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Evaluation of radical scavenging and antioxidant activity and determination of flavonoid compounds in aqueous and alcoholic extracts of Allium ampeloprasum

Nishteman Satari[1*], Fardin Mirahmadi[2], Kambiz Hassanzadeh[3]

1. M.Sc. in Food Science and Technology, Faculty of Agriculture, Islamic Azad University, Sanandaj Branch, Sanandaj, Iran.

2. Associate Professor, Department of Food Science and Technology, Faculty of Agriculture, Islamic Azad University, Sanandaj Branch, Sanandaj, Iran.

3. Associate Professor, Department of Pharmacology, Kurdistan University of Medical Sciences. Sanandaj, Iran.

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*Corresponding Author E-Mail:
satari3128@gmail.com

ABSTRACT

The plant Allium ampeloprasum, belonging to the Liliaceae family, is an important source of antioxidant compounds. In this study, the anti-radical and antioxidant activities, as well as the determination of phenolic and flavonoid compounds in the aqueous and alcoholic extracts of this plant, were investigated. In this laboratory study, the aqueous and alcoholic extracts of Allium ampeloprasum were prepared by adding 50 grams of the plant and mixing it in a 1:5 ratio with distilled water or ethanol. The total phenolic and flavonoid content was determined by spectrophotometry, and the antioxidant activity of the plant at different concentrations was measured using the Cuprac method, DPPH free radical scavenging, and ferric reducing antioxidant power (FRAP) assay. Data analysis was performed using SAS software and one-way analysis of variance. Based on the results, the total phenolic content in the aqueous extract was 86.9859 and 23.4 micrograms of gallic acid per milliliter in the alcoholic extract. The total flavonoid content was 42.81 in the aqueous extract and 345.54 micrograms of quercetin per milliliter in the alcoholic extract. Additionally, the total antioxidant capacity in the aqueous extract was 0.2362 and 0.3876 in the alcoholic extract, and the Cuprac method reported 0.0747 in the aqueous extract and 0.1992 in the alcoholic extract. The ferric reducing antioxidant power was 0.1041 in the aqueous extract and 0.0248 in the alcoholic extract, while the DPPH radical scavenging activity was 73.18 in the aqueous extract and 72.95 in the alcoholic extract. According to the study results, Allium ampeloprasum is a good source of antioxidant compounds, and its consumption can reduce oxidative damages in the body and improve health. Moreover, after extraction and purification, it can be used in pharmaceutical and food industries.

1- Introduction

Herbal medicine in the treatment of diseases, especially infectious diseases, has become an increasing trend in recent years. Clinical microbiologists tend to use these drugs to treat infections, because the side effects of these drugs are significantly lower compared to chemical drugs [1, 2]. Examining the history of the use of herbal medicine from the past to the middle of the 20th century, shows a decrease in the use of medicinal plants until the 1940s and an increase in their use until the 1980s [3].

Among the mentioned plants, Allium ampeloprasum has received a lot of attention due to its healing and antioxidant properties, and in this research, it is also tried to investigate its characteristics. Allium ampeloprasum with the Persian name (mountain leek or wild leek) and the scientific name Allium ampeloprasum is a herb similar to leek and with a taste similar to raw chives, which is consumed raw like a vegetable along with a variety of foods. This plant is both in the plains and in the mountains. The heights of the region are found, which are called its plain type (Ku Rayeh) and its mountain type (Kaniwal) [4]. Because this plant grows mostly in the foothills of Kurdistan province due to the lack of use of chemicals and all kinds of poisons, it has very useful substances that are also used in the treatment of diseases [5]. In addition, this plant is cheap and considering that the life of this spring plant is limited and they generally have herbaceous stems, they have a lot of water circulation in their vessels in a short period of time, so the amount of mineral salts absorbed in them is also desirable. Which led to an increase in its nutritional value to provide the required nutrients for the biochemical and metabolic pathways of the body [6]. Allium ampeloprasum, like other spring plants, contains anti-cancer and anti-aging compounds due to its special compounds and physical characteristics, such as its color, smell, and taste. It also prevents constipation due to its high water content [7]. In general, spring plants prevent the absorption of sugar in the diet and reduce the absorption of fat, especially cholesterol, in the digestive tract and also reduce the risk of cardiovascular diseases [8]. Edible car plants are one of the healthiest foods and are completely organic, and no chemical fertilizers and agricultural poisons are used in their growth stages, and because these plants are not grown in accessible areas, they are largely free from animal waste and microbial contamination. In addition, this plant prevents the effects of free radicals in body tissues by having antioxidants [4].

