

# PLASMA VITAMIN A AND CAROTENE LEVELS IN RELATION TO THE CLINICAL STAGES OF CARCINOMA OF THE ORAL CAVITY AND OROPHARYNX

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## Abstract

Mean plasma vitamin A and carotene levels were significantly lower ( $P < 0.01$ ) in carcinoma patients as compared to controls. The plasma vitamin A and carotene levels showed a steady decline with the advance of the disease. Whether vitamin A plays some role in carcinogenesis needs further investigation (JPMA 30:221, 1980).

## Introduction

It is known that vitamin A is involved in the maintenance of certain types of epithelia. In the hamster cheek pouch, vitamin A deficiency resulted in a high incidence of squamous tumours following topical application of dimethylbenzan-thracene (Rowe and Gorlin, 1959) whereas the topical application of vitamin A pellet induced metaplasia of mucous glands (Lawrence et al., 1960). Vitamin deficiency also resulted in squamous metaplasia which resembled that induced by chemical carcinogens (Deluca et al., 1969).

In human beings, vitamin A deficiency had been found to be associated with carcinoma of esophagus and stomach (Abies et al., 1941; Basu et al., 1974) and carcinoma of the bronchus (Basu et al., 1976). Subnormal levels of vitamin A have also been reported in carcinoma of the oral cavity and oropharynx (Wahi et al., 1965; Jafarey et al., 1974).

## Material and Methods

The study was conducted in 52 biopsy proven patients of carcinoma of the oral cavity and oropharynx. The lesions were clinically studied as recommended by the American Joint Committee (1967) for cancer staging and results reporting.

Forty nine age, sex and socio-economically matched controls free from any systemic disease, were also selected for the study.

Six milliliters of blood were drawn from the cephalic vein of patients as well as controls using heparin as an anticoagulant. Plasma was separated by centrifugation. Carr-Price method with modification (Kimble, 1939; Kesser and Sketol, 1943) for photolorimetric determinations of plasma vitamin A and carotene was used. The plasma vitamin A and carotene levels were grouped according to criteria used in WHO studies (Jellife, 1960).

## Results

The plasma vitamin A and carotene levels in carcinoma patients and controls are shown in Table I.

Table I: Plasma Vitamin A and Carotene Levels in Cases of Carcinoma of the Oral Cavity and Oropharynx and Controls

| Groups (No. :)                  | Vitamin A      |              | Carotene       |              |
|---------------------------------|----------------|--------------|----------------|--------------|
|                                 | Range (ug %) ) | Mean ± SE    | Range (ug %) ) | Mean ± SE    |
| Control (49)                    | 19-72          | 39.58 ± 1.85 | 15-180         | 57.28 ± 4.25 |
| Carcinoma (52)                  | 9-46.5         | 26.47 ± 1.41 | 12-150         | 45.21 ± 3.10 |
| P value as compared to control: | P < 0.01       |              | P < 0.05       |              |

Statistical analysis showed that the mean plasma level of vitamin A and carotene was significantly lower in carcinoma patients as compared to controls.

Table II: Grouping of Carcinoma of The Oral Cavity and Oropharynx and Controls According to ICNND Classification of Vitamin A and Carotene Levels

