

## Profile of Vitamin B12 and Vitamin D in Rural Schoolchildren in Raigad, India

Deficiency of vitamin B12 and vitamin D is reported to be common in India [1,2]. Vitamin B12 deficiency is especially common in vegetarian families [3]. The prevalence of ferritin, folate and vitamin B12 deficiency was reported to be 54.5%, 42.5% and 67.2%, respectively in Delhi [4]. In rural India, serum vitamin B12 and Vitamin D profile of children may be different due to differences in dietary practices. We herein share our data on serum vitamin B12 and vitamin D levels among children in selected schools of Raigad district.

Two hundred children between the ages of 5 and 15 years (42.9% females) from the five selected schools had 5 mL of blood collected for hemoglobin, vitamin B12 and vitamin D measurement. Written informed consent was obtained from parents prior to the data collection, and all procedures were as per the Helsinki Declaration, as revised in 2013. Samples were transported to the study laboratory in Mumbai by maintaining a continuous cold chain. Children were classified as per the socio-economic status of their parents (Kuppuswamy classification) and their routine dietary habits (24-hour dietary recall).

Vitamin B12 deficiency was observed in 26%, 32%, and 16% in the upper, middle, and lower socioeconomic groups, respectively, but was not seen in any child in the below poverty line group (**Table I**). Vitamin D levels were low in categories A1, B, C and D.

Irrespective of a non-vegetarian or vegetarian diet, vitamin B12 may be lost during cooking under high pressure. The non-pathogenic B12 synthesizing bacteria grow on green leaves of vegetables. Due to the routine use of pesticide sprays and extensive washing of green vegetables before cooking, majority of these B12 synthesizing bacteria are killed or washed out. On

the other hand, the meat of black crabs is a rich source of vitamin B12, and half-cooked crab and fish is a staple food for people of the tribal community in the region of school D.

In the present report, we found that contrary to the previous reports that vitamin B12 deficiency is rare in children, it is in fact not that uncommon [1,3]. However, fortification of food with folic acid solely, in a patient of unrecognized vitamin B12 deficiency, has the potential for causing harmful effects in the patient [5]. Low vitamin D levels could possibly be due to a lack of exposure to sunlight. It is interesting to note that 66% of school children in school A, had supra-normal vitamin D. One of the possible factors could be that this school is situated at a hilltop and has sufficient direct sunlight exposure throughout the year, contrary to the situation in other schools in this study.

We conclude that vitamin B12 and vitamin D levels in various communities may differ due to local conditions, which need to be identified and addressed for a lasting solution.

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**Table I Vitamin D and Vitamin B12 Levels in Schoolchildren of Five Different Schools, Raigad, Maharashtra**

School, No.	Socioeconomic status	Routine diet	Vitamin D, ng/mL				Vitamin B12, ng/mL	
			<10	11-15	16-30	> 30	< 200	> 200
A, 50	High SES, upper class	Green vegetables, fruits, daily eggs and milk, fish and meat twice/wk	2 (4)	5 (10)	10 (20)	33 (66)	12 (24)	38 (76)
A1, 50	High SES, Upper	Fruits, green vegetables, daily eggs and milk, fish and meat twice/wk	9 (18)	4 (8)	25 (50)	12 (24)	1 (2)	49 (98)
B, 25	Middle SES	Green vegetables, rice, bread, Fish and meat once/wk	3 (12)	12 (48)	10 (40)	0	8 (32)	17 (68)
C, 50	Lower SES	Curry, bread, rice, green fresh vegetables and dry fish	5 (10)	17 (34)	27 (54)	1 (2)	8 (16)	42 (84)
D, 25	BPL	Rice, fresh crab and fish	0	2 (4)	22 (88)	1 (4)	0	25 (100)

*Values in no. (%); School classification: A-English school; A1-Urdu school; B-school at village; C-municipal school at Mahad; D-tribal school; BPL-below poverty line.*