

VITAMIN C STATE IN A DENTAL SCHOOL PATIENT POPULATION

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ABSTRACT

Eight hundred sixty-one routine care patients at the University of Alabama School of Dentistry were examined by the Department of Oral Medicine. Vitamin C state was judged by plasma ascorbic acid levels and the tissue ascorbic acid status (intra-dermal technique and lingual test). The data suggest that from 25 to 50 per cent of the individuals show evidence of a possible marginal vitamin C deficiency state.

INTRODUCTION

Epidemiologic studies of vitamin C state have been reported from around the world in a host of different groups of individuals.

As far as one can determine, this type of survey has not been carried out in patients attending an American dental college for routine oral care. Such a survey may have research and service significance in view of the possible relationship of vitamin C to oral health and disease.

METHOD OF INVESTIGATION

Eight hundred and sixty-one routine oral care subjects participated in this survey. Each subject was examined in the Department of Oral Medicine of the University of Alabama School of Dentistry. Table I summarizes the age and sex distribution. It will be noted that approximately one-half of the group (48.43 per cent) were in the third decade. Also, there were slightly more female (59.37 per cent) than male subjects (40.65 per cent).

Vitamin C state was judged by three different techniques. Plasma ascorbic acid levels¹ were performed in the entire sample of 861 subjects (271 in the fasting state; 590 nonfasting or two-hour postprandial). Since, in the opinion of many authorities, plasma level is more a function of dietary intake than tissue concentration, two other techniques were also employed. The vitamin C state was estimated by an intradermal technique² in 560 of the 861 participants. Actually, 221 determinations were made under fasting conditions; 339 two hours postprandially. The reason for utilizing only 560 of the 861 subjects was due to the

Table 1
age and sex frequency distribution

age groups	male group		female group		total group	
	number of subjects	percentage of subjects	number of subjects	percentage of subjects	number of subjects	percentage of subjects
0-9	0	0.00	1	0.12	1	0.12
10-19	8	0.93	115	13.36	123	14.29
20-29	170	19.74	247	28.69	417	48.43
30-39	103	11.85	91	10.57	193	22.42
40-49	54	6.27	35	4.07	89	10.34
50-59	13	1.51	15	1.74	28	3.25
60-69	3	0.35	6	0.70	9	1.05
70-79	0	0.00	1	0.12	1	0.12
total	350	40.65	511	59.37	861	100.00*

*approximate

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fact that, as a dermal colorization test, it can only be performed on caucasian subjects. Finally, a very new lingual decolorization technique³⁻⁸ was employed in 229 subjects (102 fasting; 127 nonfasting). The reason for the relatively small sample (229) by the latter method was due to the fact that this test was introduced late in the survey.

RESULTS

Figure 1 pictorially portrays the distribution of plasma ascorbic acid scores for the 861 subjects in the entire group and in the fasting and nonfasting subgroups. Several points deserve consideration. Firstly,

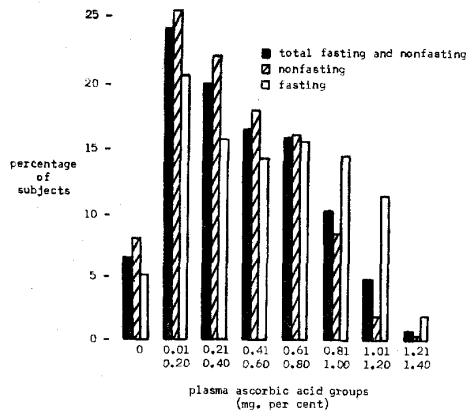


Figure 1

the greatest fraction of subjects in the entire sample (24.2 per cent) is in the 0.01-0.20 mg. per cent plasma ascorbic acid group. Secondly, it is noteworthy that 6.6 per cent of the total sample showed zero plasma ascorbic acid levels. Lastly, it is interesting that 67.8 per cent of the entire sample exhibited scores below 0.60 mg. per cent. These three items will deserve special attention later since they are important in any consideration of the extent of vitamin C deficiency.

