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ASSOCIATION BETWEEN DIETARY SOURCES OF VITAMIN C INTAKE AND RESPIRATORY INFECTIONS AMONG STUDENTS AT AYYAN INSTITUTE OF MEDICAL SCIENCES

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ABSTRACT

Background: Vitamin C (ascorbic acid) is very useful in the prevention of Scurvy and it was proved. There is some controversy for at least sixty to seventy years for the prevention and treatment of the common cold and respiratory infections has been a subject of concerned. **Objectives:** The main objective of this study was to describe the demographic characteristcs, association between dietary sources of vitamin C intake and respiratory infections among students at Ayyan Institute of Medical Sciences. **Subjects and Methods:** Data was collected using a structured questionnaire that elicited information on demographic characteristics; dietary sources of vitamin C intake and vitamin C supplementation; and the occurrence of respiratory infections in the past six months; among college students at Ayyan Institute of Medical Sciences. The data was analyzed by EPIINFO 7 software. **Results:** College students in this study consumed fairly good proportions of dietary sources of vitamin C. Eating raw vegetables was significantly ($p<0.05$) associated with sore throat, in that students who consumed more raw vegetables or salad reported a higher prevalence of sore throat. Eating fresh fruit was not significantly associated with the prevalence of respiratory symptoms. Vitamin C supplementation was significantly ($p<0.05$ associated (protective effect) with running nose and sore throat. **Conclusion:** Although there was no conclusive evidence in this study to suggest that dietary sources of vitamin C have a protective effect against respiratory infections among college girls, Vitamin C supplementation with a balanced diet may be effective in boosting immunity and affecting susceptibility to respiratory infections, especially among young college students.

INTRODUCTION

As you all know common cold is the world's most widespread viral infection, with most people commonly affected group was children, old age followed by adults, suffering approximately three colds per year.[1] Mostly common cold caused by many viruses cause infection and cold symptoms; the most common, rhinoviruses, account for 30% to 40% of adult colds. In relation to common cold, rarely cause death, but morbidity varies from severity of the disease. Re-infection is prevalent and common because of the many varieties of infectious viruses.[1] Routinely from the over the counter many consumers are often encouraged to take large doses of vitamin C supplements to prevent or relieve symptoms of the common cold,[2-3] although researchers disagree on the efficacy of taking any vitamin C preparation for the above purpose.[4]

For the last 3 decades, the most recent research suggests that vitamin C has no particular benefit over a placebo,[5,6] particularly if the "window of opportunity" is missed. In the double-blind, placebo-controlled survey revealed that as to ascertain whether a specific form of vitamin C could offer a degree of prevention when used throughout the winter months rather than when used once an infection had begun. The active preparation was Ester-C ascorbate, a natural form of vitamin C that allows cells to efficiently absorb and retain high levels of the vitamin. Ascorbic acid maximize its cellular concentration to provide high levels of biochemical activity[7] and strengthen the immune system.

Complete cure for the common cold would substantially reduce the number of work days lost each year as a result of symptoms of infection including tiredness, headaches, runny nose, sneezing, coughing, watery eyes, and impaired concentration. In the present pandemic situations, many people assuming and taking voluntarily from the super markets and pharmacy prescription as tremendously increased the use of Vitamin C consumption was observed in the general population as a assumption for immunity booster.

Vitamin C supplements marketed in the many developed countries i.e. United Kingdom, United States, and Europe vary widely by type and recommended dietary allowance. Increasing evidence has shown that Ester-C ascorbate may have significant beneficial properties such as potentiating immune cell function.[8] As there is much interest in the association between vitamin C and -respiratory infections in general, we decided to test the hypothesis of this association among college students in at Ayyan Institute of Medical Sciences.

