Vitamin C Subnutrition in Indians.

By K. Ramakrishnan Nair.

(*From the University Biochemical Laboratory, Chepauk, Madras.*)

THE rarity of clinical scurvy under ordinary conditions of life has tended to minimize the importance of vitamin C in the normal dietary. With the identification of this vitamin with ascorbic acid it began to be recognised that it must play a fundamental rôle in metabolism on account of its ability to take part in biological oxidations and reductions. Recent clinical and laboratory investigations have fully borne out this view. On the one hand, it has been shown that vitamin C therapy exerts marked beneficial effect in pathological conditions so varied as pneumonia (Gander and Niederberger, 1936), cataract (Josephson, 1935) and diphtheria (King and Menten, 1935) and further that there is a correlation between partial deficiency of vitamin C and the incidence of tuberculosis (Heise and Martin, 1936) and of rheumatic fever and arthritis (Rinehart and Mettier, 1934). Yarovsky, Almaden and King (1934) from the vitamin C content of tissues from hospital autopsies conclude that over 20 per cent. of the cases revealed a condition of latent scurvy. Similar conclusions in regard to patients admitted to hospitals in Cambridge and Manchester are reached by Harris and Ray (1935) while according to Orr (1936) half the English population receive less than their optimum of vitamin C.

Harris and Ray (*loc. cit.*) have demonstrated that urinary excretion of acsorbic acid and especially the increase in excretion in response to a massive dose of vitamin C provide simple criteria for determining the state of vitamin C nutrition of an individual. For persons receiving adequate amounts of the vitamin, the daily excretion in the urine is about 30 mgm. which suddenly rises to about 160 mgm. after ingestion of sufficient ascorbic acid to saturate the tissues (600 mgm. are usually given).

Using these criteria and the Birch, Harris and Ray (1933) method for estimation of vitamin C, fifteen 'normal' individuals (mostly students) were examined. The results are given in Table I. It will be seen that only in three out of the fifteen cases, studied (Nos. 8, 11 and 14) was the normal response obtained. In all the other cases not only was the initial excretion low but it showed little or no increase after the test dose of 600 mgm. In two cases (Nos. 1 and 2) where the test doses were repeated a steep rise in the excretion did occur, but only after four doses in the first case and after three doses in the second case showing that saturation could be obtained if sufficient vitamin is administered, thus ruling out any climatic or racial factors.

TABLE I.

Urinary Response to Doses of Vitamin C Redoxon Roche.

Subject	No. of dose	No. of mgm. excreted in urine before and after doses of 600 mgm. each	
		In 24 hours before	In 24 hours after
1	1	20·10	19·95
	2	19·95	21·37
	3	21·37	72·26
	4	72·26	134·01
2	1	19·22	20·70
	2	20·71	21·11
	3	21·11	197·00
3	1	17·93	16·72
4	1	16·57	17·41
5	1	13·95	14·70
6	1	14·71	14·55
7	1	21·00	22·50
8	1	29·72	111·50 Normal
9	1	20·02	20·05
10	1	17·77	16·80
11	1	30·20	98·00 Normal
12	1	22·90	21·00
13	1	14·95	14·40
14	1	28·94	88·82 Normal
15	1	19·84	19·00

Assuming the validity of Harris's tandards, it would appear from these preliminary experiments that, on the South Indian middle class dietary, partial deficiency of vitamin C is the rule and optimal intake the exception, in agreement with the conclusions reached by Ranganathan and Sankaran (1937). The experiments are being extended to include a larger number of individuals.