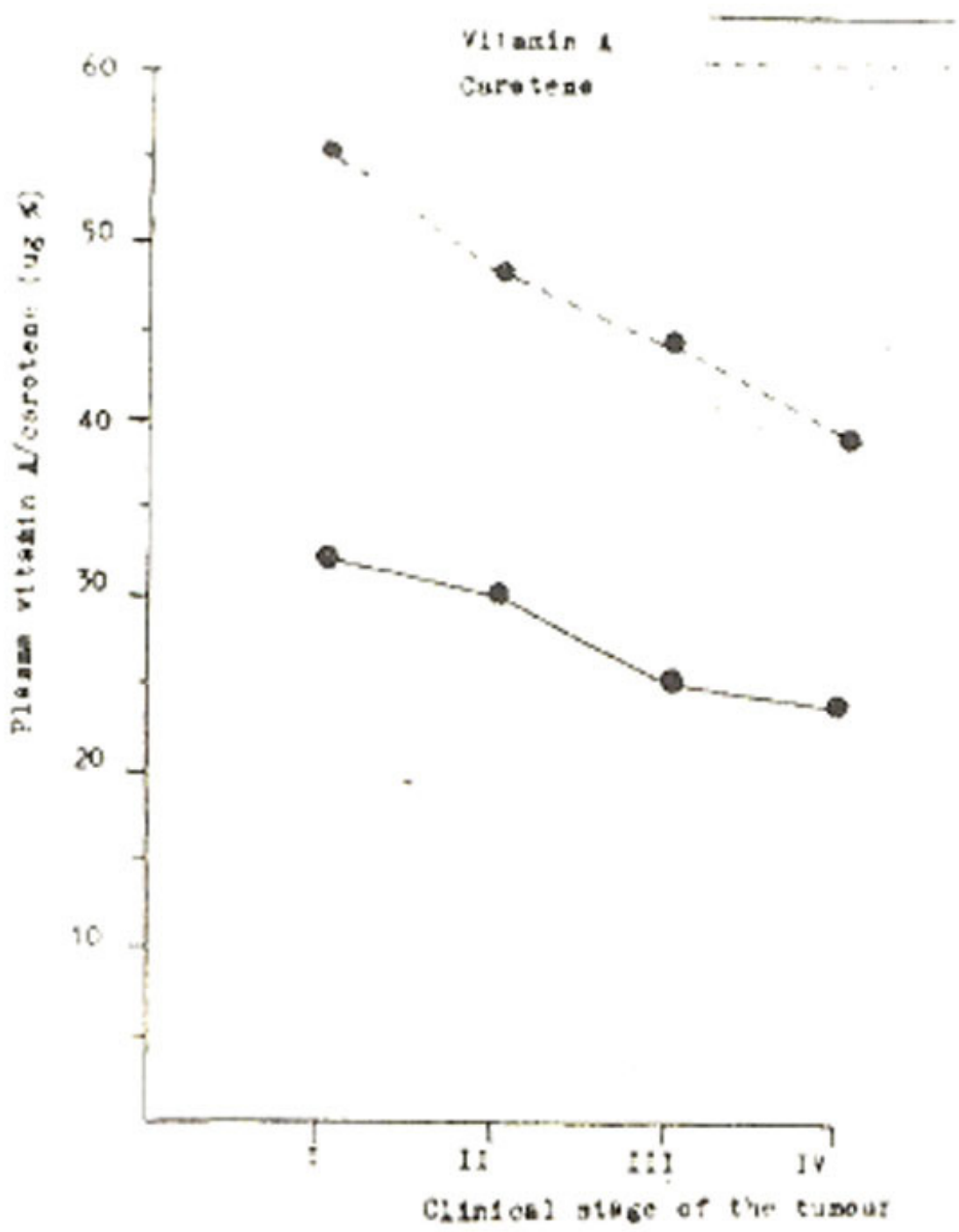
| Groups (No. :)                   | Vitamin A         |                |                       |              | Carotene          |                |                       |               |
|----------------------------------|-------------------|----------------|-----------------------|--------------|-------------------|----------------|-----------------------|---------------|
|                                  | Deficient (10 ug) | Low (10-19 ug) | Acceptable (20-25 ug) | High (50 ug) | Deficient (20 ug) | Low (20-39 ug) | Acceptable (40-100ug) | High (100 ug) |
| Controls (49)                    | 0 (0)             | 1 (2.04)       | 37 (75.5)             | 11 (22.22)   | 2 (4.08)          | 7 (14.28)      | 37 (75.5)             | 3 (6.12)      |
| Carcinoma (52)                   | 1 (1.92)          | 12 (23.07)     | 39 (75)               | 0 (0)        | 1 (1.92)          | 21 (40.38)     | 29 (55.76)            | 1 (1.92)      |
| P value as compared to controls: | (P < 0.01)        |                | N.S.                  | (P < 0.01)   | (P < 0.01)        |                | (P < 0.05)            | N.S.          |

Figures in parenthesis indicate percentage of each group.

Table II shows the classification of vitamin A and carotene levels. It is evident that according to the ICNND criteria, majority of the cases of carcinoma and controls had acceptable values of vitamin A (20-50 ug%). However, significantly greater (P < 0.01) number of the carcinoma cases were in the low range of vitamin A (10-19 ug%) when compared with controls, whereas none of carcinoma cases had high levels of vitamin A (above 50 ug). Nevertheless, the carcinoma patients differed significantly (P < 0.01) from controls.

The number of carcinoma cases that showed acceptable plasma carotene levels was significantly lower (P < 0.05) as compared to controls. The number of carcinoma cases with low- range of plasma carotene (20-39 ug%) were significantly higher (P < 0.01).

The relationship between clinical staging of carcinoma patients and mean plasma vitamin A and carotene levels has been shown in Fig. 1.



*Fig. 1:* Plasma vitamin A and carotene levels in relation to the clinical stage of carcinoma of the oral cavity and oropharynx.

Mean plasma vitamin A and carotene levels showed a fall with the advancement of disease.

**Discussion**

The significantly lower levels of plasma vitamin A and carotene in patients of carcinoma of the oral cavity and oropharynx observed in this study are in agreement with previous reports. Abies et al (1974) reported subnormal levels of plasma vitamin A in 36% patients of carcinoma of gastrointestinal tract. A high incidence of reduced vitamin A levels was also found in plasma of patients with other malignant diseases. Deficient vitamin A levels have been reported in patients with carcinoma of the stomach and oesophagus (Basu et al., 1974) and in bronchial carcinoma patients (Basu et al., 1976). Similarly in patients with carcinoma of the oral cavity, low or subnormal vitamin A levels have also been reported (Jafarey et al., 1974).

Furthermore, the plasma vitamin A and carotene levels showed a steady decline with the advance of the disease (Fig. 1). However, the association observed between low plasma vitamin A and carotene levels and carcinoma of the oral cavity and oropharynx, especially declining levels within the advance of the disease need careful elaboration whether:

1. Low vitamin A and carotene levels are due to lesion in the oral cavity leading to generalized malnutrition.
2. Vitamin A has direct effect on the target cells since vitamin A deficiency in experimental animals resulted in decrease in goblet cells and squamous metaplasia and marked keratinization (Pappenheimer and Larimore, 1924; Moore, 1967; Deluca, 1969).
3. Vitamin A deficiency indirectly enhances the cellular growth by depressing immunity as vitamin A has been suggested to have definite influence on lymphoid organs and immune responses (Jurin and Tannock, 1972; Leutskaia, 1973; Krishman et al., 1974; Sherwani, 1979).

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