

Research Article

**Detection of constituent compound and antioxidant effects of essence oil of
Polygonum aviculare in Sabzevar city**

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ABSTRACT

Polygonum aviculare, is a one year climbing Plant belongs to the Polygonaceae family which grows in Europe, Asia, Africa & America. The plant will be found in grasslands, sides of roads, between rocks, sides of cavities, shady lands, barren lands & farms.

The aim of current study is detection of constituent compounds in the plant & studying on the impact of Anti oxidant of the mentioned plant in Khorasan province (sabzevar) and comparison of other results which earned from other regions. In this study, the plant collected from sangsefid region which is in sabzevar and after making dry under shadow the oil pressing done on it by using percolation method.

The chloroform essence which result of this method analyzed after rotary by GC/MS machine. Then the possible anti oxidant activity checked by 2,2- Diphenyl 1- picryl Hydrasil (DPPH) method. The results of these tests lead to detection of 13 compositions in the mentioned plant.

Also, in studying the antioxidant activity of the plant showed that the plant has antioxidant activity.

Antioxidants acts as collector of free radicals and prevents the peroxidation of lipids and other process which done by free radicals. Antioxidants can prevent body and the processed food from oxidative harms which done by free radicals.

Keywords: *Polygonum aviculare*, Antioxidant, Percolation, DPPH

INTRODUCTION

The history of medicinal plants is not clear and the use of medicinal plants was associated with super stations and special rules. The Egyptians and Chinese were the first family that used the plants as medication 2700 BC. In the eight to tenth century AD, Avesina & Zakaria Razi, two people who were developer of treatment with plants.

In the nineteenth century the chemical drugs replaced quickly Herbal medicines. Then at the end of twenty century, the side and adverse effects of chemical medicines caused the scientists to reject using of chemical medicines. So, this period called Renaissance medicinal plants, Until the nineteenth century the medicinal plants used in the basic form and finally the

effective extraction plant started in the nineteenth century.

The medicinal plants had and has the special value and important in providing the health for society both in terms of treatment and prevention of diseases.

Historically, the plants are very important in developing of society and lots of researches have been done in order to find products and natural products of herbal medicines during history, but the important point is that just less than 10% of the total 250.000 plant species detected and used for more than one biological function (1).

Iran with special weather situation, it has more than 7500 plant species which is 2 to 3 times total vegetation in continental Europe and it is anticipated that there are more than 750 medicinal species in Iran vegetation (2). Despite of this potential, the acreage of medicinal plants in Iran is less than 10000 hectare and in terms of diversity of cultivated species, this amount is limited to about 40 species, while this amount is more than 200 species in china (3). On the other hand, the total number (amount) of registered herbal medicines is a 100 species in the country which makes less than 4% of chemical medicines in market, while this ratio is more than 35% in European countries (4,5). Global producing and processing of medicinal and aromatic plants focus in Europe and especially France and some of Asian countries. Other producing regions in the world are in order Yugoslavia, Bulgaria, Germany, Hungary and although, the highest percentage of medicinal plants are exchanged via Germany (6).

In the present study, the *polygonum avicular* from *Polygonaceae* family (Buck wheat family) studied. The family contains 30 genera & 700 species. The name of *polygonum* means Cluster which refers to the type of stem because of its great knot. Its special name *aviculare* means clusters of small birds which eaten as seed by small birds & hen. This native species belongs to Europe & Asia also, can be found in moderate

and subtropical countries. The plants belongs to the *Polygonaceae* family grows annually with E. pole elliptic leaves which there are widely in the coastal Mediterranean.

The *Polygonume aviculare* is the most common species in the southern & central Finland. In 1970, more than 40- 85% of arable land in Scotland & England contains *Polygonume aviculare* seeds and this species have been identified in the upper species in Scotland. The seeds of the species have been developed by birds, animals, water & human activities. The seed of *Polygonume aviculare* was used as a food source by American Indians in prehistoric times & used in flour during Middle Ages in Poland. Typically, there is this plant with higher density compared to other species in sabzevar- Razavi Khorasan Province.

Polygonume aviculare, has strong astringent effect, diuretic, Antihemintic & healing. Its sodden used as diarrhea even in diarrhea that by using other astringent drugs can not treated but by using *polygonume aviculare* obtained positive results. This plant has diuretic properties and low dosages of it has deterministic effect in the treatment of kidney stones, colic nephritis and bladder problems.

