

Mikromani's Artichoke (*Cynara Cardunculus* *Var. Scolymus*) - A Mediterranean Nutraceutical

GEORGIOS ZAKYNTHINOS* and THEODOROS VARZAKAS

Department of Food Technology, School of Agricultural Technology and
Food Technology and Nutrition, Technological Educational Institute of Peloponnese.
Antikalamos Kalamata, 24100 Greece.

<http://dx.doi.org/10.12944/CRNFSJ.4.1.03>

(Received: March 04, 2016; Accepted: March 28, 2016)

ABSTRACT

Globe artichoke is considered one of the most important vegetable crops in the European and non-European countries of the Mediterranean basin. The Mediterranean region is well known for the 'Mediterranean diet', with attributed health benefits based on the consumption of fruits and vegetables, olive oil, etc. The artichoke has been recognized for the treatment of several ailments and their edible parts reveal therapeutic activity. In our case we have investigated the Mikromani's artichoke, which is a local variety of the Mikromani area in the South region of Peloponnese. In the present work nutritional determination of vitamins such as "vitamin C" and folic acid, minerals, fibers and total phenolics was carried out.

Key words: Mikromani's, Artichoke, Artichoke, Considered, Mediterranean.

INTRODUCTION

Globe artichoke is considered one of the most important vegetable crops in Italy (364,871t), Spain (199,100 t), France (42,465 t) and Greece (31,600 t) as well as non-European countries of the Mediterranean basin¹ (FAO 2012). Globe artichoke is also cultivated at a lesser extent in North Africa, South America, and the United States. Globe artichoke shows important nutritional characteristics due to its particularly high content of bioactive phenolic compounds, fiber and minerals. The economic use of the crop mainly focuses on the consumption of the edible immature (flower) heads, commonly referred to as 'heads'. These edible heads are eaten as fresh, canned or frozen vegetables. More recently, their demand has increased because they are very highly reputable as healthy foods. Artichokes are grown and produced locally and prepared into dishes, which often represent local specialties. In our case we have the Mikromani's artichoke that is a local variety in the Mikromani area

in the South region of Peloponnese. The artichoke is a popular vegetable in both Greece and other Mediterranean countries² and is known from ancient times for its medicinal properties^{3,4}. The Mikromani's artichoke is a local variety - population, with specific genetic material from Mikromani grown in an area of 650 acres with 50 producers, in Messinia prefecture, South region of Peloponnese (Greece). Artichokes are an important crop for the Messinia region and the production reaches three million (flower) heads per year. Artichokes are packed frozen or fresh and promoted in supermarkets in domestic market and abroad. Due to the considerable interest in the development of natural antioxidants from botanical sources, research has focused on the qualitative and quantitative determination of the artichoke phenolic fraction, as well as the mechanisms elucidating and underlying its therapeutic activity. Many studies confirm the popular use of artichoke for the treatment of several ailments and reveal that this therapeutic activity is probably attributed to the phenolic substances, which may inhibit free radical-

mediated processes. Micromani's Artichoke could also be processed in an alternative form such as a dietary supplement or nutraceutical, transferring a high added value to the product. In the present study, the composition of nutritional ingredients such as vitamins, minerals and total polyphenols in heads of this local artichoke variety was determined and alternative ways of product processing were suggested.

MATERIALS AND METHODS

Five samples of immature (flower) heads were received from nine different cultivated areas in order to have a credibility and representative sampling. In total, forty five (45) samples of fresh artichoke from Mikroomani were collected. Five samples of each one of the nine areas were homogenized in one sample and taken as a representative for each area. Each of the nine samples was mashed and the mashed material was used for the determination of Vitamin C by the titration method of DPI, folic acid with the creation extracts by sodium acetate buffer and the following method of Gregory et al 1984⁵, total phenolics content was determined by the

Folin-Ciocalteu method⁶. The extract (0.2 ml) was transferred into a 10.0 ml volumetric flask containing 4.0 ml water; next, 0.5 ml Folin-Ciocalteu's reagent and, after 1 min, 2.0 ml 20% aqueous solution of sodium carbonate were added. The volume was made up to 10.0 ml with distilled water. After 30 min, absorbance was measured at 760 nm against the reference solution. The results are averages of five measurements. The total phenolics concentration was calculated from a calibration curve ($R^2= 0.9954$), using gallic acid as standard (0.001–0.006 mg/ml). The results are expressed as gallic acid equivalent (mgGAE/g). The antioxidant potential was measured by method of DPPH. The DPPH assay was performed as described before with some modifications⁷. Briefly, 100 μ L of the methanolic solution (10 mg/mL) was added to 3.5 mL of a 0.06 mM methanol DPPH radical solution⁸. The decrease in absorbance was determined at 516 nm until it reached a plateau (after 30 min), in the dark. The DPPH antioxidant capacity was determined using a Trolox standard curve and results were expressed as μ mol Trolox equivalent per 100 g dried plant (μ mol eq. Trolox/100 g). The DPPH (1,1-Diphenyl-2-picrylhydrazyl) was obtain from Sigma-Aldrich Chemie GmbH, Germany.

