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Analysis of Phytochemicals and Minerals of *Lycopersicon esculentum*L.

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ABSTRACT

Plant based medicines have been a part of traditional healthcare in most parts of the world for thousands of years. The *Lycopersicon esculentum* is extensively studied for its medicinal properties by advanced scientific techniques and a variety of phytochemical compounds have been estimated from fruits of the plant and were analysed. Alkaloids, flavonoids, proteins, carbohydrate, sterols, phenols, saponins and lycopene compounds present in tomato fruits and also some mineral content such as phosphours, potassium, sodium, calcium, magnesium, zinc, copper, iron and manganese content were recorded.

INTRODUCTION

The plantkingdom represent a rich store house of organic compounds, many of which have been usedfor medicinal purposes and could serve as lead for the development of novel agents havinggood efficacy in various pathological disorders in the coming years. Plants are still anindependent source of medication in the contemporary health care delivery system. Theirrole is twofold in the development of medicines and served as a natural blue print for thedevelopment of new drugs, modern medicines, nutraceuticals, food supplements, folkmedicines, pharmaceutical intermediates and chemical entities for synthetic drugs (Hammer *et al.*, 1999). Animpressive number of modern drugs have been isolated or derived from natural sources,based on their use in traditional medicine (Cragg and Newman, 1999). According to World Health Organizationmedicinal plants would be the best source to obtain a variety of drugs (Santos *et al*., 1995).

Tomato (*Lycopersicon esculentum* L.) is one of the most widely consumedvegetables, being the second most important vegetable crop worldwide. It is a keycomponent in the "Mediterranean diet", which is strongly associated with areduced risk of chronic degenerative diseases (Agarwaland Rao, 2000). Tomato is a major source of antioxidantscontributing to the daily intake of a significant amount of these molecules. It is consumedfresh or as processed products such as canned tomato, sauce, juice ketchup, stews and soup(Lenucci *et al*., 2006). In fact, epidemiological studies have showed that consumption of raw tomato and itstomato based products is associated with a reduced risk of cancer and cardiovasculardiseases (Giovannucci *et al*., 2002).

Fruits form an important part of human diets and areusually regarded as good food (Brain and Alan,1992),their consumption have been associated with decreasedrisk of breast cancer (Zhang *et al*.,2009). The Cherrytomato plant (*Lycopersicon esculentum*) is a member ofthe nightshade family (*Solanaceacae*), the fruits which are edible ripens to a distinctivered and yellow colour (Smith, 1994). The fruit has fleshy internalsegments filled with slippery seeds surrounded by awatery matrix.

Phytochemicals are natural and non-nutritive bioactive compounds produced byplants that act as protective agents against external stress and pathogenic attack (Chew *et al*., 2009).Plants are rich in a wide variety of secondary metabolites (phytochemicals), such as tannins,terpenoids, alkaloids, and flavonoids, which have been found *in vitro*

antimicrobialproperties. In many cases, these substances serve as plant defense mechanisms againstpredation by microorganisms, insects, and herbivores. Basic phytochemical investigation of plant extracts for their phytoconstituents were alsovital. Based on their biosynthetic origin, phytochemicals can be divided into severalcategories: phenolics, alkaloids, steroids, terpenes, saponins, etc. Phytochemicals could alsoexhibit other bioactivities such as antimutagenic, anticarcinogenic, antioxidant,antimicrobial, and anti-inflammatory properties (Yen *et al*., 1993). To promote the proper use of herbalmedicine and to determine their potential as sources of new drugs, it is essential to studythe medicinal plants which have folklore reputation in a more intensified way.

MATERIALS AND METHODS

Collection of *Lycopersicon esculentum*

The fruits of tomato were collected from trail pots, Thanjavur.

Qualitative analysis of phytochemical screening

The fruit extracts were subjected to phytochemical screening to test the presence of metabolites such as alkaloids, flavonoids, proteins, phenol, tannins, saponins, carbohydrate, sterols, lycopene, glycosides, terpenoids, anthraquinone, phlobatanins, starch and steroid were qualitatively analyzed (Harbone, 1973).

