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Comparison of biochemical analysis and nutritive value of the selected root tubers - Carrot and radish

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Abstract
Root tuber is ideal for weight management as they are typically low in calories. They are useful reducing the risk of cancer and heart disease, they are low in fat, high in dietary fiber and rich in folic acid and vitamin C. Tubers are the rich source of nutrient, vitamin and minerals with interesting biological activities. So the present study aimed to explore and compare the biochemical and mineral composition of *Daucus carota*, L. and *Raphanus sativus*, L. In the present study *Daucus carota* showed high amount of vitamin A and low amount of vitamin K. Vitamin A act as immune for our eye power. So it is a best way to eat the carrot, natural source of Vitamin A regularly. In *Daucus* minerals are present in desired amount (Calcium, iron, magnesium, potassium and phosphorus). In *Raphanus sativus* vitamin A was found to be higher then vitamin C. It is observed that *Daucus carota* and *Raphanus sativus* has high concentration of vitamin, calcium potassium, when compared with RDA value. Carrot and Radish are less expensive and readily available in market and found to be rich in minerals and nutrient. It is suggestible for patients with mental depression, brittle bones, leg muscle spasms caused due to calcium deficiency. It is also advisable for anemic people due to iron deficiency in the body. The result of the study using *Daucus carota* and *Raphanus sativus* reveals the tubers as a herbal alternative for various nutrient such as Vitamin K, vitamin C, and A Calcium, Magnesium, Iron, Potassium and Phosphorus.

Keywords: *Raphanus sativus*, L. *Daucus carota*, L., biochemical, nutritive analysis malnutrition, RDA value

Introduction
The tubers are good source of protein. They also have various medicinal actions. The roots stimulate the appetite and digestion having a tonic and laxative effect upon the intestines and indirectly stimulating the flow of bile. They have ability, to prevent cancer and cardiovascular disease they are excellent source of vitamin A. One cup, of carrot providing more than the daily requirement. They are good source of vitamin C, A, B and K. Root tuber is ideal for weight management as they are typically low in calories. They provide micronutrient including minerals, vitamins and antioxidant compounds, such as carotenoids and polyphenols. So the present study aimed to explore and compare the biochemical and mineral composition of *Daucus carota*, L. and *Raphanus sativus*, L.

Tubers are an important part of our diet. They provide, not only the major dietary fiber component of food, but also a range of micronutrients, including minerals, vitamins and antioxidant compounds, such as carotenoids and polyphenols. This root tuber contains valuable phytochemicals. The presence of phytochemicals in addition to vitamins and provitamins, in fruits and vegetables has been recently considered of crucial nutritional importance in the prevention of chronic diseases, such as cancer cardiovascular disease, and diabetes.

A serious challenge to human survival, particularly in the developing world, is the ever growing gap between human population and food supply. Research and development which is focused on the lesser known edible root could assist in narrowing the gap between population growth and food deficiency, currently escalating in developing countries. Growing and using wild tuber is an opportunity that has never been adequately prospected to alleviate malnutrition and ameliorate food insecurity. Tubers are the edible parts of plant that are consumed wholly or in parts, raw or cooked as part of main dish or salad. A vegetable includes leaves, stems, roots, flowers, seeds, fruits, bulbs, tubers and fungi. Tubers are good sources of oil, carbohydrates, minerals and vitamins depending on the vegetable consumed. Vegetables, specially leafy and tuberous, are important items of diet in Indian kitchens. Apart from the variety which they add to the menu, vegetables are valuable sources of nutrients especially in rural areas where they contribute substantially to protein, minerals, vitamins, fibers and other nutrients which are usually in short supply in daily diets. It is worth while to note that consumption of numerous types of edible plants as sources of food could be beneficial to nutritionally marginal population particularly in developing countries where poverty and climate do cause havoc to the rural populace. In such countries the supply of minerals is inadequate to meet the mineral requirements of farm animals and rapidly growing population. Minerals cannot be synthesized by animals and must be provided from plants or mineral-rich water.

Review of Literature
Bishayee *et al.*, (1995) [2] worked that carrot extract help to protect liver from acute injury by the toxic effect of environmental chemicals, in this study the effect of carrot extract on carbon tetrachloride induced acute liver damage in mouse was evaluated. Mills *et al.* (2008) [7] reviewed that the antioxidant potential of the liver and vitamin A store were greater in Mongolian gerbils fed with colored flesh carrots compared with the control gerbils fed with white flesh carrot and vitamin A supplemented group. Mital *et al.* (2011) [8]

studied the reducing free radical scavenging activity one of the mechanisms behind ischemia reperfusion damage of kidney. Nicolle *et al.,* (2003) [9] reported that carrot showed cholesterol absorption mitigating effect in experimental carrot fed rats. Regulation in bile acid secretion and antioxidant status was also reported. Griep *et al.,* (2011) [3] reviewed the associated between fruit and vegetables of different color and their subgroups and 10-years coronary heart disease a high intake of deep orange fruit and vegetables and especially carrot, may protect against coronary heart disease.