Its seed is emetic and cathartic. In external usage, it has strong healing effect and if it rubs on wounds & injuries will improved the wound. Diluted juice of it eliminates the inflammation. According to the lab tests conducted, it has bacillary dysentery and Anti- fungal effect. Also, if the water or alcohol extract of it injected to the vein donkey ears & cat, their blood pressure comes down. It has removing skin rash (7,8).

Dive secured in the first century AD, this plant under the name of *Polygonume male* was effective in the diarrhea, bloody mucus, bleeding & urinary incontinence. Polin said at the time that breathing the *Polygonume* extract through nasal caused shut off epistaxis. Such treatments were common among people by the early eighteenth century and gradually used in order to treatment

of diabetes based on the doctors' diagnoses. Some of old Physicians used it in order to treatment of colon polyps even in some cases associated with bleeding and also, is effective in relieving vaginal discharge.

In Germany, different products with different names gave to people such as its leaves used as a drug in order to treat tuberculosis, bronchitis & asthma. Dr.H. Leclerc, achieved the helpful results in treating tuberculars by prescribe *Polygonume* (plant) because with consumption of its products will improved general state of patients with tuberculosis, decreased the excessive sweating and adjusted action digester (7,9).

As mentioned above, the plant has lots of therapeutic use so, for this reason it needs to more study on this species in Iran till we could have full comparison with other countries. We start to detect the constituent compound and Antioxidant effect of essence of *Polygonum aviculare* in Sabzevar- Khorasan Razavi.

MATERIAL & METHODS

The *Polygonum aviculare* collected from a region located at Khorasan Razavi (sangsefid village in Sabzevar) province and dried at shadow. Then 50 g of *polygonume aviculare* powder with chloroform by percolation method was extracted and after filtering by filter paper the solvent removed by rotary device. In order to identify the compounds, distillate injected to the GC/MS device. The GC/MC analysis done by using a device equipped to HP-5MS column.

The Antioxidant activity used DPPH reagent. In order to provide DPPH reagent, first of all 2mg solid DPPH reagent carefully weight and after adding merck methanol to it the volume brought 50 cc.

Different densities 12.5, 25, 50, 100, 200 and 400 PPM obtained from the distillate which 5cc removed from each of densities and agually added DPPH after that each of samples should be

put in the dark place (in the closet) for 15 minutes finally the absorption read 517 nm wavelength.

In this test the ability of transfer the measured Hydrogen atoms or Electron by botanicals or the amount of discoloration of purple solution 2,2-Diphenyl 1-picryl Hydrazil (DPPH) in methanol. Measuring the phenolic compounds of plant (*polygonume aviculare*) done based on colorimetric method, folin cito color and in terms of Gallic acid. This means that at the beginning the standard solution with concentration of 8,16, 32 gr/lit provided in methanol from Gallic acid. Then 1 ml of each concentrations transferred to the lab tube & added to it 5 m/lit cito color reactive 10%.

After 3 or 8 minute added 4 mL sodium carbonate 7.5% then the lab tubes keeps for 1 hours at room temperature and in the dark, at the end measured the absorption at 765 nm in 3 times. After this step the absorption curve draw in terms of concentration.

Blank samples provided by melting 1cc distillate, 7.5cc distilled water and 2cc methanol.

All chemicals and used tools in this study following as: chloroform, Merck methanol, Hexane, distilled water which distilled again, ascorbic acid- Merck sodium carbonate from Merck Company (Germany) and reagent 2,2-Diphenyl 1-picryl Hydrazil (DPPH) purchased with high cleanliness from sigma company (America).

Detection of constituent distillate performed with calculating inhibition index of composition and comparison the spectrometers of composition with library resources such as library, gas chromatograph connected to mass spectrometer and comparison them with standard resource and composition such as (Eight Peak index) which used this method for quality and quantity actions (10).

RESULTS

The obtained results by analyzing the distillate of *Polygonume aviculare* with GC/MS device,

detected 13 components according to the (Table 1)

Table 1- detection of constituent compound of distillate of *Polygonum aviculare*

NO	Compound	KI	%
1	Citronellyl acetate 6-octen-1-ol	1099	2.73
2	Octadecane , 2-methyl –(GAS) 2- Me	1111	2.86
3	6-Octen – 1-ol ,3,7-dimethyl	1123.85	11.83
4	CITRONELLYL FORMATE	1142.75	4.10
5	Undecane (GAS)	1188.5	7.60
6	Phenol , 2,4-bis (1,1-dimethylethyl)-	1236.38	26.35
7	Hexadecane (GAS)	1265.02	11.76
8	(Tetrahydrocyclopentadienone) tric	1274.86	5.20
9	(Tetrahydrocyclopentadienone) tric	1275.28	1.82
10	Octane , 1 ,1 –oxybis – (GAS)	1288.75	4.72
11	Thiosulfuric acid (H ₂ S ₂ O ₃)	1329.61	6.63
12	Tetratetracontane (GAS)	1349.37	9.77
13	(-)-Loliolide 2 (4H)- Benzofuranon	1356.29	4.64

or electron and the DPPH radical will fade or discolor which will increase the radical scavenging