Quantitative analysis of metabolites

Primary metabolites are the compounds synthesized in plants and directly involved in normal growth, development and reproduction which provide an idea of the nutritive potential of the plant parts. Primary metabolites like carbohydrate (Hedge *et al*., 1962), estimation of protein (Lowery *et al*., 1951). Secondary metabolites produced by plants to test their properties and to evaluate their possible use in the industry. The total content of phenolics was determined using the Foline Ciocalteu method (McDonald *et al*., 2001) flavonoids were estimated according to the procedure by Aluminium chloride colorimetric method (Chang *et al*., 2002) and estimation of tannin was carried with the method described by Schanderl, (1970).

Estimation of mineral content by AAS method

The minerals were analyzed from thesolution obtained by first dry ashing, 1g of the sample wasplaced in a crucible in a muffle furnace at 550^{o}C for 5hours to ash and then transferred into a desiccator to cool.The cooled ash was dissolved in 10% HCl and filtered intoclean graduated sample bottles. The solution was made to50ml with deionised water and analyzed for K, Na, Ca,Mg, Zn, Fe and Mn using the atomic absorptionspectrophotometer and for P, using UV-visiblespectrophotometer at 436nm after making ammoniumvanadate molybdate complex according to establishedprocedures of Perkin-Elmer (1982).

RESULT AND DISCUSSION

In the current investigation some of the important phytochemcial components were analysed. The following qualitative phytochemcialssuch as alkaloids, flavonoids, proteins, carbohydrates, sterols, phenolics, saponins and lycopene were recorded from the fruit of *Lycopersiconesculentum*. The quantitative analysis of phytochemcials from *L.esculentum* was estimated. It was alkaloids, flavonoids, protein, carbohydrate, sterols, phenols, saponins and lycopene compounds with 24.2, 51.2, 25.8, 23.2, 16.4, 36.1, 13.4 and 26.7 mg/g estimated from the *L.esculentum* fruit respectively (Table 1 and 2).

Phytochemical screening of the *Lycopersicon esculentum*fruit revealed thatsaponin, anthraquinone and glycosides were present in thefruit while phlobatanin and steroidal glycosides wereabsent. They have been scientifically proved tohave some anti-inflammatory effects on conjunctivitis(Fish and Fish, 1996).The Phytateconcentration (mg/100g) of the fruit was 112.82±0.0(mg/100g). Phytate can influence the functional andnutritional properties of food, depending on itsconcentration. Also it has the potential ability to lowerblood glucose, reduce cholesterol and triacylglycerols, andreduce risk of cancer through its absorption of divalent andmultivalent minerals which cancerous cells require forgrowth. The tannin concentration of *Lycopersiconesculentum* fruit was 0.20+0.00 %TA.Tannin helps to control all indications of gastritis,esophagitis, enteritis and irritating bowels disorders.

Phytochemical screening results of the powdered sample of *Lycopersicon esculentum*flowers extracted in water and methanol showed the presence of all the constituentswhereas the hexane and chloroform extracts showed the presence of very few bioactivecompounds. Chemical investigation on the different parts of the plant has resulted in theisolation of a large number of novel and interesting metabolites (Mohammed RafiqKhan *et al*., 2013).

Numerous phytonutrients in tomatohave been showed to help prevent excessive clumping of platelet cells. This ability isusually referred to as an anti-aggregatory effect (Lazarus *et al*., 2004). Presence of flavonoid, a class ofphenolic compounds is present in *Lycopersicon esculentum* showed anti inflammatoryactivity. Presence of cardiac glycosides has been scientifically proved to have some anti-inflammatory effects on conjunctivitis (Fish and Fish., 1996).

Mineral elements also play an important role in health and disease states of humans.Adeyeye(2002) reported that high amount of potassium in the body increases iron utilization. Calcium and phosphorous containing substances are required by children, pregnant and lactating woman for bones and teeth development (Sodamade *et al*., 2013). This result showed that *T. cucumerina* can contribute 341.66 mg of the recommended daily allowance of 800 mg of Ca and P required per day for both adults and children (NRC, 1989 and Ugbaja *et al*., 2017).

