therapeutic approaches can be used to decrease the oxidative stress including scavenging of free radicals. Inhibition of these radicals produces enzymes and enchains antioxidant system by targeting the signaling routes. Many synthetic drugs protect against oxidative damage but they have adverse side effects. The present study showed that the leaves methanolic water extracts of Arnebia Decumbens (Vent.) have good antioxidant as well as free radicals scavenging properties.

- The diameter inhibition of leaves extract from Arnebia Decumbens (Vent.) is 13±0.6 mm. Then we can say that the bacteria Staphylococcus aureus ATCC 6816 sorting sensitive to flavonoids. The results showed that the diameter inhibition 12.5 ± 0.5 mm for Polymyxin B are against the bacteria Staphylococcus aureus ATCC 6816. Through reading the results, we conclude that the most effective flavonoids to polymyxin B because the diameter of inhibition is greater. The diameter of inhibition of leaves extract from Arnebia Decumbens (Vent.) is 14 ± 0. 5 mm, then we can say that the methicillin-resistant Staphylococcus aureus bacteria sensitive to the extracts flavonoids. The results give inhibition diameter 11.0 ± 0.4 Polymyxin B for against bacteria Staphylococcus Aureus Methicillin resistant. Through reading the results, we conclude that flavonoids are more effective than polymyxin B against bacteria Staphylococcus aureus methicillin resistant. The diameter of inhibition of leaves extract from Arnebia Decumbens (Vent.) is 8 ± 0, 2 and from these results we can say that the bacteria Bacillus cereus ATCC 14579 Medium Sensitivity against flavonoid. Through reading the results, we conclude that flavonoids are less effective than polymyxin B against to bacteria Bacillus cereus ATCC 14579.

Table 2: Mass yield and flavonoids content EC mg /g DM) of leaves extract obtained by methanol 80% of *Arnebia Decumbens (Vent.)*. Results are expressed as the mean and ±standard deviation of three independent experiments.

	Yield (%) w/w	Total antioxidant activity mg GAE/g DW	Flavonoids content
Arnebia Decumbens (Vent.)	10,25± 0,07	129.45 ± 3.43	9.181 ±0.23

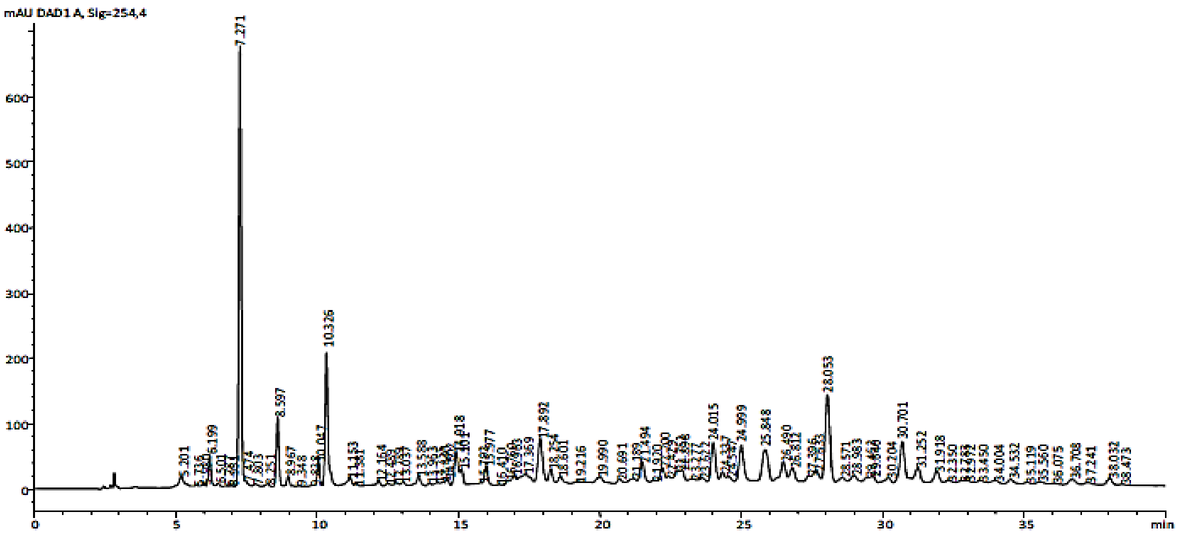

Figure 1: HPLC profile of leaves extract from *Arnebia Decumbens (Vent.)* recorded in UV at 254 nm

Table 3: Quantification of flavonoids compounds identified in methanolic 80% leaves extract from *Arnebia Decumbens (Vent.)*.