The containing minerals Fe, Se Zn, Cu Mg, Mn, Ca obtained and K were determined by atomic absorption and flame emission spectrometry according to the methods of AOAC (2003). Finally, fiber content was determined by the AOAC 2009.01 method (*Codex Alimentarius Commission*).

Table 1: Average of nutritional values (vitamins, electrolytes, minerals) of nine samples of fresh artichoke heads per 100 g fresh weight

Nutritional values per 100 g fresh weight	Average values
Fibre	6.15-6.47 g
Vitamins	
Folic acid	68-72 μ g
Vitamin C	11.7-13.1 mg
Electrolytes	
K	370-398 mg
Minerals	
Ca	38-44 mg
Cu	0.175-0.231 mg
Fe	1.49-1.58 mg
Mg	72-80 mg
Mn	0.198-0.256 mg
P	73-96 mg
Se	0.22 μ g-0.34
Zn	0.49 mg -0.65

Table 2: Antioxidant capacity by DPPH assay of artichoke heads (μ mol eq. Trolox/100 g)

Samples	Antioxidant Capacity, μ mol eq. Trolox/100 g
SH1	4290,00
SH2	3789,00
SH3	4110,33
SH4	3458,23
SH5	3876,34
SH6	4200,65
SH7	4000,34
SH8	5020,32
SH9	3893,45

RESULTS AND DISCUSSION

The total dietary fiber ranged from 6.15 to 6.47 g, just above that of the Italian artichoke. Micromani's artichoke had a significantly high folic acid content, reaching the value of 72 µg/100 g (Table 1). The total phenols content in Micromani's artichoke showed a relative abundance of phenolic phytochemicals. In fact, nine tested samples yielded an average value of $1.789,43 \pm 101.16 - 1.932,29 \pm 109.13$ mg/100 g, expressed as gallic acid equivalents (GAE). The antioxidant capacity by DPPH assay of artichoke heads gave quite high values exceeding the 5×10^3 µmol eq. Trolox/100 g (Table 2).

According to various studies the artichoke flower heads have a high content of vitamin C (10 mg / 100 g fresh weight) and minerals (K 360 mg / 100 g fw; Ca 50 mg / 100 g fw)⁹. In the present work we observed a higher content of minerals compared

to other studies. Leaves and heads of artichoke have been found to be rich in polyphenols, fiber and minerals⁴. In our case the vitamin C content of some samples of Micromani's artichoke heads reached the value of 13 mg / 100 g f.w.

Nutritional and pharmaceutical properties of artichoke heads are linked to their special chemical composition, which includes high levels of polyphenolic compounds, fiber and minerals. The present work according to the analyzed results could consider Mikromani's Artichoke as a high nutritional value product. Thus in our case the product called "Micromani's" artichoke could be processed in an alternative form such as the dietary supplement or nutraceutical, giving the product a high added value. In the present study the composition of nutritional ingredients such as are vitamins, minerals and total polyphenols of artichoke heads from this local variety was determined and alternative ways of product processing were suggested.

REFERENCES

1. FAO 2012, <http://faostat.fao.org/site/567>.
2. Yerram Raju Behara, Pharmacological studies on artichoke leaf extract -An edible herb of Mediterranean origin. *Journal Pharmaceutical and Biomedical Sciences* **11**(11) 2011.
3. G. Sonnante, Pignone, D., & Hammer, K., The domestication of artichoke and cardoon: from Roman times to the genomic age. *Ann. Bot.*, **100**, 1095-1100, 2007.
4. V. Lattanzio, Kroon, P. A., Linsalata, V., & Cardinali, A., 2009, Globe artichoke: a functional food and source of nutraceutical ingredients. *J. Funct. Foods*, **1**, 131-144.
5. J. F. Gregory, Sartain, D. B., Day, B. P. F. Fluorometric determination of folacin in biological materials. *J. Nutr.* 1984.
6. A. Djeridane, Yousfi, M., Nadjemi, B., Boutassouna, D., Stocker, P., Vidal, N., Antioxidant activity of some algerian medicinal plants extracts containing phenolic compounds. *Food Chemistry* **97**: 654–660, 2006.
7. Gouveia, S. C., & Castilho, P. C, Helichrysum monizii Lowe: Phenolic composition and antioxidant potential. *Phytochemical Analysis*, **23**, 72–83 2012a.
8. X, Li, Wux, and Huangl, Correlation between Antioxidant Activities and Phenolic Contents of Radix Angelicae Sinensis(Danggui). *Molecules* **14**: 5349–5361 2009.
9. N., Ceccarelli, Curadi, M., Picciarelli, P., Martelloni, L., Sbrana, C., & Giovannetti, M. Globe artichoke as functional food. *Mediterr. J. Nutr. Metab.*, **3**, 197-201, 2010.