Aims and Objectives

The purpose of this study was to describe the association between intake of dietary sources of vitamin C, vitamin C supplementation and respiratory infections in college students. More specifically, the objectives of the study were mentioned as follows:

- To assess the intake of dietary sources of vitamin C and vitamin C supplementation patterns among college students of Ayyan Medical college, Hyderabad, Telangana.
- To assess the various forms of respiratory infections experienced by the college girls in a given time period (In the past six months).
- To determine factors associated with vitamin C intake and the various forms of respiratory infections as reported by college girls.
- To estimate the association between intake of dietary sources of Vitamin C, vitamin C supplementation and respiratory infections in college girls.

METHODOLOGY

Study design

This was an observational study using the cross-sectional study design. The sample for the study was obtained from the students of Ayyan Medical college, Hyderabad. The cross-sectional study was conducted by a survey using a structured questionnaire to elicit information on intake of dietary sources of vitamin C, vitamin C supplementation and respiratory infections in college students.

Study sample

The survey involved a multistage, stratified sample of 100 students of Ayyan Institute of Medical Sciences, Hyderabad. There were a total of 100 students in Ayyan Medical College, from which 3 semesters were randomly selected. From the randomly selected levels of the semesters, again randomly selected from each student, provided who were willing to participate in the study.

Subjects included in this study were

Ayyan Medical college of the age group 18-23 years; College girls willing to participate in the study; College students without chronic lung diseases for example: Tuberculosis.

Subjects excluded from this study were

Ayyan Medical college students under 18 years and above 23 years of age ;College students not willing to participate in the study; And College students with Chronic Lung Diseases.

Data collection

Data was collected using a structured questionnaire .The study participants filled the questionnaire to the best of their knowledge and the researcher collected the completed questionnaires for data analysis. This questionnaire was pre-coded and contained three sections:

1. **Demographic characteristics of the college Students** (Name of college , level, age, date of birth, marital status, monthly household income, weight and height)
2. **Dietary and Vitamin C Intake Patterns:** (eat fresh fruit, citrus fruit, cooked green vegetables, cooked root vegetables, eat raw vegetables, fish , and drink fruit juices, take vitamin C tablets)
3. **Prevalence of respiratory infections in the past six months** (have a Common cold, Running nose, Cough, Wheezing, Sore throat, phlegm , shortness of breath, fever)

   The data was entered in Excel 97-2003 and analyzed in EPIINFO 7 statistical software. The questionnaires were coded and contained a unique ID number for identification and checked for completeness when they were returned by participants. One hundred college girls were included in the sample for this study.

Statistical analysis

Assessment of qualitative variables was done with descriptive statistics using mean and standard deviations for continuous variables and frequency and percent for categorical Variables. Comparative measures using categorical variables were analyzed by chi-square analysis with a level significance set at 0.05.

RESULTS

The present study was done in the Ayaan Institute of Medical Sciences, Hyderabad, Telangana during the period January to June 2020.

One hundred students of the age group 18-23 years, not complaining from chronic lung diseases were included in this study. The demographic characteristics of the study population are given in Table 1.

Table 1: Generalcharacteristics of the college girls in the study.

Characteristics	Mean ± SD	Number (%)
Age In Years Height in Cms Weight in Kg Body Mass Index	21.44 ± 1.41 154.80 ±4.12 58.66 ± 11.60 23.0 ± 3.8	
Level (Semester Number): 2 5 6		 30(30%) 40 (40%) 30(30%)
Marital Status: Single/Never married Married		 97 (77%) 03 (19%

Hundred apparently healthy college girls were included in this study, their mean ages ± S.D was 21.44 ± 1.41 years and their mean BMI ± S.D was 23.0 ± 3.8 years Table (1). Total sample was 100 girls, it included 30% of girls from level 2, 40% of them from 5th level and there was 30% girls of level 6. Ninty seven seven percent were single girls and 3% college girls were married during study.

Table 2: The diet history as reported by college girls in the study.

