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VITAMIN 'C' CONTENT IN LOCALLY AVAILABLE VEGETABLES OF RETAIL SHOPS IN DISTRICT KURUKSHETRA

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ABSTRACT

Inspite of performing various functions by Vitamin C (ascorbic acid) in our body it cannot synthesised. Hence is to be provided from exogeneous sources. Vitamin c exists only in fresh fruits and vegetables and its contents reduce on storage and sensitive to heat. Keeping this in view, the present study is undertaken to determine vitamin C in commonly consumed locally available vegetables and fruits of retail shops in district Kurukshetra Haryana. The vitamin C content of vegetables was determined by visual titration method. The mean ascorbic acid (mg/100g) was found maximum in *amla* (222.82±29.45) and minimum in carrot (7.077± 0.958). Among green leafy vegetables, coriander has maximum ascorbic acid (92.11±5.85mg/100g) contents. In roots, tubers and other vegetables maximum mean ascorbic acid was found in cabbage (90.26± 10.27mg/100g). Vitamin C contents were more in carrot, mustard and pea available at retail shops of district Kurukshetra in comparison to the values of this vitamin reported by NIN for respective fruits and vegetables. Whereas in all other vegetables, the contents of vitamin C were found less than that of NIN.

KEYWORDS: Vitamin C, Vegetables, Retail Shops.

Vitamin C also named as ascorbic acid is a hexose derivative synthesized by plants and most animals from glucose and galactose. But human beings lack the enzyme, 'L-Gulonolactone Oxidase' required for synthesis of ascorbic acid from glucose (Gerald et al.,2000) .That's why it has to be provided from exogenous sources.Low intake of vitamin C causes bleeding of gums, loose teeth, swollen tender joints as well as hemorrhages and disease scurvy (Swaminathan,2000). Ascorbic acid is found in all fresh fruits and vegetables, but its amount reduces with storage. *Amla* and guavas are the richest sources of vitamin C in our country. Other good sources of vitamin C include citrus fruits along with plum, papaya, cabbage, tomato and green leafy vegetables.

In Kurukshetra, local population purchase fruits and vegetables from retail shops. Therefore, the present study has been undertaken to determine the "Vitamin C contents in locally available vegetables of retail shop in district Kurukshetra.
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MATERIALS AND METHOD

Selection of Sample: The present study was conducted to determine the vitamin C contents in locally available winter vegetables retail shops in district Kurukshetra. For the purpose, following vegetables and fruits purchased from different shops of district Kurukshetra were:-

Green Leafy Vegetable: Coriander, fenugreek and mustard leaves as well as spinach.

Roots and Tubers and Other Vegetable Group: cabbage, carrot, chili, radish, turnip, pea, potato.

Fruits: amla, tomato.

Preparation of samples: All vegetables and fruits were washed with tap water followed by drying extra water by keeping them in folds of filter paper.

Vitamin C contents from the fruits &vegetables was determined by Visual titration method (AOAC, 1990).

Statistics: - The results obtained in the present study were analyzed by using standard deviation and fishers 't' test.

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RESULTS & DISCUSSION

Amongst the studied vegetables and fruits (Table 1.1), mean ascorbic acid contents was found maximal in *amla* (222.82±29.45 mg/100g) and minimum in carrot (7.01±0.95 mg/100g). In green leafy vegetables, the mean ascorbic acid contents was highest in coriander (92.11±5.85mg/100g) followed by in mustard (48.92±7.86 mg/100g), fenugreek (43.84±5.61 mg/100g) and spinach (24.79± 3.81mg/100g). On the other hand, in root tubers and other vegetables, the mean ascorbic acid contents was maximum in cabbage (90.26±10.27mg /100g) followed by in chili turnip, pea, potato, radish carrot and their respective values were (69.47±10.41;35.61±2.87; 16.01±2.76; 16.31±2.52; 14.11±1.86; 7.01±0.95 mg/100g). In tomato the mean ascorbic acid contents was found 14.77±2.64mg/100g.

The ascorbic acid contents reported by NIN (Gopalan, C.et al.,2000) in coriander, mustard, fenugreek and spinach were135, 33, 52 and 28mg/100g respectively. For cabbage, chili, turnip, pea, potato, radish and carrot the given values of vitamin C were 124, 111, 43, 9, 17, 15 and 3mg/100g respectively and in *amla* and tomato 600, 27 mg/100g.

