K.Sangeetha et al /J. Pharm. Sci. & Res. Vol. 12(2), 2020, 267-270

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

Efficacy of Antioxidants and phytonutrients content in the selected varieties of garlic samples

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Abstract

Garlic's are rich in trace elements such as zinc, magnesium, copper, selenium and iodine also it has protein content, dietary fibre, tocopherols, ascorbic acid, and polyphenols. Garlic (Allium sativum L., Alliaceae) has acquired a reputation as a therapeutic agent and herbal remedy to prevent and treat several pathologies, including microbial infection, allergy, hypertension, hypercholesterolemia, diabetes atherosclerosis and cancer. Garlic is known to have at least 33 sulphur compounds, 17 amino acids, several enzymes and minerals like Selenium. Out of all the Allium species, it contains the highest concentration of sulphur compounds. These compounds are responsible for its medicinal effects and the pungent odour. Dried and powdered garlic contains 1% Alliin. The wealth of scientific literature supports the proposal that garlic consumption have significant effects on lowering blood pressure, prevention of atherosclerosis, reduction of serum cholesterol and triglyceride, inhibition of platelet aggregation, and increasing fibrinolytic activity. Studies on garlic-containing meal plans and cancer risk show potential benefits from regular intake of this much-loved vegetable. Varying decreases in risk have been associated with regular garlic consumption in every day meal s in the form of garlic powder or crushed garlic.

Key words : polyphenols, sulphur compounds, hypercholesterolemia, pungent odour

INTRODUCTION

Garlic has been used for centuries to fight bacteria and **viruses** and speed up healing. According to one study, modern science has documented **garlic's** effects on immune system improvement, cardiovascular disease, and more. When you crush raw **garlic**, it makes a chemical called allicin. Garlic is also a triple threat against infections, offering antibacterial, **antiviral** and antifungal properties. Not only is it effective at killing **antibiotic**-resistant bacteria, including MRSA, but it also fights yeast infections, viruses and parasites.

Allium satvium, commonly known as Garlic. The name "Allium Sativum" is derived from the Celtic word "all" meaning burning (or) stinging and the Latine "Sativum" meaning planted (or) cultivated **[Mahady et al., 2001].**

In Allium Sativum L. three important sulphur compounds Allicin, Ajoene and Alliin are found. Besides, these sulphur compounds some other chemical compounds such as α-Phellandrene, β-phellandrene, citral linolool and geraniol are also found. **[Sanjay Kumar et al., 2017].**

Garlic is known to have atleast 33 sulphur compounds, 17 amino acids, several enzymes and minerals like Selenium. Out of all the Allium species, it contains the highest concentration of sulphur compounds. When the garlic is crushed or cut, the injury activates the enzyme Allinase, which converts Alliin to Allicin. Allicin is a sulfoxide and account for approximately 80% of the cysteine sulfoxide in garlic and resides in the storage cell. Crushing, cutting, chewing or otherwise processing the garlic release alliinase from the bundle sheath cells, an enzyme that catalyzes alliin to allicin.

Although allicin has been reported to inhibit the proliferation of cancer cells. **[Jayathilaka et al.]** Garlic can rightfully be called one of nature's wonderful plants with healing power. It can inhibit and kill bacteria, fungi, lower (blood pressure, blood cholesterol and blood sugar), prevent blood clotting, and contains anti-tumor properties. It can also boost the immune system to fight off potential disease and maintain health **[Abdullah et al. 1988].**

MATERIAL AND METHODS

Materials

Two different varieties of garlic (Mountain garlic and Country garlic) were purchased from Shevaipet Market in Salem District., Tamil Nadu. The collected samples were used for the research purpose of this study.

Sample preparation

To prepare the aqueous extract from the garlic samples, 0.7 - 0.9 g of samples were weighed and added to 25 mL of chilled water (4°C), stirred vigorously for 30 seconds; an extra 25 mL of cold water were added and it was stirred for 30 more seconds.

Methods

Estimation of the total Tannin content

The total Tannin content (TTC) of the garlic extract was estimated and adopted by **(**Okwu, 2005). Briefly 5gm of the sample was boiled with 400ml of water for 30 minutes, cooled and filtered through a Whatmann no.1 filter paper and it was made up to 500ml with distilled water. About 0.5ml of the sample was made upto 10.0ml with distilled water. To this, 0.5ml of colouring agent was added. The blue colour was read at 760nm against reagent blank after 30 minutes at room temperature. A standard was also run simultaneously at concentrations range of 20-100µg and the amount of tannic acid equivalent was

calculated. The values are expressed as mg of tannic acid equivalent/ gm of dried sample.

