CRUDE COMMON SALT AS A FAIRLY GOOD SOURCE OF DIETARY CALCIUM IN THE CASE OF SOUTH INDIANS

ON analysing a specimen of a basal South Indian rice diet,* representing the average consumption per subject per day, in connection with some human metabolism experiment, it was observed that it contained about 0·8 gm. of calcium. This high value of calcium was much more than expected as the various ingredients chosen for the diet were of low calcium content. To account for this high calcium content, all the ingredients of the diet were analysed for calcium and it was found that crude common salt was responsible for this. 50 gm. of the salt were added to the diet to make it tasty; the calcium supplied by this quantity of salt alone being about 0·3 gm.

The normal intake of common salt is about 12 gm. per day; but in South India, an adult consumes about 50 gm. of crude common salt which he takes mainly in spicy preparations like vegetable soup (*Sambar*), *Rasam*, and *Uppuma*. It was therefore of much interest to see how the subjects keep themselves in calcium balance with such a high intake of calcium from the common salt and also to compare the results with those of the subjects receiving refined salt.

Six healthy adult human subjects were used for the experiment. Each subject received the diet, the composition of which is mentioned above. The quantity of food served to each subject was the same during the two periods assuring the same caloric intake. *Uppuma*, a common South Indian preparation of rice flour was served to each person during both at breakfast and at tea time and cooked rice with *sambar* and vegetable curry was served during lunch and dinner. Each experimental period lasted for seven days; the first three days were observed as a preliminary period, and the urine and fæces of the subsequent period of four days were collected quantitatively. There was a rest period at one week between the two successive feeding periods.

Data on calcium balance are expressed in mg. per day

Subject	Calcium metabolism with crude common salt					Calcium metabolism with refined salt				
	Food* calcium intake	Excretion			Balance	Food† calcium intake	Excretion			Balance
		Urinary	Fæcal	Total			Urinary	Fæcal	Total	
H.M. ..	790	162	395	557	+233	501	178	351	529	−28
J.C. ..	,,	174	473	647	+143	,,	135	313	448	+53
M.D. ..	,,	131	444	575	+215	,,	194	322	516	−15
H.B. ..	,,	145	571	716	+ 74	,,	113	301	444	+57
K.B. ..	,,	192	382	574	+216	,,	144	315	459	+42
B.B. ..	,,	183	632	815	− 25	,,	153	396	549	−48
		Average ..			+142		Average ..			+10

* Calcium supplied by 50 gm. of crude salt alone being 0·301 gm.

† Calcium supplied by 50 gms. of refined salt alone being 0·04 gm.

Calcium in the food, salt and fæces was estimated by the method of McCrudden.[1] Urinary calcium was measured according to the method of Shohl and Pedley.[2] The data on calcium intake excretion, and balance are given in the above table.

From the above data it is seen that in the case of crude salt, all the subjects excepting one, are on the safe side of positive calcium balance with an average of + 142 mg. balance, while in the case of refined salt three out of six subjects show negative balance, the average calcium balance being only +10 mg.

These findings show that the crude common salt is a useful source of calcium and can partly supplement the South Indian rice diet which is deficient in that essential mineral.

The various samples of crude salt have been analysed by us for the calcium content, the calcium content varies from 0·48—0·72 gm. per 100 gm. of the salt.

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* The composition of the diet was 675 gm. of polished rice ; 40 gm. thur dhal ; 10 gm. Bengal gram ; 200 gm. vegetables, *i.e.*, potatoes, brinjals, onions ; 1 oz, of groundnut oil ; and *a small amount of spices, tamarind* and *chillies* (Tamarind 25 gm., dry chillies 12 gm. and other spices 10 gm.)

1. McCrudden, F. H., *Jour. Biol. Chem.*, 1911-12, **10**, 187. 2. Shohl, A. T., and Pedley, F. C., *Ibid.*, 1922, **50**, 537.

lamina and midribs all over the sprayed area. The leaf material showing these discoloured spots where the liquid had accumulated into droplets and dried up, was preserved in Formalin-Acetic-Alcohol.

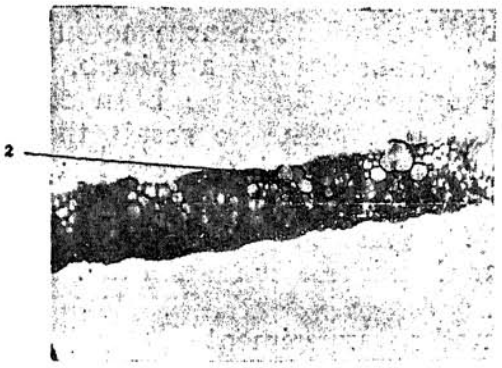

FIG. 1

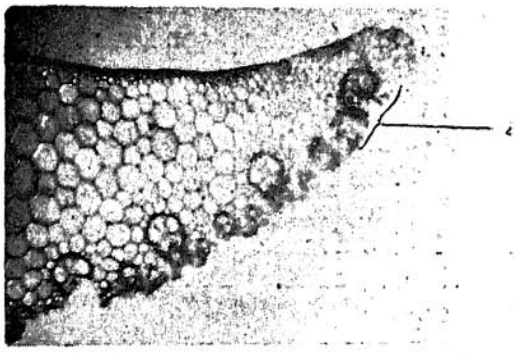

FIG. 2

FIG. 3

FIG. 1. T.S. of lamina showing disruption of epidermis which is intact at *a* (× 60)

FIG. 2. Part of T. S. of midrib showing extensive disintegration of tissues. Blackish substance is present in Xylem vessels and in parenchymatous cells at *b* (× 40).

FIG. 3. Part of T.S. of midrib showing the weakening of middle lamella as indicated by regular tearing away of cells at *c* (× 250).

Hand sections (Figs. 1 and 2) through these spots showed that liquid affected the plant tissues adversely, both in the lamina and the midribs. The lumen of long cells