Antioxidants are a group of chemical compounds that can reduce oxidation in cells and tissues. Oxidation is a natural process in which cells encounter the production of free radicals and oxidants, which can lead to cell damage and premature aging [3]. The use of antioxidants can help prevent cell damage and maintain cell health. Some natural sources of antioxidants include fruits, vegetables, medicinal plants, foods rich in vitamin C and E, and foods containing flavonoids and carotenoids [9]. As an important point, it should be noted that consuming the right amount of antioxidants through natural foods can help health, but taking too many antioxidant supplements may be harmful instead of helping health. Allium family plants are an important source of phenolic and flavonoid compounds in the diet [10]. Flavonoids in food and other phenolic compounds such as flavonols quercetin, kaempferol, gallic acid and myrstein have biological effects such as antibacterial, antiviral and anti-allergic activities. There is evidence that natural antioxidants may be useful in preventing damage caused by oxidative stress [11].

2- Materials and methods

The experiments related to this thesis were conducted in the research laboratory of Islamic Azad University, Sanandaj branch. Carnival plant was harvested from three regions of Saral, Dehgolan and Saqez in Kurdistan province.

1-2- How to prepare the extract

To prepare the aqueous and alcoholic extract, first, 50 grams of the crushed plant was mixed with 250 ml of distilled water or 96% ethanol

from Merck America in a ratio of 1:51 and placed in a glass container in a dark place for 24 hours. Then the resulting solution was filtered with paper. Solvent removal was performed by a rotary device at a temperature of 45 °C. After removing the solvent, the remaining concentrated extract in the extractor was transferred to sterile containers and kept in the refrigerator until use [4].

2-2- Measuring the total amount of phenolic compounds

The basis of this method is the reduction of folinic acid reagent by phenolic compounds in an alkaline environment and the formation of a blue complex that shows the maximum absorption. The amount of total phenolic compounds was measured by Folin Sieve Caltio method and the results were expressed in terms of mg of gallic acid per gram of extract. One gram of gallic acid was brought to a volume of 1000 ml. From the standard solution and the extract, different dilutions were prepared, then 20 microliters of the extract solution were mixed with 1.160 microliters of distilled water and 100 microliters of Folin-Sio Calto reagent. After 1 to 8 minutes, 300 microliters of sodium carbonate solution was added to the previous solution. The test tubes were placed in a water bath at a temperature of 40 degrees Celsius and after 30 minutes their absorbance was read at a wavelength of 760 nm [12, 13].

3-2- Evaluation of antioxidant capacity by caprock method

Copper (II) chloride solution with a concentration of 0.01 M was prepared from divalent copper chloride and 2 water (weighed 0.4262 grams and dissolved in water) and finally the volume reached 250 ml. Ammonium acetate buffer 7 was prepared by weighing 19.27 grams of NH4AC and dissolving it in water and bringing it to a volume of 250 ml. NC solution with a concentration of 〖10〗^(-3) × 7.5 M is prepared by dissolving 0.039 g of NC in 96% ethanol and the volume of ethanol was brought to 25 ml. One milliliter of potassium chloride was mixed with one milliliter of NC (neocuproine), one milliliter of ammonium acetate was mixed with 0.5 milliliters of aqueous and alcoholic extract along with 0.6 milliliters of deionized water. Incubated for 30 minutes at room temperature and finally the absorbance was read at a wavelength of 450 nm [14].

4-2- Measuring the total amount of flavonoid compounds

The amount of total flavonoids was measured by aluminum chloride colorimetric method. Quercetin index was used. Dilution was done with deionized water. Different dilutions of quercetin were prepared. Then 1500 microliters of 95% ethanol, 100 microliters of 10% aluminum chloride and 100 microliters of 1 M potassium acetate were added to 500 microliters of quercetin solution in different concentrations. The absorbance of the mixture was read at a wavelength of 415 nm and the results were expressed in milligrams per gram of extract [15].