Diet	2- 3 times a day Number (%)	Once a day Number (%)	2 – 4 times a week Number (%)	Once a week Number (%)	1 – 3 times a month Number (%)	Less often or never Number (%)
Fresh fruit	11(11%)	13(13%)	13(13%)	31(31%)	21(21%)	11(11%)
Cooked green vegetables	4(4%)	20(20%)	28(28%)	26(26%)	15(15%)	7(7%)
Cooked root vegetables	8(8%)	12(12%)	18(18%)	21(21%)	20(20%)	21(21%)
Raw vegetables or salad	9(9%)	34(34%)	24(24%)	17(17%)	11(11%)	5(5%)
Fish	0	4(4%)	9(9%)	17(17%)	38(38%)	32(32%)
Drink fruit juices	14(14%)	16(16%)	23(23%)	23(23%)	19(19%)	5(5%)

Statistical analysis of dietary sources of vitamin C (Fresh fruit, Fish, Drink fruit juices.... etc) were recorded in table (2) About 31% reported once a week fresh fruit intake. 28% reported 2-4 time a week intake of cooked green vegetables. And 34% reported daily intake of raw vegetables or salad. Eating fish 38% reported 1-3 times of a month. Also were the 23% of students drink fruit juices about 2-4 times a week.

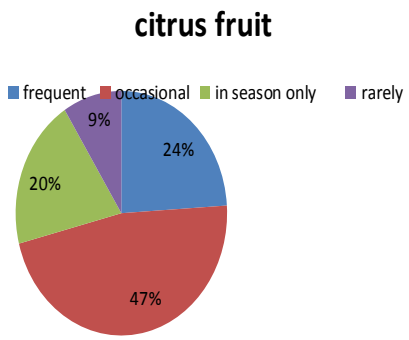

Figure (2): citrus fruit or juice consumption in the past 6 months.

Statistical analysis and results of Citrus Fruit or Juice consumption in the past 6 months in the studied students are given in Fig (1). On comparing the rate of Citrus Fruit or Juice consumption, the most answers were (occasional) 47%.

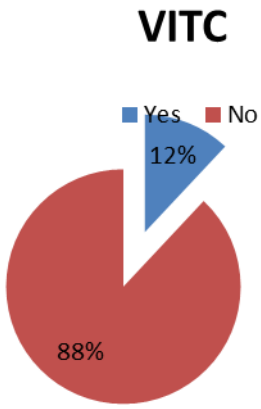

Figure 3: Vitamin C Supplementation.

Statistical analysis and results of use vitamin C supplementation are recorded in Figure (2). Only about 12% of college girls reported using Vitamin supplementation. The frequency of their use of vitamin C supplementation was reported as at least once a week.

Table 3: Association between vitamin c rich food Intake and Respiratory symptoms among college students.

Respiratory Symptoms		Common cold		Running Nose		Cough		Wheezing		Sore throat	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Cooked green vegetables	Yes	67.95 %	32.05 %	74.36 %	25.64 %	67.95 %	32.05 %	17.95 %	82.05 %	74.36%	25.64 %
	No	77.27 %	22.73 %	63.64 %	36.36 %	68.18 %	31.82 %	18.18 %	81.82 %	59.09%	40.91 %
P value		0.20		0.16		0.49		0.47		0.09	
Cooked root vegetables	Yes	64.41 %	35.59 %	77.97 %	22.03 %	67.80 %	32.20 %	15.25 %	84.75 %	72.88%	27.12 %
	No	78.05 %	21.95 %	63.41 %	36.59 %	68.29 %	31.71 %	21.95 %	78.05 %	68.29%	31.71 %
P value		0.07		0.06		0.48		0.20		0.31	
Raw vegetables or salad	Yes	72.62 %	27.38 %	73.81 %	26.19 %	69.05 %	30.95 %	16.67 %	83.33 %	75.00%	25.00 %
	No	56.25 %	43.75 %	62.50 %	37.50 %	62.50 %	37.50 %	25.00 %	75.00 %	50.00%	50.00 %
P value		0.10		0.18		0.30		0.22		0.02	
Fish	Yes	80.00 %	20.00 %	66.67 %	33.33 %	60.00 %	40.00 %	26.67 %	73.33 %	73.33%	26.67 %
	No	65.71 %	34.29 %	74.29 %	25.71 %	71.43 %	28.57 %	14.29 %	85.71 %	70.00%	30.00 %
P value		0.08		0.22		0.13		0.08		0.37	