Materials and Methods

Collection of Plant Material

The selected samples were collected from different places in and around, Nilgiri district (Fig - 1), Tamil Nadu, India during the month of November, (2016).

Fig 1: Study Area

Preparation of the Sample

The tubers were destalked, washed and shade dried to avoid destroying active compounds. The dried tubers were then ground to homogenous powder using willey mill grinder and then stored in an air tight container for further analysis. Carbohydrate, Starch, Protein, Aminoacid, Vitamins and Minerals were analysed using the standard methods in the laboratory.

Biochemical Analysis

The biochemical analysis was analyzed by following standard methods. Carbohydrates - Anthrone Method, Starch - Anthrone Method, Protein - Lowry's Method, Amino Acids - Ninhydrin Method, Vitamins - AACC Method, Minerals- AOAC method.

Fig 2: *Daucus carota*, L.

Order	-	Apiales
Family	-	Apiaceae
Genus	-	Daucus
Species	-	D.carota
Binomial name	-	*Daucus carota*, L.

Daucus carota, L. (Fig -2) is native to Europe and South – western Asia. The plant probably originated in Persia and originally cultivated for its leaves and seeds. The carrot plant produce a rosette of 8-12 leaves above ground and fleshy conical tap root below ground. USES –it is mainly used for clean the intestines and to be diuretic, antidiarrhoeal, tonic, antianemic.

Fig 3: *Raphanus sativus*, L.

Order	-	Capparales
Family	-	Brassicaceae
Genus	-	Raphanus
Species	-	R.Sativus
Binomial Name	-	*Raphanus sativus*, L.

Raphanus sativus, L. (Fig -3) is native to the Caspian Sea. It grows up to 1.5 m tall and is cultivated primarily for its large, white tap root. USES – The root stimulate the appetite and digestion having a tonic and laxative effect upon the intestines and indirectly stimulating the flow of bile. The juice is used in diuretic and laxative.

Results

The result of biochemical analysis (Table 1, Fig 4) showed the presence of carbohydrate,Starch, Protein and Aminoacids in least amount. The Carrot (Table 1 and Fig 5, 6) showed the presence of high concentration of Vitamin A as (5.01mg/100gm) and minerals such as Calcium (1420.0mg/100gm), Iron (19.50mg/100gm), Magnesium (650.0mg/100gm), Potassium (1008.0mg/100gm) and Phosphorus (110.0mg/100gm) that are typically hard to obtain from plant food. When compared with Recommended Dietary Allowance (Table 2, Fig 7) the plant showed high amount of Vitamin A, Calcium, Iron and Magnesium.

The result of biochemical analysis (Table 1, Fig 4) showed the presence of Carbohydrate, Starch and Protein in least amount. The Radish (Table 1 and Fig 5) showed the presence of high concentration of Vitamin A (11.02mg/100gm) and minerals such as Calcium (1210.0mg/100gm), Iron (16.80mg/100gm), Magnesium (540.0mg/100gm), Potassium (990.0mg/100gm) and Phosphorus (108.0mg/100gm) that are typically hard to obtain from plant food. When compared with

Recommended Dietary Allowance (Table 2, Fig 7) the plant showed high amount of Vitamin A, Aminoacid, Calcium, Potassium and Magnesium.

Conclusion

Root tubers are useful in reducing the risk of cancer and heart disease since they are low in fat high in dietary fiber and rich in folic acid and vitamin C. Tubers are the rich source of nutrients, vitamin and minerals with interesting biological activities. But their importance and nutritive power are unknown to the people. So the aim of this study was to analyse the biochemical and mineral composition of *Daucus carota*, L. *and Raphanus sativus*, L. The sample tubers were collected from Nilgiris. and the macronutrient (Carbohydrate Starch, Protein, Aminoacids) Vitamins (Vitamin A & Vitamin C), and Minerals (Iron, Calcium, Magnesium, Phosphorus, Potassium) were analyzed by following standard method. The plant *Raphanus sativus*, L. and *Daucus carota*, L. seemed to have the potential to act as a source of Vitamin A, Vitamin C, Calcium, Potassium and Magnesium that can improve the health.