5-2- Evaluation of DPPH free radical inhibition activity

The resulting mixture was vigorously stirred. Test tubes were first prepared with standard solutions (synthetic antioxidants) including TBHQ, BHT, and BHA for 30 minutes. (0.01 and 0.02 grams of each are weighed to prepare 100 and 200 ppm solutions). Then a 50% alcohol solution was prepared in a 250 ml balloon. To prepare different dilutions of aqueous and alkaline extracts (50%), 0.05 g of weight was added to a volume of 100 ml. From different concentrations of extracts and synthetic antioxidants, 3000 microliters + 1000 microliters of DPPH were drawn, placed in a dark place for 30 minutes until the color changed from dark purple to yellow. After this time, the absorbance was read at 517 nm wavelength. Finally, the percentage of inhibition of DPPH radicals by the extract was calculated with this formula [15, 16]:

$$DPPH = (A_c - A_s)/A_c \times 100$$

In this formula, Ac and As are control absorption and sample absorption, respectively.

6-2- Measuring the reducing power of iron III

The experiment was performed with a concentration of 800 ppm (0.08 g/ml). 0.08 grams were weighed and the volume was brought to 100 ml. Dilutions (800, 600, 400, 200, 100) were prepared. The same steps were repeated for the aqueous and alkaline extracts of the kenival plant. We weighed 0.08 grams of synthetic antioxidants and extracts each, made it up to 100 with methanol, and then prepared the dilutions mentioned above from the mother solution. Then, the experiment was performed in Eppendorf tubes in three repetitions as follows:

1 ml of the solution was taken, 2.5 ml of phosphate buffer and 2.5 ml of potassium thiocyanide were added, the lid was closed and it was kept for 30 minutes at a temperature of 50 degrees Celsius in a water bath. After the stored time, 2.5 ml of trichloroacetic acid was added, the lid was closed and it was centrifuged at 1650 rpm for 10 minutes. After this period, 2.5 ml of the supernatant solution was removed, 2.5 ml of deionized water and 0.5 ml of ferric chloride were added and the absorbance was read at 700 nm [14].

3- Data analysis

SAS9.2 statistical software was used for data analysis. In order to compare the antioxidant capacity, anti-radical, regenerating property and polyphenol and flavonoid content of extracts with different solvents with different concentrations of Allium ampeloprasum plant collected in Kurdistan province, single factor analysis of variance was used and to determine the comparison of means based on LSD test done Experiments were performed in triplicate.

4- Results and discussion

1-4- Analysis of the results of the amount of total phenol

The results show that the model and co-treatments of all kinds of antioxidants including different extracts of Allium ampeloprasum plant based on the standard test of gallic acid with the equation y=0.0013x+0.0473 with R^2=0.99 at the 0.1% level are significant based on the LSD test. (Table 1).

Table 1. Results of the analysis of variance model, and treatments of various antioxidant (extracts, alcoholic and aqueous) in terms of the amount of total phenolics

Resource changes	Degrees of freedom	Average of squares
		The amount of total phenolics based on acid Gaelic
Model choice	1	6063.0377***
Type of antioxidant*	1	6063.0377***
Error trial	4	10.8585
Cv		5.9699

*: Extracts, alcoholic and aqueous Allium ampeloprasum *** Namely, at the level of 0.1 percent, based on the testLSD There is a significant difference.

Also, the results show that the extracts extracted with different solvents are significant at the level of 5% based on the LSD test, and the highest concentration of total phenol based on gallic acid is related to the aqueous extract with a value of 86.9859 micrograms per milliliter (Table 2).

Table 2. A comparison of the mean pretreatment of various extracts, the antioxidant Allium ampeloprasum in terms of the amount of total phenolics

Treatment of extracts	Average concentration of total phenolics based on Acid, gallic(µ g/ ml)
Aqueous extract	86.9859 ± 0.678^{A}
Alcoholic extract	23.4090 ± 1.162^{B}

Numbers with the same letters in columns do not have a significant difference at the 5% level based on the LSD test.

In 2016, Najda et al. worked on nutritional and health properties and antioxidant properties of onion and leaves of two varieties of Allium ampeloprasum var, namely ampeloprasum (GHG-l) and A. sativum. The mentioned study showed that the amount of phenol in this plant depends on the parts of the grass used in the preparation of the extract, and in general, the amount of phenolic compounds in the onion of this plant was higher than in the leaves. In the leaves of the variety (GHG-1), 1.073 mg GAE /g FW is more than the extract obtained from

the leaves of the A. sativum variety, 0.804 mg GAE /g FW. Also, this amount in the extract obtained from onion variety (GHG-1) was higher, 2.021 mg GAE /g FW than the onion extract in A. sativum variety, 1.673 mg GAE /g FW [17].