Eating raw vegetables was significantly (P<0.05) associated with sort throat, in that students who consumed more raw vegetables or salad repeated a higher prevalence of sore throat. This may be attributed to the hygienic conditions involved in the preparation of the raw vegetables salad and/or could be attributed to other environmental factors and the individuals' immune system. Eating cooked root vegetables was marginally significantly associated with common cold. There seems to be a protective effect against this symptom. Also Eating fish was marginally significant (P=0.08) associated with common cold and wheezing.

Table 4: Association between fruit Intake and Vitamin C supplementation respiratory symptoms among college girls.

Respiratory Symptoms		Common cold		Running nose		Cough		Wheezing		Sore throat	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Fresh fruit	Yes	72.06%	27.94%	72.06%	27.94%	69.12%	30.88%	19.12%	80.88%	70.59%	29.41%
	No	65.63%	34.38%	71.88%	28.13%	65.63%	34.38%	15.63%	84.38%	71.88%	28.13%
P value		0.26		0.48		0.36		0.34		0.45	
Drink	Yes	73.68%	26.32%	72.37%	27.63%	72.37%	27.63%	19.74%	80.26%	67.11%	32.89%

fruit juices	N0	58.33%	41.67%	70.83%	29.17%	54.17%	45.83%	12.50%	87.50%	83.33%	16.67%
P value		0.08		0.43		0.05		0.22		0.06	
citrus fruit or juice	Yes	70%	30%	72.00%	28.00%	68.00%	32.00%	18.00%	82.00%	71.00%	29.00%
	N0	0	0	0	0	0	0	0	0	0	0
VITC	Yes	83.33%	16.67%	50.00%	50.00%	58.33%	41.67%	33.33%	66.67%	50%	50%
	No	68.18%	31.82%	75.00%	25.00%	69.32%	30.68%	15.91%	84.09%	73.86%	26.14%
P value		0.15		0.04		0.23		0.09		0.05	

Eating fresh fruit was not significantly associated with the prevalence of respiratory symptoms. Vitamin C supplementation was significantly (P<0.05) associated with running nose and sort throat. There seems to be a protective effect against these two symptoms with vitamin C supplementation. Drinking fruit juices was significantly (P<0.05) associated with cough, in that students who drink more fruit juices were more prone to report cough, this may be attributed to drinking cold or ice juices in warm and hot climate zones. Drinking fruit juices exhibited a marginally protective effect for sore throat among college girls.

Table 5: Association between fruit Intake and Vitamin c supplementation respiratory symptoms among college students

Respiratory Symptoms		Phlegm		Shortness of	breath	Fever	
		Yes	No	Yes	No	Yes	No
Fresh fruit	Yes	27.94%	72.06%	26.47%	73.53%	67.65%	32.35%
		37.50%	62.50%	18.75%	81.25%	53.13%	46.88%
P value		0.17		0.20		0.08	
Drink fruit juices	Yes	30.26%	69.74%	25.00%	75.00%	64.47%	35.53%
	No	33.33%	66.67%	20.83%	79.17%	58.33%	41.67%
P value		0.38		0.35		0.29	
citrus fruit or juice	Yes	31.00%	69.00%	24.00%	76.00%	63.00%	37.00%
	No	0	0	0	0	0	0
VITC	Yes	41.67%	58.33%	41.67%	58.33%	58.33%	41.67%
	No	29.55%	70.45%	21.59%	78.41%	63.64%	36.36%
P value		0.20		0.07		0.36	

Eating fresh fruit was marginally significant (P=0.08) associated with fever, in that students who ate more fresh fruit reported a higher prevalence of fever, that may be attributed to the hygienic conditions of fruit consumption and/or the college girls exposure to other

environmental factors that affects the prevalence fever. Vitamin C was marginally (P=0.07) associated (protective effect) with shortness of breath.