The results were tabulated and represented in the Chart and compared with RDA value. Poor people who are unable to buy the costly nutrient rich fruits, vegetables and food items, lack of nutrients in their food leads to nutrient deficiency. It is important to focus on utilizing less expensive and readily available resources to replace costly nutrient products. Tubers are locally available plant with nutritive importance, so it can be used as an alternative nutrient supplement. It consequently improves the food security and reduces the level of poverty in developing countries. It is also suggestible for patients with mental depression, tooth decay, back and leg cramps, osteoporosis, brittle bones, leg muscle spasms caused due to calcium deficiency. It also advisable for anemic people due to iron deficiency in the body. Vitamin A acts as immune for our eye power. So it is a best way to eat the Carrot. The result of this study offers a platform for using *Daucus carota* and *Raphanus sativus* as a herbal alternative for various nutrients. It is good for our health.

Table 1: Concentration of nutrients present in *Daucus carota*, L. and *Raphanus sativus*, L.

S. No	Nutrients	Concentration (mg/100g)	
		Carrot	Radish
1.	Carbohydrate	27	1.6
2.	Starch	1.6	1.44
3.	Protein	12.4	1
4.	Amino acid	10	32
5.	Vitamin A	5.01	11.02
6.	Vitamin C	1.20	0.88
7.	Calcium	1420.0	1210.0
8.	Iron	19.50	16.80
9.	Magnesium	650.0	540.0
10.	Potassium	1008.0	990.0
11.	Phosphorus	110.0	108.0

Table 2 Comparison of nutrients present in *Daucus carota*, L. *and Raphanus sativus*, L. with Recommended Dietary Allowance (RDA) value

S. No	Nutrients	Nutrient present in carrot mg/100gm	Nutrient present in Radish mg/100g	RDA Value			
				(1-3years) Infants and children	Older children	Adult man and women	Pregnant women and lactating mother
1	Carbohydrate	27	1.6	95g	130g	130g	210g
2	Protein	12.4	1	11.0g	19g	46-56g	71g
3	Amino acid	10	32	714mg	214mg	84mg	---
4	Vitamin –A	5.01	11.02	.300mg	0.600mg	0.900mg	.770mg
5	Vitamin – C	1.20	0.88	0.5mg	0.9mg	1.3mg	1.4
6	Calcium	1420.0	1210.0	500mg	1300mg	1000mg	1000mg
7	Iron	19.50	16.80	7mg	8mg	8mg	27mg
8	Magnesium	650.0	540.0	80mg	240mg	400mg	360mg
9	Potassium	1008.0	990.0	460mg	1250mg	700mg	700mg
10	Phosphorus	110.0	108.0	3000mg	4500mg	4700mg	4700mg

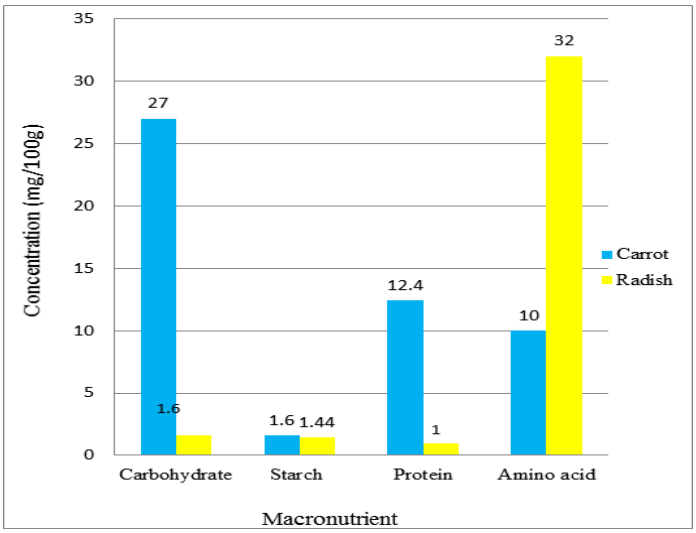

Fig 4: Composition of macronutrients present in *Daucus carota*, L. and *Raphanus sativus*, L

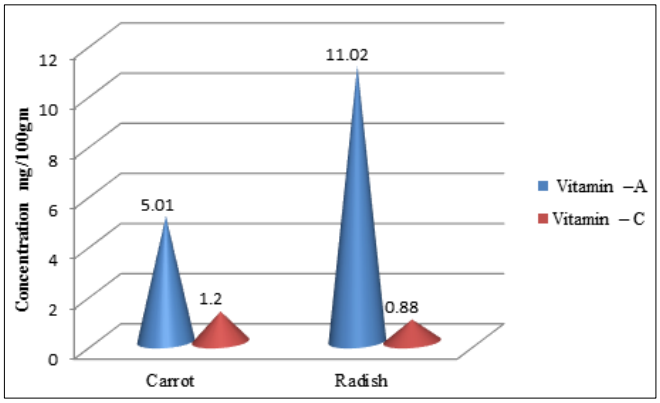

Fig 5: Composition of vitamins present in *Daucus carota*, L. and *Raphanus sativus*, L.