In 2014, Garcia-Herrera et al. conducted a study on the amount of phenolic compounds in the alcoholic extract of Allium ampeloprasum. a and reported this amount as 5.70 mg GAE/g extract, which is lower than the recent study [18]. In a study conducted by Berneart et al. in 2012 regarding the measurement of total phenol in extracts from green leaves and white stems of 30 Allium ampeloprasum var. Porrum was conducted and the amount of total phenol was reported between 5 and 15 mg GAE/g dw. In this study, Bernert reported the level of total phenol in the green parts of the plant to be significantly higher than the white parts [19].

4-2-Analyzing the results of the total flavonoid amount

The results show that the model and treatments of all kinds of antioxidants including different extracts of Allium ampeloprasum plant based on quercetin standard with equation $y=0.0005x+0.2018$ and $R^2 = 0.9947$ are significant at 0.1% level based on LSD test (Table 4). The extracts extracted with different solvents are significant at the level of 5% based on the LSD test, the highest amount of total flavonoid concentration based on quercetin is related to the alcoholic extract, 345.547 micrograms/ml, and the aqueous extracts have the lowest amount, which is 813. are 42 micrograms per milliliter (Table 4).

Table 3. The results of model variance analysis and different antioxidant treatments (alcoholic and aqueous extracts) in terms of total flavonoids

Resource changes	Degrees of freedom	Average of squares
		The amount of flavonoid, total, based on quercetin
Model choice	1	137471.2067***
Type of antioxidant*	1	137471.2067***
Error trial	5	723.2033
Cv		13.8492

Alcoholic and aqueous extracts of Canival * at 0.1% level, according to the LSD test, show a significant difference.

Table 4. A comparison of the mean pretreatment of various extracts, the antioxidant Allium ampeloprasum in terms of the amount of flavonoid total

Treatment of extracts	Average concentration of flavonoid, total, based on the Querstin (micro g /ml)
Aqueous extract	42.813 ± 10.781^{B}
Alcoholic extract	345.547 ± 2.077^{A}

Numbers with the same letters in columns do not have a significant difference at the 5% level based on the LSD test.

In a study by Garcia-Herrera et al. in 2014 on the nutritional and antioxidant properties and phytochemical properties of Allium ampeloprasum. A, they reported the amount of flavonoid compounds in the alcoholic extract of this plant (0.86 CE/g extract), which is lower than the amount reported in this study [18]. In 2016, Najda et al. investigated the amount of flavonoids in onion and leaf extracts of Allium ampeloprasum. This amount was reported in the onion of ampeloprasum variety (HGH-l), 0.264 mgQE/gFW and more than that of A. sativum variety, 0.185 mgQE/gFW, and also in the leaves of ampeloprasum variety (HGH-l),

0.65 mgQE/gFW. had a higher concentration of leaves of A. sativum variety (0.034 mgQE/gFW); And in general, the amount of flavonoids in the onion of this plant is more than in the leaves [17].

In the study that was conducted on the aqueous and alcoholic extracts of Pulicaria gnaphalodes, the total flavonoid in the aqueous extract was 25.12, in the ethanolic extract 21.32, and in the methanolic extract 24.97 µg/ml. It has been reported. The results obtained in Hayzah plant are the opposite of Allium ampeloprasum plant.

3-4- Analysis of DPPH radical reduction results

The anti-radical properties of the extracts were determined based on the DPPH method, which are shown in the following tables based on one-factor variance analysis (Table 5). These results show that both the model and the treatments of various antioxidants, including common antioxidants and different concentrations of extracts from different solvents, are significant at the 0.1% level based on the LSD test.

Table 5. The results of model variance analysis and different antioxidant treatments of different extracts of Allium ampeloprasum and common antioxidants in terms of DPPH inhibition percentage

Resource changes	Degrees of freedom	Average of squares
		Percent inhibitory activities
Model choice	13	250.0178***
Type of antioxidant*	13	250.0178***
Error trial	28	0.2419
Cv		0.5827

*: alcoholic and aqueous extracts of kenival *** means there is a significant difference at the level of 0.1% according to the LSD test.