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Gander and Niederberger, *Munch. Med. Woch.*, 1936, **51**, 2074.
Josephson, *Science*, 1935, **82**, 222.
King and Menten, *J. Nutrition*, 1935, **10**, 129 and 141.
Heise and Martin, *Proc. Soc. Exptl. Biol. Med.*, 1933, **34**, 642.
Rinehart and Mettier, *J. Expt. Med.*, 1934, **59**, 97.
Yarovsky, Almaden and King, *J. Bio. Chem.*, 1934, **106**, 525.
Harris and Ray, *Lancet*, 1935, **228**, 71.
Orr, *Food, Health and Income*, 1936 (Macmillan).
Birch, Harris and Ray, *Biochem. J.*, 1933, **27**, 590.
Ranganathan and Sankaran, *Ind. J. Med. Res.*, 1937, **35**, 29.

The International Commission of Snow.

THE International Commission of Snow, authorized by the International Association of Scientific Hydrology at Lisbon in 1933, held its first gathering in Edinburgh, September 1936, as part of the International Union of Geodesy and Geophysics. The Snow Commission's program was made purposely broad to create a background of universal interest and to point out the many needs to be served. In outline the subject included Measuring Precipitation, Snow Cover and Snow Surveying, Influence of Snow on Runoff, Avalanches. Transport, Ice on Lakes and Rivers, Physical Properties of Snow and Ice, Glaciers, Icebergs. Reports of Recent Expeditions to the Arctic and Antarctic, and Apparatus. The proceedings will be published in full.

The next international meeting is to be held in Washington in 1939. Officers of the Commission representing the three major fields of investigation are J. E. Church (U.S.A.), President, *Snow*; Antoni B. Dobrowolski (Poland), Vice-President, *Ice*; Peter Stakle (Latvia), Secretary, *Cold*.

The problems formally assigned for investigation and report in 1939 are: (1) The permeability of snow with respect to water. The capacity of the snow to retain water; (2) Influence of snow and ice on the flow of streams with reference to the condition of the ground, as to whether it is normal or frozen, and to condensation; (3) Compilation of snow maps of all countries. Informal activities include the interchange of information on all problems of snow and ice. In illustration mention may be made of the following problems referred to the Commission: (1) Explanation of the cause of the abnormal and seemingly persistent low minimum flow in the Punjab, India; and (2) Review of a new method of selecting sites for snow-survey courses on the upper Columbia River in British Columbia.[1]

Mountaineering and exploration are already including snow-surveying in their program. A Mount Rose Snow Sampler was requested by the American-British Expedition to the Himalayas this past (1936) summer, and others have been requested by an American expedition planning to return to the Greenland Ice-cap. Dr. Frederick W. Lee, Chief of the Geophysical Division of the U.S. Geological Survey, has developed a light electrical resistivity meter to measure the depth of snow and ice. John C. Stevens has developed a portable springless balance for weighing evaporation pans. Snow Sports are being added as a division in close association with Avalanches. In America forecast have already begun regarding winter-sport conditions in the National Parks, and in the future radio broadcasts on them will be given in connection with those on snow surveys.

Akin to this, though carried on as pure research by the Central Geophysical Observatory at Leningrad, is a Soviet investigation of snow crystals under varying meteorological conditions. This investigation would be of practical interest in the Arctic where the Eskimos have several names for snow and are as interested in the effect of various types on the slipping of their sledges as is a skier in the various types of ski wax. The government of Argentina has now inaugurated a comprehensive snow-survey system, and the scientists of Argentina and Chile are investigating high mountain snows, such as the "nieve penitente".

In the interval between international gatherings meetings of national groups are proposed. The British group is already fully organized; its chairman is Gerald Seligman, former President of the Ski Club of Great Britain, and a number of meetings have been held.[2]—J. E. CHURCH, *Pres.* (*Bull. Amer. Met. Soc.*, 1937, **18**, 373.)

[1] A discussion of these problems by R. C. Farrow appears in the *Trans. Amer. Geophys.* and May, 1937, pp. 60–2, 92.—*Ed.*

[2] Cf., *Geogr. Rev.*, July, 1937, p. 504. The Commission has issued mimeographed reports of these to its members; see also *Met. Mag.*, April and May, 1937, pp. 60 2, 92.—*Ed.*