Estimation of the total Phenol content

The total Phenol content (TPC) of the garlic extract was estimated and adopted by (Spanos and Wrolstad, 1990)**.** Briefly, In a test tube, 200µl of the extract (1mg/ml) was mixed with 1ml of Folin-Ciocalteu reagent and 800µl of sodium carbonate. After shaking, it was kept for 2 hrs for reaction. The absorbance was measured at 750nm. Using gallic acid monohydrate, standard curve was prepared and linearity was obtained in the range of 10-50µg/ml. Using the standard curve, the total phenol content of the extract was determined and expressed as gallic acid equivalent in mg/g of the extract.

Estimation of the Antioxidant content

The antioxidant activity of the garlic samples was determined by using **Reducing power assay** and **Nitric oxide scavenging activity.**

Reducing power assay (RPA)

The sample together with Ascorbic acid solutions were spiked with 2.5ml of phosphate buffer (0.2 M, pH 6.6) and 2.5ml of 1% potassium ferricyanide. The mixture was kept in a 50°C water-bath for 20min. The resulting solution was cooled rapidly, spiked with 2.5ml of 10% trichloroacetic acid, and centrifuged at 3000rpm for 10 min. The supernatant (5ml) was mixed with 5ml of distilled water and 1ml of 0.1% ferric chloride and incubated for 10min. The absorbance was detected at 700nm on spectrophotometer. The extract concentration providing the absorbance was calculated from the graph of absorbance at 700 nm against extract concentration. Ascorbic acid was used as standard. Higher absorbance indicates higher reducing power (Oyaizu, 1986).

Nitric oxide radical scavenging activity (NORSA)

Sodium nitroprusside in aqueous solution at physiological pH spontaneously generates nitric oxide (NO), which interacts with oxygen to produce nitrite ions, which can be estimated using Griess reagent reaction (Garrat, 1964). Scavengers of NO compete with oxygen, leading to reduced production of NO and a pink coloured chromophore is formed. The absorbance of these solutions was measured at 540 nm against the corresponding blank solutions.

Estimation of the Allicin content

The concentration of allicin in the isolated fraction was standardized by spectrophotometry, according to the HPLC analysis. The absorbance of the collected fraction was measured at 240 nm and 254 nm using a 1 cm quartz cuvette. Typically, the absorbance ratio (240 nm/254 nm) is 1.4 to 1.5. The chromatographic purity was used as an acceptance criterion for the calibration solution, and the percentage of impurity per peak area should be less than 12% for the allicin solution to be used as a standard. The working standard was diluted with water to create standards for a linearity curve covering approximately 5 – 80 µg/mL for HPLC analysis. The standard temperature was maintained cold, and they were stored at ≤0°C until use.

Statistical analysis

The collected data were compiled to statistical analysis to find out the impact of analysis of phytochemicals, antioxidant and cut allicin results were worked on for statistical analysis with paired 't' test method.

RESULTS AND DISCUSSION

Comparing the two various garlic samples such as mountain garlic and country garlic. Total phenol and tannin content were high in mountain garlic than country garlic. For analysis of antioxidant content, various concentrations of garlic samples were used. The result found was high in mountain garlic compare to country garlic. Allicin content also comparative high in mountain garlic. The results from the lab were following up this study.

TABLE – 1 Phytochemical analysed parameters

S. No	Samples	Parameter analyzed	
		Phytochemicals (mg)	
		Phenol	Tannin
1	Mountain garlic	2.78	1.45
2	Country garlic	1.53	1.28

Figure 1 Total Phenol content in sample 1 & 2

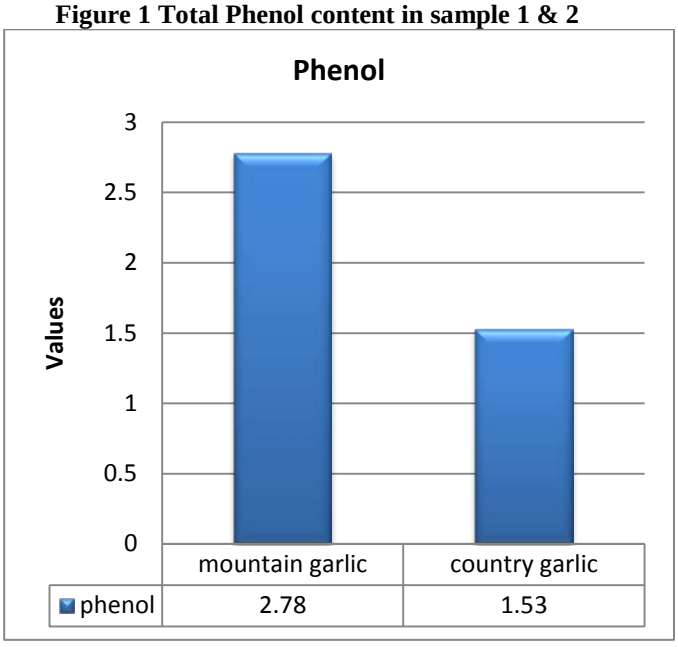

TABLE – 2 Antioxidants analyzed parameters

S. No	Samples	Parameter analyzed	
		Antioxidants (IC_{50})	
		RPA	NARSA
1	Mountain garlic	76.19	73.47
2	Country garlic	67.35	68.03