Further, it has been revealed (Table 1.2) that carrot, mustard and pea availabled at retail shops of district Kurukshetra contained more vitamin C than the values reported by NIN for corresponding vegetables. The percentage increased in vitamin C contents of respective vegetables were 135.6,48.1 and 77.7.On the other hand, cabbage, chilli, coriander, fenugreek, and potato as well as radish, spinach turnip and *amla* contained low vitamin C than the values addressed by NIN. The percentage decreased of vitamin C contents in comparison to NIN value in cabbage, chilli, coriander, fenugreek and potato were 27.3, 37.5, 31.8, 17.4 and 4.2. Radish, Spinach, turnip and *amla* contained low percentage of vitamin C i.e. 6, 11.8, 17.2 and 62.9 than reported values for these vegetables by NIN. This may be because of difference in variety of sample, climatic conditions, fertility of soil and maturity of vegetable and fruit. Moreover, the vegetables and fruit samples used by NIN was grown in its own fields and immediately used after harvesting for determination of ascorbic acid. While in the present study, vegetables and fruit samples were taken from the retail shops of vegetable market of district Kurukshetra, harvested long back between 2-3 days to a week.

Variety (Tresseler et al., 1936), freshness (Tresseler et al., 1936; Bessey et al., 1933) and maturity have been indicated as factor affecting the vitamin C contents of vegetables. Difference in ascorbic acid contents according to climatic conditions, production factor, maturity state, positioning as well as species and variety has been reported by Nagy et al.(1980) in citrus fruits. He stated that high nitrogen fertilizer rates can lower vitamin C levels in citrus fruits, potassium levels are also needed for good vitamin C. According to him cool nights, total heat availability, early maturing varieties and fruits positioned on the outside of the tree are the contributory factors of vitamin C in citrus fruits.

Further, the significant effect of storage temperature on ascorbic acid contents of carrot was studied by Sisay et al.(2008). According to Siaga (1986) the vitamin C contents of tomato was increased with maturity stages and reached the peak, thereafter started decreasing.

SUMMARY & CONCLUSION

1. Carrot, Mustard and Pea available at retail shops of district Kurukshetra contains more vitamin c contents in comparison to the values of this vitamin reported by NIN for these respective fruits and vegetable.
2. Whereas the contents of vitamin C in cabbage, chilli, coriander, fenugreek and potato as well as radish ,spinach, turnip, amla and tomato were found less than that

of NIN.

TABLE 1.1 Vitamin C Contents (mg/100 g) In Raw & Fresh Vegetable Locally Available In Retail Shops of District Kurukshetra

Sr. No.	Ascorbic acid contents (mg/100 g) in Row & fresh Vegetable Samples.												
	Cabbage	Carrot	Chilli	Coriander	Fenugreek	Mustard	Pea	Potato	Radish	Spinach	Turnip	Amla	Tomato
1.	90.27	7.07	84.23	84.07	35.75	36.54	13.2	12.03	13.8	18.61	30.38	198.4	9.2
2.	87.4	5.4	69.4	86.0	40.0	40.0	13.8	14.4	10.5	25.0	32.4	200.2	14.2
3.	110.0	6.40	54.23	97.0	48.4	38.9	12.6	18.6	15.6	20.6	38.6	208.0	15.5 I
4.	100.2	8.2	70.0	100.07	50.2	46.4	15.0	19.5	17.12	28.4	37.9	248.5	19.16
5.	95.8	5.8	59.0	99.56	49.3	54.5	18.9	13.4	13.6	30.61	40.4	190.2	12.2
6.	97.9	7.1	80.4	92.3	38.4	60.54	20.0	15.8	14.8	25.0	35.0	198.6	17.4
7.	75.6	6.8	75.5	95.45	48.64	56.4	19.4	15.4	14.5	19.4	36.1	245.8	13.5
8.	78.4	7.7	63.4	94.5	46.4	48.5	12.6	16.04	11.8	26.5	34.2	275.0	14.5
9.	86.90	8.5	82.2	84.0	35.0	51.5	16.9	17.9	13.4	27.8	34.0	203.2	15.6
10.	80.13	7.8	56.4	88.23	46.4	56.0	17.7	20.1	16.0	26.0	37.2	260.3	16.5
Mean	90.26	7.077	69.476	92.118	43.849	48.92	16.01	16.317	14.112	24.792	35.61	222.82	14.77
S.D.	10.27	0.958	10.419	5.852	5.614	7.865	2.76	2.528	1.863	3.811	2.87	29.45	2.647
C.V.	11.38	13.535	14.997	6.353	12.802	15.076	17.27	15.493	13.202	15.372	8.064	13.221	17.911
Value given by NIN	124	3	111	135	52	33	9	17	15	28	43	600	27
t value	-9.85*	12.77*	-11.95*	-21.98*	-4.35**	6.07*	1.73	-0.81	-1.46	-2.52***	-7.71*	-38.41*	-13.41*

*Significant at .000 level
** Significant at .01 level
*** Significant at .05 level

Fig. 1 Vitamin C Contents (mg/100 g) In Raw & Fresh Vegetables Locally Available In Retail Shops of District Kurukshet