In the present study some of the specific minerals compounds were estimated from the *Lycoperisicon esculentum.* It was phosphorous, potassium, sodium, calcium, magnesium, zinc, copper, iron and manganese with 15.04±0.21, 11.90±0.10, 4.56±0.31, 18.04±0.06, 9.55±0.28, 0.31±0.00, 0.05±0.00, 0.45±0.00 and 0.36±0.00µg/100g was analysed with respective methods (Table 3). Their deficiencies can lead to abnormal bone development (Aletor and Aladetimi, 1989). Iron composition 0.4 mg/100g of the Cherry fruit is comparable to 0.6 mg/100g obtained by Ihekoronye and Ngoddy (1985). Iron is required for blood formation and it is also important in normal functioning of the central nervous system (Shills *et al*., 1992). Manganese, a nutritionally valuable mineral element was also present in the fruit in appreciable quantity. Manganese is required by several metal enzymatic reactions such as those catalyzed by superoxide dismutase, an antioxidant enzyme which is protective against unstable cell damaging free radicals and also required for proper bone and cartilage formation.

Table 1: Qualitative analysis of phytochemicals from *L.esculentum*

S.No	Phytochemicals	Inference
1	Alkaloids	+
2	Flavonoids	+
3	Proteins	+
4	Carbohydrates	+
5	Tannins	-
6	Sterols	+
7	Glycosides	-
8	Phenols	+
9	Saponins	+
10	Terpenoids	-
11	Lycopene	+

(+) present, (-) absent

Table 2: Quantitative analysis of phytochemicals from *L.esculentum*

S.No	Phytochemicals	Inference (mg/g)
1	Alkaloids	28.2
2	Flavonoids	51.2
3	Proteins	25.8
4	Carbohydrates	23.2
5	Sterols	16.3
6	Phenols	36.1
7	Saponins	13.4
8	Lycopene	26.7

Table 3: Mineral composition (mg/100g) of *L. esculentum* fruit

S.no	Name of the minerals	Inference (mg/100g)
1	Phosphorous	33.04± 0.21
2	Potassium	11.90± 0.10
3	Sodium	4.56± 0.31
4	Calcium	32.04± 0.06
5	Magnesium	9.55± 0.28
6	Zinc	0.31± 0.00
7	Copper	0.05 ± 0.00
8	Iron	0.48±0.00
9	Manganese	0.36±0.00

REFERENCES

1. Adeyeye, E.I. (2002). Determination of the chemical composition of the nutritionally valuable parts of male and female common west African fresh water crab *Sudananautes africanus*. *Inter.J.of Food Sci. Nutri*; 53: 189-196.
2. Agarwal, A. and Rao, A.V., (2000). Tomato lycopene and its role in human health and chronic diseases. *Can Med Assoc J*; 163: 739-744.
3. Aletor, V.A. and Aladetimi, O.O., (1989). Compositional evaluation of some cowpea varieties and some underutilized legumes in Nigeria. *Nahrung*; 33:999-1007.
4. Brain, F.A. and Alan, G.C., (1992). Food Science, Nutrition and Health. London: Edward Arnold.
5. Chang, C., Yang, M., Wen, H. and Chern, J., (2002). Estimation of total flavonoid content in propolis by two complementary colorimetric methods. *J Food Drug Anal*;10:178-82.
6. Chew, Y.L., Goh, J.K. and Lim, Y.Y., (2009). Assessment of *invitro* antioxidant capacity and polyphenolic composition of selected medicinal herbs from Leguminosae family in Peninsular Malaysia. *Food Chem*; 119: 373-378.
7. Cragg, M.G. and Newman, D.J., (1999). Plants as source of anticancer agents. *J Nat Prod*; 60: 52-60.
8. Fish, J.D. and Fish, S., (1996). A student guide to the seashore. 2nd ed. Cambridge University Press.
9. Giovannucci, E., Rimm, E.B., Liu, Y., Stampfer, M.J. and Willett, W.C., (2002). *J Natl Cancer Inst*; 94: 391-398.
10. Hammer, K.A., Carson, C.F. and Riley, T.V., (1999). Antimicrobial activity of essential oils and other plant extracts. *J Appl Microbiol*; 86(6): 985.
11. Harborne, J.B. (1973). Phytochemical methods. London. Chapman and Hall, LTD; 49-188.
12. Hedge, J.E., Hofreiter, B.T. and Whistler, R.L., (1962). Be Miller JN. In: Carbohydrate Chemistry. 17th Ed. Academic Press: New York.