Figure 2 graphically outlines the distribution of intradermal values for the 560 subjects in the entire sample and the 211 and 339 in the fasting and nonfasting subgroups. Three points warrant special note. Firstly, the greatest portion of subjects is in the 25-34 minute group. Secondly, approximately 28 per cent of the participants (560) demonstrates intradermal time values greater than 35 minutes. Finally, about two-thirds of the sample have values greater than 25 minutes. These three points will be considered again later since they are pertinent to any discussion of the scope of vitamin C deficiency.

Figure 3 summarizes the distribution of lingual time scores for the 229 in the entire group (102 fasting; 127 nonfasting). Once again, several items should be stressed. Firstly, the greatest frequency was found in the 15-24 second group. Secondly, 19.1 per cent of the total (229) have lingual time values greater than 35 seconds. Finally,

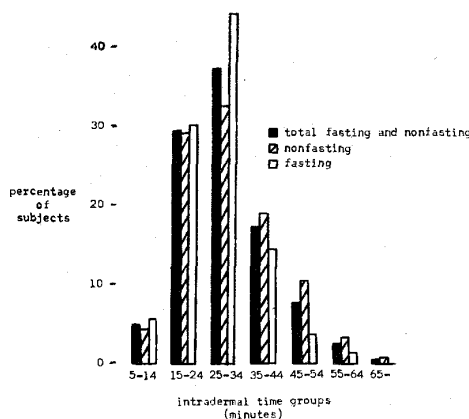


Figure 2

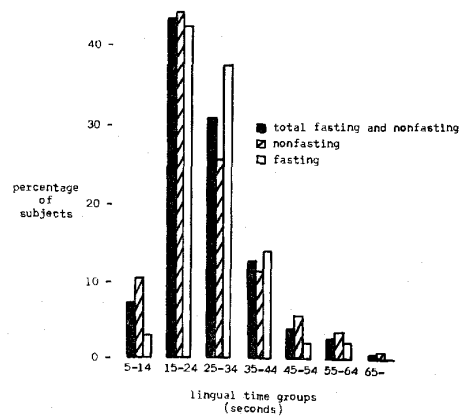


Figure 3

about one-half exhibit levels above 25 seconds. These items will be reviewed in terms of possible vitamin C deficiency state.

DISCUSSION

It is difficult to estimate the extent of vitamin deficiency since there is little agreement as to the physiologic range by any of the present testing techniques.

Some authorities, apparently in the minority, contend that vitamin C state cannot be judged by plasma concentration. Other researchers, and a larger group including the Interdepartmental Committee on Nutrition for National Defense, argue that plasma ascorbic acid levels below 0.2 mg. per cent are unsatisfactory.⁹⁻¹¹ If one accepts this cutoff point, then one must conclude that in this survey 30.8 per cent of the participants have inadequate levels. Some few¹² prefer to regard 0.5 mg. per cent as the minimal acceptable level. On this basis, 60.5 per cent of the individuals in this survey have unacceptable plasma concentrations. The majority of investigators hold for a lower limit of 0.6 mg. per cent.^{13, 14} Utilizing this parameter, approximately 68 per cent of the cases show deficient scores. Finally, some few suggest a minimum of 0.7 mg. per cent.¹⁵⁻¹⁸ This scale nets 77.4 per cent of the group with poor vitamin C plasma scores.

There is even less agreement as to the physiologic range for the intradermal time. If one grants that the limits are 15 to 25 minutes,¹⁹ then two-thirds of the group display inadequate vitamin C tissue levels.

Obviously, there is even less information regarding the values for the relatively new lingual time test procedure. Granting that the physiologic spread is 15-25 seconds,²⁰ then one-half of the group, with times greater than this range, must be judged deficient.

This study will certainly not resolve the question as to the physiologic range for any of the presently employed vitamin C tests. This survey does, however, point out that, by whatever means tested, a significant fraction of the studied population has an inadequate vitamin C state (which leaves much to be desired).

SUMMARY

1. The vitamin C state of a patient population in a dental school was studied by means of three ascorbic acid tests (plasma vitamin C, intradermal and lingual test procedures) under fasting and postprandial conditions.
2. The evidence suggests that as much as one-half of the studied sample shows levels indicative of a possible marginal vitamin C deficiency state.

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