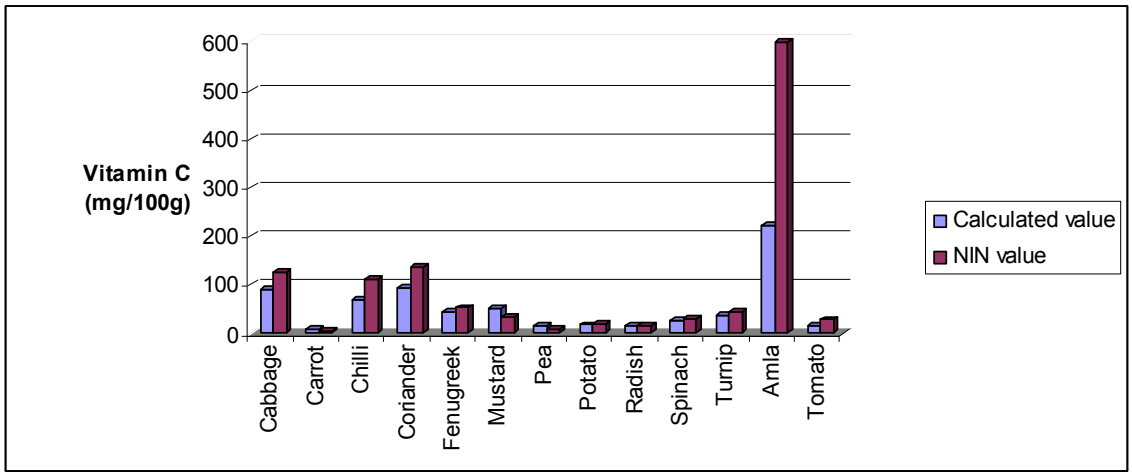
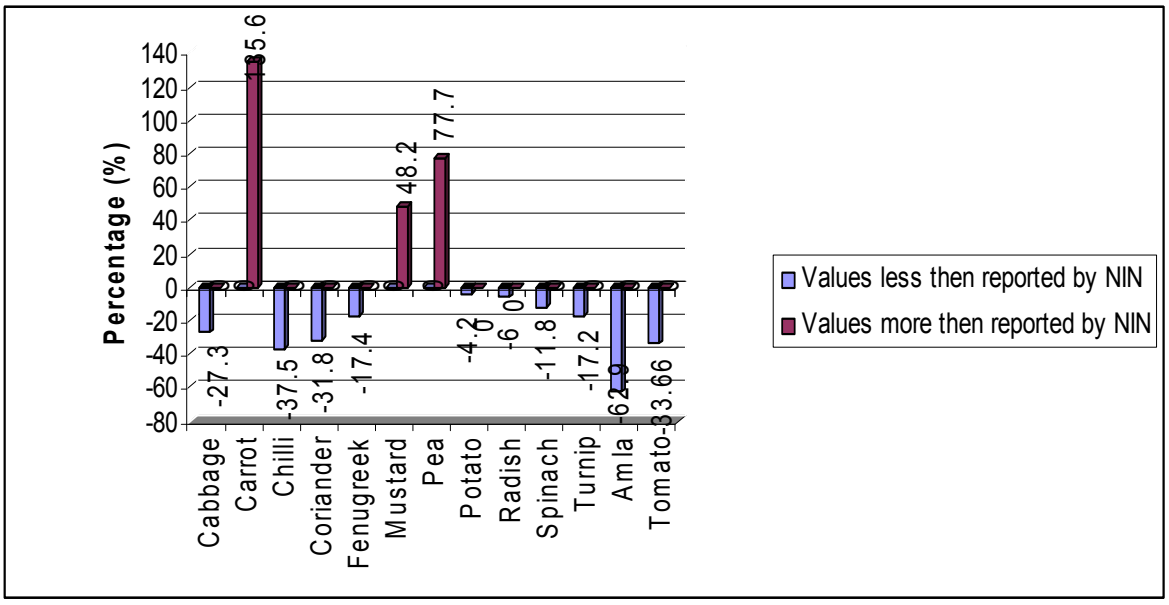


Table-1.2 Vitamin C contents of raw vegetables & fruits available at retail shops of district Kurukshetra.

Name of vegetables and fruits	Vitamin C contents (mg/100g)		Percentage Vitamin C contents	
Sr. No	**Locally available vegetables and fruits**	**Values reported by NIN**	**Values less then reported by NIN**	**Values more then reported by NIN**
Cabbage	90.26	124	-27.3	-
Carrot	7.077	3	-	135.6
Chilli	69.74	111	-37.5	-
Coriander	92.11	135	-31.8	-
Fenugreek	43.84	52	-17.4	-
Mustard	48.92	33	-	48.2
Pea	16.01	9	-	77.7
Potato	16.31	17	-4.2	-
Radish	14.11	15	-6	-
Spinach	24.79	28	-11.8	-
Turnip	35.61	43	-17.2	-
Amla	222.82	600	-62.9	-
Tomato	17.91	27	-33.66	-

Figure 1.2 Percentage Increase/Decrease in Vitamin C Content of Studied Vegetables with respect to NIN value



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