Also, the results of comparing the averages (Table 6) show that all the common antioxidants in the maximum concentration allowed for use in food i.e. 200 micrograms per liter and even at a lower concentration of 100 micrograms per milliliter with a significant difference from most of the concentrations of Allium ampeloprasum plant extracts. It has more and stronger restraining power. The highest inhibitory power is related to TBHQ 96, on the other hand, increasing the concentration of the extract significantly increased the inhibitory power (Figure 1).

Table 6. Comparison of the average DPPH inhibitory percentage in different concentrations of Allium ampeloprasum extract and common synthetic antioxidants

Samples Concentration (gµ/ml)	Average percent inhibition sell(%)				
	BHT	BHA	TBHQ	Aqueous extract	Alcoholic extract
100	92.4290±0.035^{C}	92.7884±0.012^{C}	93.9594±0.035^{B}	73.1826±1.575^{H}	72.9507±0.323^{H}
200	94.1565±0.023^{B}	94.6435±0.035^{B}	96.0000±0.035^{A}	74.6434±0.377^{G}	75.2811±0.174^{G}
400	------	------	------	78.3536±1.237^{F}	77.7507±0.613^{F}
600	------	------	------	83.5014±0.479^{D}	82.0173±0.930^{E}

Different letters in each concentration indicate a significant difference at the 5% probability level based on LSD test.