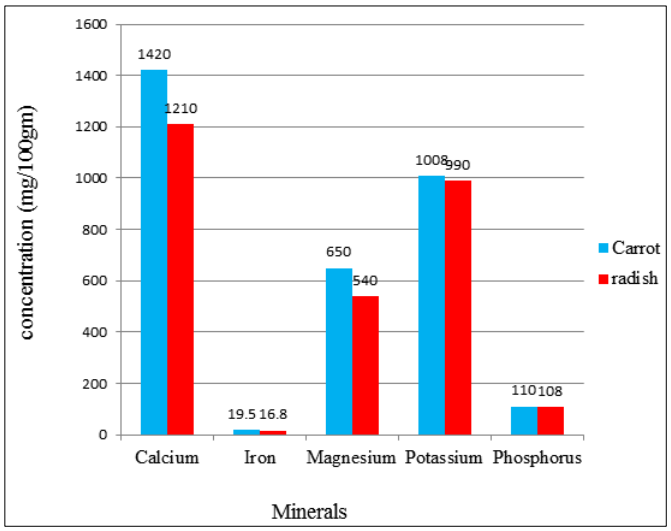

Fig 6: Composition of mineral present in *Daucus carota*, L. and *Raphanus sativa*, L.

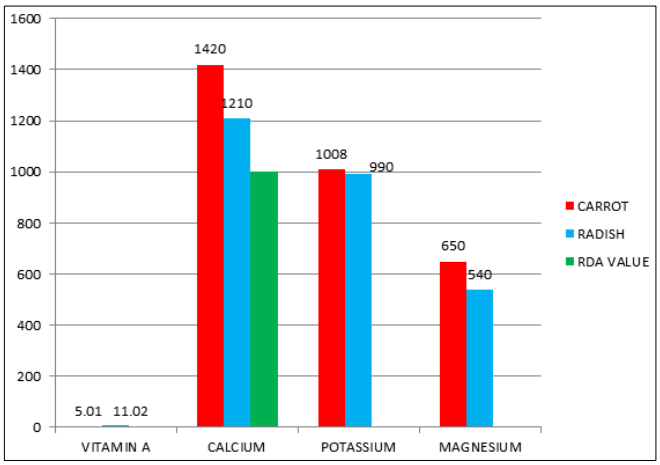

Fig 7: Suggested nutrients in *Daucus carota*, L. *and Raphanus sativus*, L. with comparison to RDA

References

1. American association of cereal chemists. (compiled approved methods committee) AACC Ins St Paul Minn USA2. 1976.
2. Bishayee A, Sarkar A, Chatterjee M. Hepatoprotective Activity of Carrot (*Daucus carota* L.) against Carbon Tetrachoride Intoxication in Mouse Liver, Journal of Ethnopharmacology. 1995; 47:69-74.
3. Griep LM, Verschuren WM, Kromhout D, Ocké MC, Geleijnse JM. Colors of Fruit and Vegetables and 10-Year Incidence of CHD. British Journal of Nutrition. 2011; 106:1562-1569.
4. Hedge JE, Hofreiter BT. (1962). In: Methods of Carbohydrate Chemistry, (Eds. Whistler, RL. and Be Miller, J.N.), Academic Press, New York. 1962.
5. Issac RA, Johnson WC. collaborative study of wet dry techniques for the elemental analysis of plant tissues by atomic absorption spectrophotometer. Journal of AOAC. 1975; 58:436.
6. Lowry OH, Rosebrough NJ, Farr AL, Randall RJ. protein measurement with folin phenol reagent. journal of biological chemistry. 1951; 193:265-275. ISSN: 1949-8454.
7. Mills JP, Simon PW, Tanumihardjo SA. Biofortified Carrot Intake Enhances Liver Antioxidant Capacity and Vitamin A Status in Mongolian Gerbils, Journal of Nutrition. 2008; 138:1692-1698.
8. Mital PR, Laxman PJ, Rameshvar PK. Protective Effect of *Daucus carota* Root Extract against Ischemia Reperfusion Injury in Rats. Pharmacology. 2011; 1:432-439.
9. Nicolle C, Cardinault N, Aprikian O, Busserolles J, Grolier P, Rock E *et al.* Effect of Carrot Intake on Cholesterol Metabolism and on Antioxidant Status in Cholesterol-Fed Rat, European Journal of Nutrition. 2003; 42:254-261.