

Assessment of Vitamin C Deficiency among Population in Semi Urban Area: A Hospital Based Study

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ABSTRACT

Background: India has made tremendous progress in all fronts since independence including food production. Scurvy is a clinical syndrome that results from vitamin C deficiency. Hence; the present study was undertaken for assessing Vitamin C Deficiency among Population in Semi Urban Area.

Materials & Methods: The net semi-urban population in the present study was 796 patients. After obtaining the written consent in these patients, blood samples were taken and were sent to the department of general pathology. From the blood samples, plasma concentrations of vitamin C were calculated using an-autoanalyzer. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

Results: A total of 796 semi-urban subjects were analyzed. Among these 796 subjects, deficient levels of vitamin C was found to be present in 28.64 percent of the patients, while sub-optimal and adequate levels of vitamin C was found to be present in 26.64 and 44.72 percent of the patients. Among 228 vitamin C deficient subjects, 39.48 percent belonged to the age group of more than 45 years. 54.82 percent of the Vitamin C

deficient patients were males while the remaining were females.

Conclusion: Vitamin C deficiency is prevalent in significant in significant amount among semi-urban population.

Keywords: Population, Vitamin C, Semi- Urban.

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INTRODUCTION

India has made tremendous progress in all fronts since independence including food production. Scurvy is a clinical syndrome that results from vitamin C deficiency. Tales from pirates and British sailors made the disease infamous. Vitamin C deficiency and its manifestations have largely been a product of inadequate dietary intake.¹⁻³ Vitamin C is naturally found in fresh fruits and vegetables; for example, grapefruits, oranges, lemons, limes, potatoes, spinach, broccoli, red peppers, and tomatoes. Up to 90% of vitamin C is consumed in the form of vegetables and fruits. Lack of exposure to these foods has been the most frequent cause of the deficiency. Several in vivo factors related to inflammation and oxidative stress have been demonstrated to influence the biological variation in vitamin C concentration in humans.⁴⁻⁶ Hence; under the light of above obtained results, the present study was undertaken for assessing Vitamin C Deficiency among Population in Semi Urban Area.

MATERIALS & METHODS

The present study was planned in the Department of General Medicine, Government Medical College, Bharatpur, Rajasthan,

India. The study included assessment of Vitamin C Deficiency among Population in Semi Urban Area. Before the starting of the study, ethical approval was obtained from the ethical committee of the institution. A total of 1560 subjects who reported to the department of general medicine were screened during the study period. Among these patients, separate data record was made for analysis of semi-urban population. Inclusion criteria:

- Patients with negative history of presence of any other metabolic disorder,
- With negative history of presence of diabetes or hypertension,
- Patients within the age group of 20 to 60 years

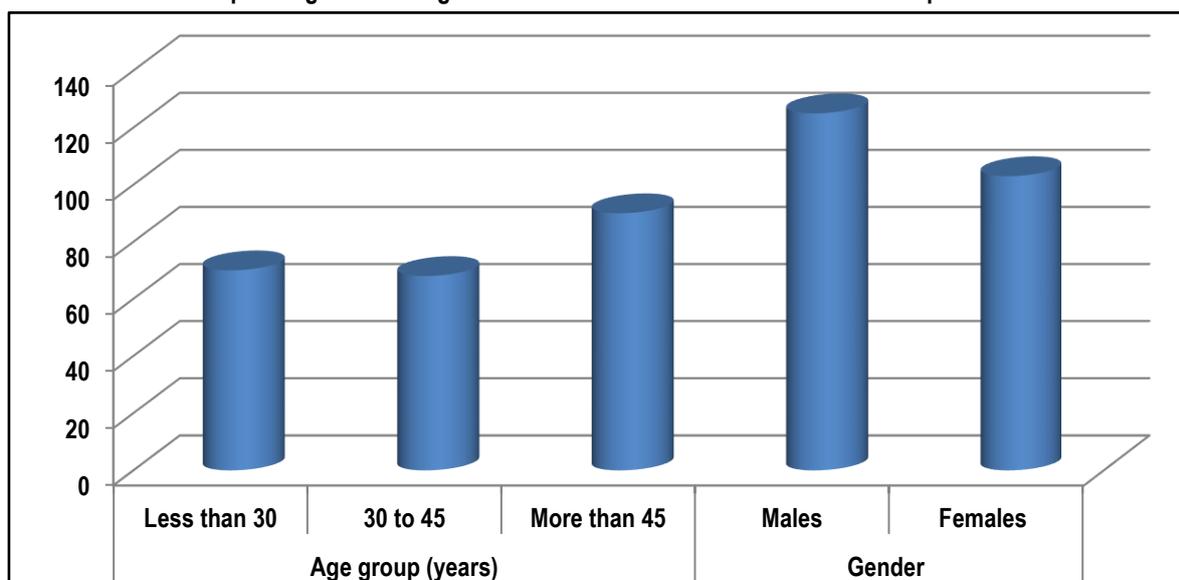
After segregating and meeting the inclusion criteria, the net semi-urban population was found to be 796 patients. Therefore; the final sample size for the present study came out to be 796. After obtaining the written consent in these patients, blood samples were taken and were sent to the department of general pathology. From the blood samples, plasma concentrations of vitamin C were calculated using an-autoanalyzer. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test was used for assessment of level of significance.