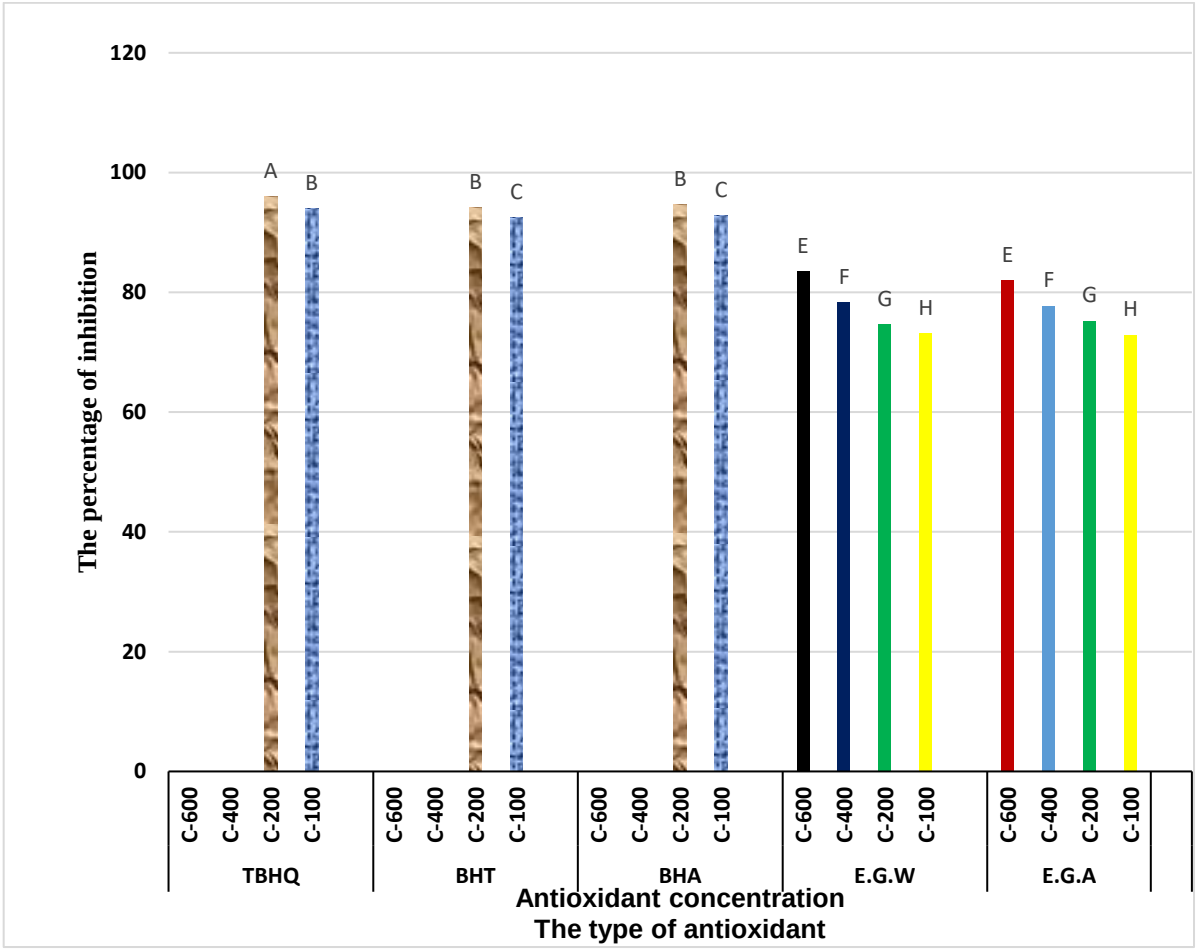

Figure 1. Comparing the average antioxidant and the concentration of different extracts of carnival and common antioxidants in terms of DPPH inhibition percentage.

In 2014, Garcia-Herrera et al. conducted a study on the DPPH reducing power in the alcoholic extract of Allium ampeloprasum. A and reported this amount (15.12 mg/ml methanolic extract). This amount is higher in the tested alcoholic extract. According to the theory of Herrera et al., the amount of antioxidant power depends on the variety and growing conditions, including weather, light, rainfall, and soil [18]. In 2016, Najda et al. worked on the DPPH reducing power of onion and leaves of two varieties of Allium ampeloprasum, namely ampeloprasum (GHG-l) and A. sativum. The mentioned study showed that the regeneration potential is different in different parts of the plant. This amount in the leaves of the variety (GHG-l) is more (17.56 µM TE/gFW) than the extract obtained from the leaves of the variety A. sativum (13.99 µM TE/gFW). Also, in the extract obtained from the variety (GHG-l) onion, it was higher (81.14 µM TE/gFW) than the onion extract in the variety A. sativum (67.23 µM TE/gFW), and in general, the reducing power of DPPH in the onion of this plant is more than It was leaves [17].

4-4- Analysis of the results of total regenerative power

In the reductive power stage, the total extracts were checked and the results of the analysis were evaluated based on the analysis of variance of the two antioxidant factors and the concentration, and the results showed that both the model and the treatments of all types of antioxidants including common antioxidants and different concentrations of the extracts of different solvents They are significant at the 0.1% level based on the LSD test (Table 7). The results of comparing the averages showed that

the common antioxidants are in one group and the highest reducing power is related to TBHQ with a value of 2.0590 micrograms/ml and there is no significant difference between the extract samples and they are statistically in the same group with the highest amount It is related to aqueous extract at the rate of 0.1041 micrograms per milliliter (Table 8).

Table 7. The results of analysis of variance of the model and different antioxidant treatments and concentrations in terms of total reducing power

Resource changes	Degrees of freedom	Average of squares
		The power of total regeneration
Model choice	24	3.7909***
Type of antioxidant*	4	15.2150***
The concentration of antioxidants	4	4.2662***
Interaction effect of type and concentration of antioxidants	16	0.8160***
Error trial	50	0.0012
Cv		3.0118

Table 8. Comparison of the average treatment of antioxidants in terms of total reducing power

Treatment of extracts	The power of total regeneration
Aqueous extract	0.017±0.1041B
Alcoholic extract	0.014±0.0248B
TBHQ	0.122±2.0590A
BHT	0.090±1.4723A
BHA	0.114±2.0263A

Numbers with the same letters in the columns do not have significant differences based on the LSD test at the 5 percent level.

Also, the highest antioxidant capacity corresponds to the concentration of 800 micrograms/ml with a value of 1.6833 micrograms/ml, and the lowest value corresponding to the concentration of 100 micrograms/ml is 0.4502 micrograms/ml (Table 9).

Table 9. Comparison of the average main concentration treatment in terms of total regenerative power

Treatment concentration(micro g ml)	Average power resuscitation promoting total
800	1.6833 ± 0.144^{A}
600	1.5863 ± 0.111^{B}
400	1.2267 ± 0.065^{C}
200	0.7400 ± 0.065^{D}
100	0.4502 ± 0.036^{E}

Numbers with the same letters in the columns do not have significant differences based on the LSD test at the 5 percent level.