DISCUSSION

Dietary supplements rich with Vitamin C have been recommended by the people in many circumstances in the prevention of the common cold. Many studies have been conducted in order to find any significant association between the vitamin C and Respiratory Infections and to determine whether Dietary Sources of Vitamin C intake involves in the protection from Respiratory Infections, those that yielded conflicting results.

The present study was designed to determine the association between dietary sources of Vitamin C intake, vitamin C supplementation and Respiratory Infections in students of Ayyan Institute of Medical Sciences. Therefore, in the present study we asked the study participants to fill the questionnaire to the best of their knowledge to ensure for getting more accurate results. Our results revealed there were some positive associations between vitamin C intake and Respiratory Infections. Most of the dietary sources of vitamin C factors were not significantly associate.

We can refer this non-significant effect to the small sample size of our study and need similar studies for the substantiation of the current study findings. Pauling 1970b (9) and Pauling 1976 (10) also presented and data suggesting that human diets might not provide sufficient intake of vitamin C for optimal health, and proposed that mega-dose supplementation might profoundly influence both the incidence and severity of the common cold the disease.

In a qualitative review on vitamin C and the common cold, Dykes 1975[11] also concluded that vitamin C had no effects on colds. Although regular vitamin C supplementation at doses of 1 g/day or more has consistently decreased the duration or alleviated the symptoms of the common cold, there was substantial heterogeneity in the results (Hemilä 1994)[12] The evidence relating to large doses, while not consistent, was more promising to the current study findings.

Ritzel (1961) et al reported a result as decline of 45% in the total incidence of colds in 279 skiers given 1 g of ascorbic acid per day for one week, Anderson et al. (1972) found that 26% of subjects who were given 1 g ascorbic acid per day remained free of symptoms compared with 18% of those given a placebo. Our results were similar to the previous studies that

showed no conclusive evidence of any protective effect and difficult to draw general conclusions.

Some of the studies have been poorly designed and furthermore, although the trial of Anderson et al. (1972) was admirably designed and conducted, it was based on carefully selected volunteers who may have been especially vulnerable to respiratory infections and who represented only about 10% of the available population.

This selection may have led to an eventual overestimate of the average effect of vitamin C, but on the other hand these subjects had an above average and a high proportion were probably already receiving a Vitamin C. Other study which support our findings have drink fruit juices marginally protective effect with sore throat, intake of Juice was associated with fewer number of days with at least moderate common cold symptoms.[14]

We also observed the students who consumed more raw vegetables or salad repeated a higher prevalence of sore throat. A study conducted and revealed that even though the positive findings in such studies are consistent with the notion that vitamin C intake may affect susceptibility to infection, the effect may be caused by other substances in fruit and vegetables.[13]

CONCLUSIONS

The college Students in this study reported consuming fairly good proportions of dietary sources of vitamin C that included fresh fruit, cooked green vegetables, fruit juices and citrus fruit. Only 12 percent of the study population reported taking vitamin C supplementation. The respiratory illnesses that were reported by the college girls were wheezing, running nose, sore throat, common cold and cough. Drinking fruit juices and taking vitamin C supplements were significantly associated with the prevalence of sore throat and running nose, in that it had a protective effect.

Although there was no conclusive evidence in this study to suggest that dietary sources of vitamin C have a protective effect against all types of respiratory infections among college girls, it was difficult to draw conclusions from cross-sectional studies of small size and self-reported data that may have inherent biases. However, as the literature suggests, Vitamin C supplementation with a balanced diet may be effective in boosting the immunity and preventing susceptibility to respiratory infections. Studies with large sample size and

intervention trials with vitamin C supplementation may produce more conclusive evidence for the association between vitamin C sources and respiratory infections particularly among students of Ayyan Inistitute of Medical Sciences, Hyderabad.

Source of finding: None

Conflict of interest: None

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