Retention time (min)	Pic surface	Identification	Quantification µg/ml
8.597	690.4	Gallic acid	63.676
7.271	3992.9	No identified	-
10.326	1493.3	Catechin	122.584
24.015	625.6	p-comaric acid	101.451
25.848	715.8	Coumarine	82.478
30.701	783.5	Isoquercetrin	557.084
28.053	1502.3	No identified	-
12.622	255	Querecetin	20.30

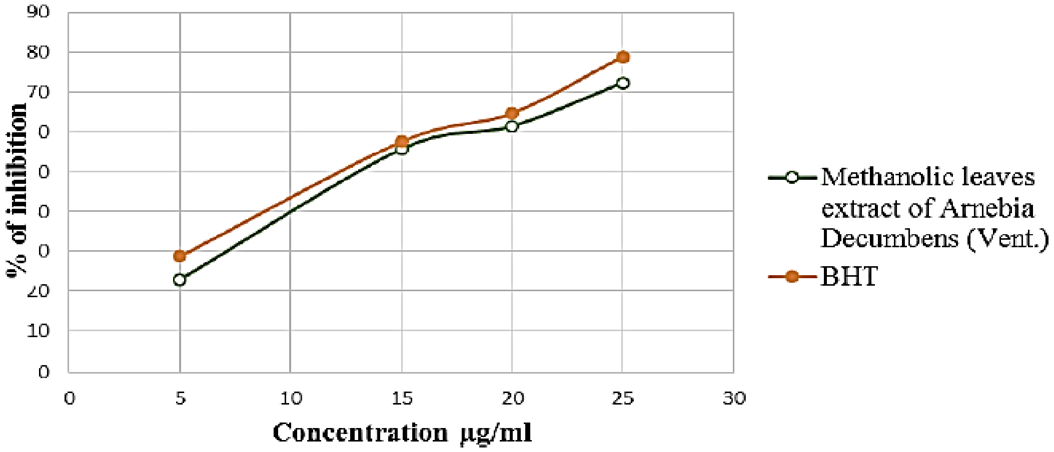

Figure 2: DPPH scavenging radical activity of leaves extract from *Arnebia Decumbens (Vent.)*.

Table 2: Antibactrial activity of methanolic extracts leaves of *Arnebia Decumbens (Vent.)*

Microorganisms Bacteria	Diameter of zone inhibition	
	extract	polymyxine B
Staphylococcus aureus ATCC 6816	13 ± 0.6	12,5 ± 0,5
Staphyloccocus aureus	14 ± 0.5	11,0 ± 0,4
Bacillus cereus ATCC 14579	8 ± 0,2	8,5 ± 0,1

Conclusion

We think that the present study is the first investigation and comparing the phytochemical composition, antioxidant and antimicrobial activity of extracts of three varieties of Arnebia decumbens (Vent.) growth in Southeast Algeria. This study showed that considerable variance exists between the three extracts of leaves for plant Arnebia decumbens (Vent.) Cosset Kral" flavonoids". We found highest amount of flavonoids. On the other hand, the results of antioxidant activity tests present the strong capacity of extracts of leaves for plant Arnebia decumbens (Vent.), higher than the standards antioxidants (BHT). Finally, all extracts Appears the high antimicrobial activity for the Microorganisms tests (bacteria) exceeded most of the time the positive control. A strong correlation was found between activity and phytochemical contents indicates that the effects observed could be attributed to flavonoids compounds. This data Suggest a strong potential of this extracts as a natural source of flavonoids compounds, antioxidant and antimicrobial and may be considered in future to replace synthetic preservatives and drugs in pharmaceutical and food industry. After the results obtained in the previous study, from various concentrations, we can determine the sensitivity of each type of bacteria against each extract. As conclusion, we can say that they Extracts flavonoids to have an active effect on bacteria; Staphylococcus aureus ATCC 6816 and Staphylococcus aureus methicillin resistant and have shown greater efficacy than the antibiotic chosen "polymyxin B".

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