2. Title: Effect of methionine supplementation on urine composition (Bangkok Infants)

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OBJECTIVE

Since it was found in previous report that Ubol village infants (hyperendemic area) excreted less inorganic sulfate than Ubol city and Bangkok infants (hypoendemic area), and urinary inorganic sulfate was believed to reflect intake of high quality protein containing methionine and/or cystine, this study was attempted to evaluate the nutritional status of infants living in the two areas by studying the influence of methionine supplementation on urine composition of Bangkok infants and Ubol village infants.

DESCRIPTION

Aliquots of the 24 hr urine samples collected the last day of the control period and methionine period which were described in study No. 1 were analyzed for various urinary excretions. Total phosphate, calcium, sodium, potassium, chloride, uric acid, urea and creatinine were analyzed by automated techniques. Urinary magnesium was determined by an atomic absorption spectrophotometer (Perkin—Elmer). Urinary oxalic acid was determined by the fluorometic method described by Zaremski and Hodgkinson. Urinary hydroxyproline by the method of Prockop and Udenfriend. Citric acid was determined by the method of Stern. Sulfate sulfur by isotope dilution method. The results were compared with those of Ubol Village infants obtained from previous study.

PROGRESS

Twenty—Four Hour Urine Samples

The mean urine volumes and mean ages for both locations are shown in Table 1. Bangkok infants were divided into 2 groups to obtain comparable mean ages between village and Bangkok subjects.

Urinary Metabolites

The excretion of urinary creatinine, urea nitrogen, sulfate and hydroxyproline expressed as milligrams per 24 hours and per gram of creatinine excretion are shown in Table 2.

The excretion of urinary oxalic acid, uric acid and citric acid are demonstrated in Table 3.

Urinary calcium, phosphorus, magnesium, sodium, potassium and chloride are shown in Table 4.

Table 1 demonstrates the amounts of twenty—four hour urine before and after methionine supplementation which shows no significant difference in Bangkok groups and village group.

Table 2 shows no difference in the excretion of urinary creatinine, urea nitrogen, sulfate and hydroxyproline before and after methionine supplementation in Bangkok infants. These findings might suggest that Bangkok infants probably have enough intake of high quality proteins containing methionine. The determination of those in Ubol village infants as not completed. However, it was previously found that Ubol village infants excreted low level of inorganic sulfate and the excretion was increased after methionine supplementation. These findings suggest low intake of high quality proteins.

From table 3 the urinary oxalic acid and uric acid showed small changes before and after the supplementation, however Ubol village infants demonstrated a higher excretion of urinary oxalic acid but lower of uric acid when compared with those of Bangkok infants.

Table 4 shows no difference in the excretion of urinary calcium, phosphate, magnesium, sodium, potassium and chloride before and after supplementation. However there were markedly decreased amounts of urinary phosphate, sodium, potassium and chloride in Ubol village infants when compared with those of Bangkok infants.

The results of this study emphasize the concept that vesical calculus formation is a neo—natal disease, and protein and mineral deficiencies might play an important role (s) in the etiology of the stones.

Table 1

Twenty—four hour urine volume, Number and Mean Ages of Subjects

Location & Supplementation	No. Subj.	Mean Ages months	24 hr Urine volume ml.
Bangkok			
6-12 M.			
Control	12	8.8	219.2
Methionine	12	8.8	195.8
12-24 M.			
Control	10	19.5	368.5
Methionine	10	19.5	288.1
Ubol village			
6-12 M.			
Control	18	9.2	294.7
Methionine	18	9.2	296.3

Table 2

Mean urinary Creatinine, Urea nitrogen, Sulfate and Hydroxyproline before and after Methionine Supplementatian

Location & Supplementation	Creatinine	Urea Nitrogen		Sulfate		Hydroxyproline	
	mg/24 hr	mg/24 hr	mg/gmC	Mg/24 hr	mg/gmC	mg/24 hr	mg/gmC
Bangkok							
6-12 M.							
Control	69.9	2,643	33,683	301.9	4,185	18.7	268.4
Methionine	61.4	2,621	43,029	277.3	4,857	16.7	278.1
12-24 M.							
Control	117.7	4,400	36,459	444.4	3,721	22.8	186.2
Methionine	114.5	5.322	53,169	441.4	4,083	24.3	208.2
Ubol village							
6-12 M.							
Control	72.2	—	—	(19.1	338)*	—	—
Methionine	80.9	—	—	—	—	—	—

*Result from other previous study of 11 Infants (7—12 months)

Table 3

Mean Urinary Oxalic Acid, Uric Acid and Citric Acid
Before and After Methionine Supplementation

Location & Supplementation	Oxalic Acid		Uric Acid		Citric Acid	
	mg/24 hr	mg/gmC	mg/24 hr	mg/gmC	mg/24 hr	mg/gmC
Bangkok						
6–12 M.						
Control	4.0	62.2	82.5	1,245	3.4	44.0
Methionine	3.7	64.8	59.2	980	3.1	50.7
12–24 M.						
Control	7.6	61.7	96.8	817	8.7	67.1
Methionine	6.1	54.0	114.9	1,025	3.5	26.8
Ubol Village						
6–12 M.						
Control	10.4	128.8	57.3	862.5	—	—
Methionine	8.2	121.7	67.1	939.9	—	—

Table 4

Mean Urinary Calcium, Phosphorus, Magnesium, Sodium, Potassium and Chloride
Before and After Methionine Supplementation

Location & Supplementation	Calcium		Phosphorus		Magnesium		Sodium		Potassium		Chloride	
	mg/24 hr	mg/gmC	mg/24 hr	mg/gmC	mg/24 hr	mg/gmC	mg/24 hr	mg/gmC	mg/24 hr	mg/gmC	mg/24 hr	mg/gmC
Bangkok												
6–12 M.												
Control	14.9	211.6	355.9	4,792	10.5	153.2	298	4,125	622	8,674	580	8,833
Methionine	12.4	203.9	248.2	4,013	7.7	129.6	256	4,038	514	8,126	471	7,429
12–24 M.												
Control	24.1	209.7	366.9	3,258	20.9	165.2	701	5,614	873	7,459	1,185	9,574
Methionine	23.5	216.8	349.9	3,165	13.8	122.1	762	6,233	811	7,422	1,281	10,795
Ubol Village												
6–12 M.												
Control	11.2	167.5	31.1	381.6	8.5	160.7	141.6	2,063.8	148.8	2,406	294	4,324
Methionine	17.1	274.0	30.6	342.3	11.8	170.2	210.3	2,406.1	145.6	1,865	422	4,522