Regarding to the results Antioxidant test it should be noted that in DPPH system, Antioxidant react with DPPH stable radicals and caused it changed. Antioxidant such as cysteine, Glutathione, Ascorbic acid, Tocopherol, Poly hydroxy aromatic compounds (like Hydroquinone, Pyrogavol,...) reconstructed DPPH radical by giving it Hydrogen

activity of the extract when the phenolic compounds or the Hydroxylation of it increased. Diagram 1, 2 showed the results of Antioxidant test by DPPH free radical scavenging method and concentration response curves of free radical scavenging.

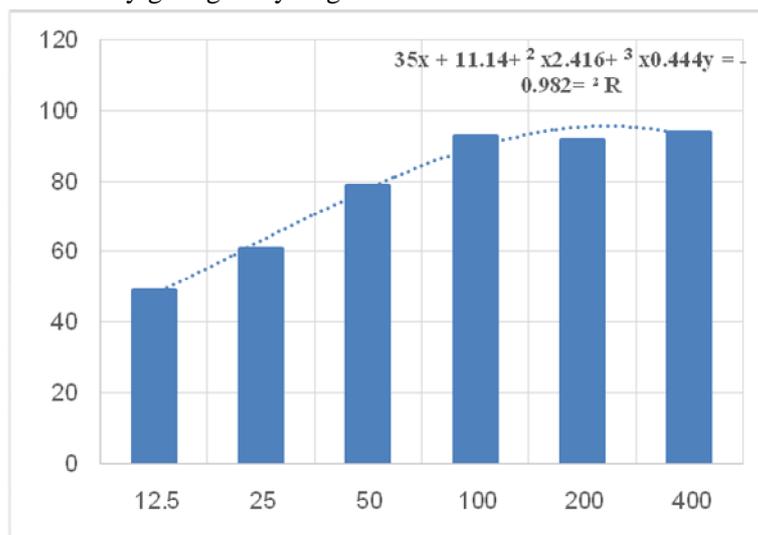


Diagram 1- The results of Antioxidant test by DPPH free radical method

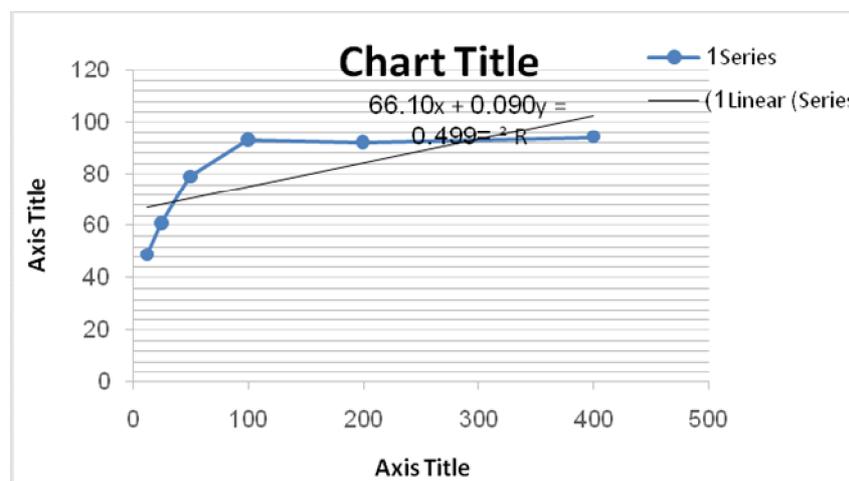


Diagram 2- The concentration response curves of DPPH free radical scavenging

Y: inhibition percent

X: concentration

Ic 50 = 17.88

Inhibition percent: $ODC - (ODS - ODB) / ODC (100)$

The general content of phenolic compounds extract in milligram gallic acid in the extract dry powder weight, according to the diagram 3 by the following formula:

$C \text{ mgr/gr} = C \text{ mgr/ml} (V/M)$

C mgr/gr: The general content of phenolic compounds extract

C mgr/ml: The concentration of Gallic acid of standard curve

V: The volume of extract

M: The weight of extract

685: C mgr/gr

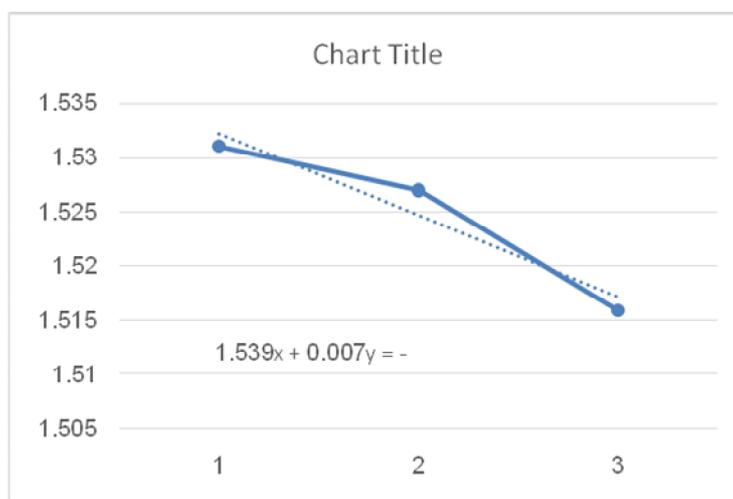


Diagram 3- The general content of Phenolic compounds extract at milligram Gallic acid in weight of dry powder extract

DISCUSSION

As you know, using of plants is one of important solutions of traditional medicine for 80% of the

population in Africa, Asia, Latin America & countries of Middle East. As in recent years, the current pharmaceutical companies used the plants

in developing treatment based on the natural products which extracted the plants. Also, nowadays wide research performed on various essential oils until the researcher can achieved samples with high Antioxidant activity. Antioxidants compounds which protects cell genetic material against free radical damages, however, the researchers trying to identify or extract the natural compounds of creatures which have efficient antioxidant system or there are in their body Anti-radical (11).

The result of the test caused to identify 13 compound in the mentioned plant. Also, in the performed investigation on Antioxidant activity of it showed that it has Antioxidant activity. The antioxidants act as free radicals scavenger and stop the peroxidation of lipids and other process which done by free radicals.

The antioxidants can protect the body and processed food against oxidative damage which related to free radicals.

In a study which performed by cong & etalls in 2012 on antimicrobial activity and analysis of special types of phytochemicals from *Polygonume aviculare* in which naturally is growing in coastal areas of the Mediterranean, concluded that the mentioned plant used in folklor medicine and studying on the special types of phytochemicals showed that the presence of tannins, saponins, flavenoids, Alkaloids, Terpens & extracts against bacteria were positive gram and negative gram (12).

Another study in 1967 were investigated by Holm & etalls on the gums in South America on 60 students among 18-25 year old man.

For two week, these students used the extract in amount of 1 mg/ml twice daily in mouthwash without brushing. Prior to this action, the O'leary plaque index, LOE, Sliness & stock gingivitis were recorded in the volunteers.

After 14 days, the results showed that the extract in mouthwash affected significantly in dental plaque which is used for treating gingivitis as well (13).

Also, a study by Asif Performed in 2012 on Photochemical studies of Polyphenols on *Perilla frutescensas* in order to study the antioxidants activity that showed the plants which full of antioxidant compounds can protect the cells against Oxidative stress (14).

In 2006, Hsu and etalls performed a study on the activity of Antioxidant extract of *Polygonume aviculare*, they concluded that the role of free radical has been proved in the development of many disease they also found the plants are the natural antioxidant resource (15).

In 1965, scott performed a research on the effect of Oxidants & atmospheric antioxidants and concluded that multiple biochemical reactions in the body provide active oxygen which can destroy biomolecules. The harmful effect of free radicals can be blocked by antioxidants. These compounds caused detoxification of free radicals.

The foods full of antioxidants play the important role in prevention of cardiovascular disease, cancer, degenerative disease (Parkinson & Alzheimer) (16). The mentioned research's matches with the current study.

According to the diversity of medicinal plants in the country and lack of integrated study on this type of plant, it should be done vast investigation on this type of plant which has important medicine usages.

As we know, these studies cannot be used at university so, it is necessary many studies done on this plant in terms anticancer, Antifungal, antibacterial, antitumor According to the high important of herbal compounds should be taken measures that discipline connected to them such as medicine compounds and traditional medicine increase and scientific action, researches and papers as well.

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