In 2014, Garcia-Herrera et al. conducted a study on the antioxidant properties of Allium ampeloprasum. A and reported the amount of reducing power in the alcoholic extract of this plant (0.7mg/ml methanolic extract), which is higher than the amount measured in this research. In a study conducted by Mizaei et al. on the antioxidant properties of five plants of khaki, barhang, zenian, coriander and fenugreek, the power of iron reduction in terms of micromoles of iron per gram of extract was 232.9, 746.6, 1169.36 respectively. 624 reported 6.300 for these five plants. The regeneration power of Barhang is significantly different from other samples. According to the mentioned study, the regeneration power depends on the type of plant and this amount is lower in Allium ampeloprasum plant than these 5 species [18].

4-5- The amount of different flavonoids in the aqueous and alcoholic extracts of carnival plant from different regions

The amount of different flavonoids in aqueous and alcoholic extracts of kenival plant from

different regions is shown in the following table (Table 9).

Table 9. The amount of different flavonoids in the aqueous and alcoholic extracts of the carnival plant from different regions.

Type of extract	Total flavonoids (mg/liter extract)*	
	Inhibition time of standard quercetin	The concentration of quercetin
Blue	0.036±4.56	04/0±9.26
Alcoholic	0.036±4.51	03/0±11
* The data are the average of three repetitions ± standard deviation.		

6-4- Analysis of the results of total antioxidant capacity based on Kuprak method

The amount of antioxidant capacity for bedbugs was checked based on the CUPRAC method based on the TROLOX standard, based on one factor analysis of variance (Table 10).

Table 10. The results of variance analysis of model and different antioxidant treatments (alcoholic and aqueous extracts) in terms of antioxidant capacity based on CUPRAC method

Resource changes	Degrees of freedom	Average of squares Antioxidant capacity, total (method CUPRACmmolTE/g)
Model choice	1	0.0233***
Type of antioxidant*	1	0.0233***
Error trial	4	0.00003
Cv		3.4699

*: Alcoholic and aqueous extracts of kenival and common antioxidants (BHA, BHT, TBHQ) *** means there is a significant difference at the level of 0.1% according to the LSD test.

The results show that both the model and the treatments of various antioxidants including common antioxidants and different concentrations of different extracts with solvents and different concentrations of Allium ampeloprasum are significant at the level of 0.1% based on the LSD test (Table 11).

Table 11. Comparing the average of the main treatment of antioxidants in terms of total antioxidant capacity based on the CUPRAC method

Treatment of extracts	Average antioxidant capacity, total , based on the method of CUPRAC
Aqueous extract	0.0015±0.0747B
Alcoholic extract	0.0012±0.1992A

The values are based on the TROLOX standard and the calibration curve obtained with equation number 1 (R = 0.999, which is below).

$$Y = 1.67 \times 10^4 \times C - 0.033$$

which are used to determine the total antioxidant capacity (TAC) based on the Trolex standard.

According to the results, the highest capacity is related to alcoholic extract and the lowest is related to aqueous extract. In 2009, Kamal Roosta et al. studied the antioxidant and chelating properties of cinnamon extract and found that in addition to its antioxidant properties, cinnamon extract has chelating properties on copper metal and can be used as a source of antioxidants and chelating agents. natural to be used [20].

7-4- The power of regenerating trivalent iron

The results show that the common antioxidants are in one group and the highest reducing power is related to TBHQ with a value of 20.0590 micrograms/ml and there is no significant difference between the extract samples and they are statistically in the same group. It is found that the highest amount related to the aqueous extract is 0.1041 micrograms per milliliter.

The highest antioxidant capacity corresponds to the concentration of 800 micrograms/ml with a value of 1.6833 and the lowest value

corresponds to the concentration of 100 with the amount of 0.4502 micrograms/ml. Garcia-In a study conducted by Mizaei et al. (2013) on the antioxidant properties of five earthy plants, barhang, zenian, coriander and fenugreek, the power of iron reduction in terms of micromoles of iron per gram of extract was 624.36, 1169, respectively. Reported 6/746, 9/232, 6/300 for these five plants. The regeneration power of Barhang is significantly different from other samples [21]. According to the mentioned study, the regeneration power depends on the type of plant and this amount is lower in Allium ampeloprasum plant than these 5 species.