TABLE – 3 Allicin analyzed parameters of both samples

S. No	Samples	Parameter analyzed
		Allicin (mg)
1	Mountain garlic	1.62
2	Country garlic	1.32

Figure – 2 Total antioxidant content in sample 1 and 2

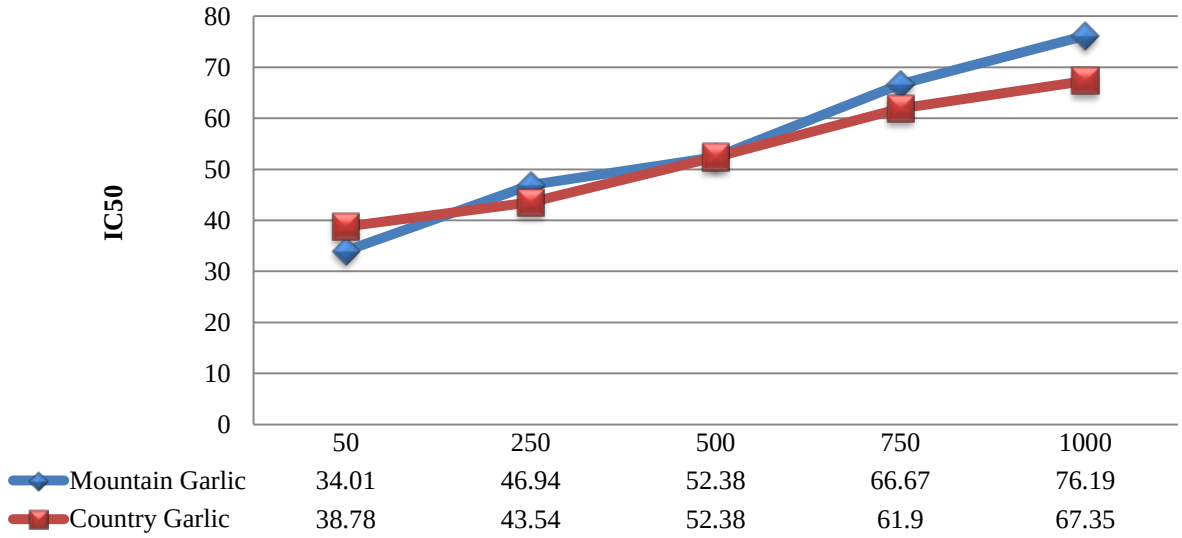

TABLE – 4 Analysed parameters of phenol

S.No	Samples	Parameters (mg/100gm)	Triplicate Value			Mean ± S.D	Method of analysis
			A	B	C		
1.	Mountain garlic	Total Phenol	1.25	2.42	2.78	2.15 ± 0.80	DGHS method
2.	Country garlic	Total Phenol	1.02	1.42	1.53	1.32 ± 0.27	

Tan;e 3 conclude that the analysed parameters values of phytochemicals, antioxidants and allicin content. Among the two garlic samples, analysed results of phytochemicals, antioxidants and allicin contents were comparatively higher in mountain garlic.

The table – 4 reveals the analysed parameters value of phenol. The results shows that the mountain garlic contains phenol of 2.78 mg/100 gm of garlic, like that country garlic phenol contains of 1.53 mg/100 gm are analysed using DGHS methods (Directorate general of health services) for phenol present. The phytochemical phenol present in country garlic is comparatively higher than mountain garlic.

CONCLUSION

The garlic compounds present in both mountain and country varieties of garlic show the multiple pathways of benefits inclusive of Allicin for anti-carcinogenic activities. More critical information on the application of garlic as anti-carcinogenic agent could be generated by considering the tested parameters. By knowing the beneficial effects of garlic, increase in consumption of allium vegetables may decrease the risk of cancer. The study recommends 20 g / day of allium vegetables is good for health. The study recommends the nutraceutical of garlic establish for anti-carcinogenic agent in the future studies. People should get awareness on consumption of garlic through community nutrition programmes**.** Intakes of recommended garlic help us to prevent from various diseases.

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