13. Ihekoronye, A.I. and Ngoddy, P.O., (1985). Tropical fruits and vegetables. Integrated. Food science and technology for the tropics. Tropical fruits and vegetables. Macmillan education LTD. London and Oxford, 306.
14. Lazarus, S.A., Bowen, K. and Garg, M.L., (2004). Tomato Juice and Platelet Aggregation in Type 2 Diabetes.*JAMA*; 292(7): 805-806.
15. Lenucci, M.S., Cadinu, D., Taurino, M., Piro, G. and Dalessandro, G., (2006). Antioxidant composition in cherry and high-pigment tomato cultivars.*J Agric Food Chem*; 54: 2606-2613.
16. Lowery, O.H., Rosenberg, N.J., Farr, A.L. and Randal, R.J., (1951). Protein measurement with the folin-phenol reagent. *J Biol Chem*;193: 265-75.
17. McDonald, S., Prenzer, P.D., Autolovich, M. and Robards, K., (2001). Phenolic content and antioxidant activity of olive extracts. *Food Chem*;73:73-84.
18. Mohammed RafiqKhan, Dhanya Radhakrishnan, Mufeedha Mohamed, Mohamed Shamseer, Sheethal Johnson. (2013). Pharmacognostic profile and phytochemical investigation on the leaves of *Achyranthes aspera.World Journal of Pharmacy Research*; 2(6): 2919- 2927.
19. NRC., (1989). National Research Council Recommended Daily Allowance. National Academy: 22-50
20. Perkin-Elmer., (1982). Analytical Methods of Atomic Absorption Spectro-photometer. Perkin Elmer Corp., USA.
21. Santos, P.R.V., Oliveira, A.C.X. and Tomassinin, T.C.B., (1995). Controle microbiógico de produtos fitoterapicos. *Fitoterapicos Rev Farm Bioquim*; 31:35-38.
22. Schanderl, S., (1970). In: Methods in food analysis. Acedemic Press: in New York; 70.
23. Shills, M.Y. and Young, V.R., Nieman, D.C., Butterworth, D.E. and Nieman (1992). C.N (eds). Nutrition.,Wmc. Brown publishers, Dubugue, USA. Pp. 276-282.
24. Smith, A.F., (1994). The tomato in America early history. University of Illinois Press: 224.
25. Sodamade, A., Bolaji, O.S. and Adeboye, O.O., (2013). Proximate Analysis, Mineral Contents and Functional Properties of *Moringa oleifera* Leaf Protein Concentrate. *Journal of Applied Chemistry*; 4: 47-51.
26. Ugbaja, C.C., Oluwasegun O.F., Abiodun S.O., Idris O.F., Abiodun A. A. and David A. A., (2017). Comparative Phytochemical and Nutritional Composition of *Trichosanthes cucumerina* (L.) and Some *Solanum lycopersicum* (L.) Cultivars in Nigeria. *American Journal of Plant Sciences*; 8: 297-309.
27. Yen, G.C., Duh, P.D. and Tsai, C.L., (1993). Relationship between antioxidant activity and maturity of peanut hulls. *J Agric Food Chem*; 41: 67-70.
28. Zhang, C.X., Ho, S.E., Chen, Y.M., Fu, J.H., Chen, S.Z. and Lin, F.Y. (2009). Greater vegetables and fruits intake is associated with a lower risk of breast cancer among Chinese women. *Inter. Journal of cancer;*125(1): 181-188.