Table 1: Distribution of serum vitamin C levels

Serum vitamin C levels	Vitamin C levels	Number of patients	Percentage of patients
Less than 28 $\mu\text{mol/L}$	Adequate	356	44.72
11 to 28 $\mu\text{mol/L}$	Sub-Optimal	212	26.64
Less than 11 $\mu\text{mol/L}$	Deficient	228	28.64
Total		796	100

Table 2: Age-wise and gender-wise distribution of vitamin C deficient patients

Parameter		Number of patients	Percentage of patients
Age group (years)	Less than 30	70	30.70
	30 to 45	68	29.82
	More than 45	90	39.48
Gender	Males	125	54.82
	Females	103	45.18

Graph 1: Age-wise and gender-wise distribution of vitamin C deficient patients

RESULTS

In the present study, a total of 796 semi-urban subjects were analyzed. Among these 796 subjects, deficient levels of vitamin C was found to be present in 28.64 percent of the patients, while sub-optimal and adequate levels of vitamin C was found to be present in 26.64 and 44.72 percent of the patients. In the present study, among 228 vitamin C deficient subjects, 39.48 percent belonged to the age group of more than 45 years, while 29.82 percent of the subjects belonged to the age group of 30 to 45 years. 30.70 percent of the subjects belonged to the age group of less than 30 years. 54.82 percent of the Vitamin C deficient patients were males while the remaining were females.

DISCUSSION

On average, the human body loses approximately 3% of its vitamin C content per day, which is the percentual daily loss corresponding with the first-order elimination process of vitamin C assuming no intake. This severely limits the disease-free and survival time when subjects are on a diet poor in vitamin C, because this nutrient is a first-line antioxidant acting as a free radical scavenger. The half-life of ascorbic acid is approximately

16 days. Vitamin deficiencies are considered unusual in Western populations, but recent case reports warn that scurvy is still present and may be misdiagnosed. Poor vitamin C status is associated with low socioeconomic status in developed countries. Vitamin C deficiency has also been reported in some disadvantaged groups, but there has been little concern that wider groups of the population may be at risk of clinical or sub-clinical deficiency.⁷⁻⁹

In the present study, a total of 796 semi-urban subjects were analyzed. Among these 796 subjects, deficient levels of vitamin C was found to be present in 28.64 percent of the patients, while sub-optimal and adequate levels of vitamin C was found to be present in 26.64 and 44.72 percent of the patients. Vitamin C deficiency manifests symptomatically after 8 to 12 weeks of inadequate intake and presents as irritability and anorexia. After these initial symptoms, dermatologic findings include poor wound healing, gingival swelling with loss of teeth, mucocutaneous petechiae, ecchymosis, and hyperkeratosis.¹⁰ Mosdøl A et al estimated prevalence and predictors of vitamin C deficiency within UK's low-income population. A valid plasma vitamin C measurement was made in 433 men and 876 women. The results

were weighted for sampling probability and non-response. An estimated 25% of men and 16% of women in the low-income/materially deprived population had plasma vitamin C concentrations indicative of deficiency (<11 micromol l(-1)), and a further fifth of the population had levels in the depleted range (11-28 micromol l(-1)). Being a man, reporting low-dietary vitamin C intake, not taking vitamin supplements and smoking were predictors of plasma vitamin C levels ≤ 28 micromol l(-1) in mutually adjusted logistic regression models. Health professionals need to be aware that poor vitamin C status is relatively common among adults living on a low income.¹¹ Schleicher RL et al determined the most current distribution of serum vitamin C concentrations and the prevalence of deficiency in selected subgroups. Serum concentrations of total vitamin C were measured in 7277 noninstitutionalized civilians aged ≥ 6 y during the cross-sectional, nationally representative National Health and Nutrition Examination Survey (NHANES III) 2003-2004. The prevalence of deficiency was compared with results from NHANES III. The overall age-adjusted mean from the square-root transformed (SM) concentration was 51.4 micromol/L (95% CI: 48.4, 54.6). The highest concentrations were found in children and older persons. Recent vitamin C supplement use or adequate dietary intake decreased the risk of vitamin C deficiency ($P < 0.05$). In NHANES 2003-2004, vitamin C status improved, and the prevalence of vitamin C deficiency was significantly lower than that during NHANES III, but smokers and low-income persons were among those at increased risk of deficiency.¹²

In the present study, among 228 vitamin C deficient subjects, 39.48 percent belonged to the age group of more than 45 years, while 29.82 percent of the subjects belonged to the age group of 30 to 45 years. 30.70 percent of the subjects belonged to the age group of less than 30 years. 54.82 percent of the Vitamin C deficient patients were males while the remaining were females. Only two studies have been conducted outside high income countries including one from India. A nationally representative population study from Mexico reported a 40% prevalence of deficiency in women of childbearing age. In a small study of 322 people aged 20–50 years from western India, vitamin C deficiency was found in 9.6% of men and 13.0 % of women, and just over a half had levels in the sub-optimal range.^{13, 14}

CONCLUSION

Under the light of above obtained data, the authors concluded that vitamin C deficiency is prevalent in significant amount among semi-urban population. However; further studies are recommended.

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