5- Conclusion

According to the reported results, it is clear that the amount of total phenol in the aqueous extract is higher than that of the alcoholic extract, while the amount of total flavonoid in the alcoholic extract is much higher than that of the aqueous extract. Also, total antioxidant capacity and antioxidant capacity by Cuprac method are also higher in alcoholic extract than aqueous extract. On the other hand, the reducing power of trivalent iron in the aqueous extract is higher than the alcoholic extract,

while the reducing power of DPPH is similar in both extracts. The aforementioned results indicate a significant amount of phenolic and flavonoid compounds as well as high antioxidant power in Allium ampeloprasum plant extract. Therefore, it can be used as a good source of antioxidants to reduce cell damage caused by free radicals.

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مقاله علمی_پژوهشی

ارزیابی فعالیت ضد رادیکالی، آنتی اکسیدانی و تعیین ترکیبات فلاونوئیدی عصاره‌های آبی و الکلی گیاه کنیوال (Allium ampeloprasum)

نیشتمان ستاری[1*]، فردین میراحمدی[2*]، کامبیز حسن زاده[3]

۱- دانش آموخته کارشناسی ارشد علوم و صنایع غذایی، دانشکده کشاورزی، دانشگاه آزاد اسلامی واحد سنندج. سنندج، ایران.

۲- استادیار گروه علوم و صنایع غذایی، دانشکده کشاورزی، دانشگاه آزاد اسلامی واحد سنندج. سنندج، ایران.

۳- دانشیار گروه فارماکولوژی دانشگاه علوم پزشکی کردستان. سنندج، ایران.

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* مسئول مکاتبات:

satari3128@gmail.com

چکیده

گیاه کنیوال با نام علمی Allium ampeloprasum از تیره لیلیاسه منبع مهمی از ترکیبات آنتی اکسیدانی هستند. در این پژوهش فعالیت ضد رادیکالی و آنتی اکسیدانی و تعیین ترکیبات فنلی و فلاونوئیدی عصاره های آبی و الکلی این گیاه مورد بررسی قرار گرفت. در این مطالعه آزمایشگاهی ابتدا عصاره آبی و الکلی Allium ampeloprasum را با اضافه کردن ۵۰ گرم از گیاه و مخلوط کردن به نسبت ۱ به ۵ با آب مقطر یا اتانول تهیه کردیم. میزان فنل و فلاونوئید تام به روش اسپکتروفتومتری صورت گرفت و در نهایت فعالیت آنتی اکسیدانی گیاه در غلظت های مختلف با استفاده از روش کوپراک و مهار رادیکال آزاد DPPH و احیای آهن سه ظرفیتی اندازه گیری شد. تجزیه و تحلیل داده ها با نرم افزار SAS و روش آزمون آنالیز واریانس تک عامله انجام شد. بر اساس نتایج به دست آمده میزان فنل کل در عصاره آبی ۸۶/۹۸ و در عصاره الکل ۲۳/۴ میکروگرم اسیدگالیک بر میلی لیتر می باشد و میزان فلاونوئید تام در عصاره آبی ۴۲/۸۱ و در عصاره الکلی ۳۶۵/۵۴ میکروگرم کوئرستین در میلی لیتر گزارش گردید. همچنین ظرفیت آنتی اکسیدانی کل در عصاره آبی ۰/۲۳۶۲ و در نوع الکلی ۰/۳۸۷۶ و ظرفیت آنتی اکسیدانی به روش Cuprac در عصاره آبی ۰/۰۷۶۷ و در عصاره الکلی ۰/۱۹۹۲ گزارش شد. قدرت احیاکنندگی آهن سه ظرفیتی در عصاره آبی ۰/۱۰۴۱ و در عصاره الکلی ۰/۰۲۴۸ و قدرت احیای DPPH در عصاره آبی ۷۳/۱۸ و در نوع الکلی ۷۲/۹۵ بود. باتوجه به نتیجه مطالعه گیاه Allium ampeloprasum منبع خوبی از ترکیبات آنتی اکسیدانی می باشد که مصرف آن سبب کاهش آسیب های اکسیداتیو در بدن و بهبود سلامتی می شود و درصورت استخراج و خالص سازی می تواند در صنایع دارویی و غذایی استفاده گردد.