Vitamin Supplementation and Related Nutritional Status in Thai Children, Aged 1-5 Years

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Objective: *To evaluate the prevalence of vitamin supplementation in Thai children aged 1-5 years at Queen Sirikit National Institute of Child Health (QSNICH), parental knowledge of vitamins, practices, and related factors such as nutritional status in vitamin supplementation.*

Material and Method: *A cross-sectional study was performed at the Well Child Clinic, QSNICH, from 1-31 May 2005. Five hundred parents of young children, aged 1-5 years were interviewed by using the questionnaire to obtain information regarding knowledge and practices of vitamin supplementation. Weight and length/height were measured and nutritional status was assessed using the Thai growth reference. The relationships among vitamin supplement, nutritional status, and other related factors were analyzed using Chi-square test. The p-value <0.05 was considered statistically significant.*

Results: *Prevalence of vitamin supplementation was 76%, including vitamin C 62%, multi-vitamin (MTV) 35%, and cod-liver oil 20%. Regarding parental knowledge of vitamins, 57% of them knew the health benefits but 74% did not know the toxic effects of vitamins. The reasons for vitamin supplementation were poor feeding 63%, under-weight 23% and unhealthy status 14%. Vitamins were obtained from over-the-counter 59%, health services 40%, and friends 1%. Vitamin supplementation was significantly higher in children over 2 years of age, whose parents knew the benefits of vitamins, and in those children with malnutrition.*

Conclusion: *The prevalence of vitamin supplementation was high in malnourished children, over 2 years of age whose parents had knowledge about benefits of vitamins. Parents should be warned about the dangers of high dose of vitamin consumption.*

Keywords: *Vitamin supplementation, Thai children, Nutritional status*

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Vitamins are important micronutrients that have an important role in the human metabolism and are needed for normal growth and healthy life. Children require high amounts of nutrients and energy to support their rapid growth and development[1]. They are normally able to get enough vitamins from a balanced diet choosing from a wide variety of foods[2]. Good dietary habits established early in life can be followed throughout the lifetime[1]. Preschool children (under 5 years) are often difficult and erratic eaters. Poor parenting skills and lack of dietary knowledge often exacerbate the problem of some nutrient deficiencies in young children[1,3]. Moderate to high fat diets in children were not consistently protective against nutrient deficiency[4]. Deficiencies of micronutrients usually coexist in developing countries[5]. However, there have been some evidences from developed countries also[6]. Some vitamin deficiencies may cause poor appetite, poor weight gain, growth failure, and negative immune-modulating effects[7]. Vitamin supplementations have been prescribed by physicians for children at nutritional risk, including children who are underweight, have restricted diets, or suffer from illnesses[2]. After vitamin supplementation, there were significantly reduced prevalence of deficiencies[8], decreased risks of mortality and morbidity from some infections[9], and improved nutritional status[5,10,11]. A large number of children in the United States use vitamin supplementations, which for most may not be medically indicated[12]. The American Academy of Pediatrics does not advise the use of vitamin supplementations for the general pediatric population[13]. The American Academy of Pediatrics and the American Dietetic Association, strongly recommend that in healthy children, diet is the best source of vitamins and minerals[2].

Vitamin preparations for infants and children

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in Thailand are available and regulated by the Food and Drug Administration. Numerous vitamins are available over-the-counter to the general public. Vitamin supplementations have been used for improvement of children's appetite and growth. However, few cases of overdose from vitamin supplementations or megavitamins have been reported[14,15]. It was the author's purpose to evaluate the prevalence of vitamin supplementation in young Thai children (1-5 years), the parental knowledge of vitamins, practices and related factors in vitamin supplementation.

Material and Method

A cross-sectional study was conducted from 1-31 May 2005. Five hundred parents of young children, aged 1-5 years were interviewed by trained health personnel using the questionnaire at the Well Child Clinic, QSNICH. The following data were collected: demographics such as age and sex, parental knowledge about benefits and toxic effects of vitamins, reasons for giving vitamins to their children, where they obtained vitamins, and anthropometric data including weight and length/height of the children.

Statistical analysis

Weight and length/height were assessed for nutritional status using Thai growth reference (2009)[16]. Nutritional statuses were classified as normal (weight for height or W/H above 90% and height for age or H/A above 95%), wasted (W/H at or below 90%), stunted (H/A at or below 95%), and over-nutrition including overweight (W/H above 110%) and obesity (W/H above 120%). Demographic data, parental knowledge and practices, and nutritional status were analyzed as percentage. The relationships among vitamin supplementation, nutritional status, and other related factors such as children's age, sex, and parental knowledge were analyzed using Chi-square test and *p*-value less than 0.05 was considered statistically significant.

Results

Five hundred children were included in the present study, 56% were boys. Mean age was 2.2±1.1 years. The prevalence of vitamin supplementation was 76%, including vitamin C 62%, multi-vitamin (MTV) 35%, and cod-liver oil 20% (Table 1). Forty-three percents received single vitamin supplement and the most common single supplement was vitamin C 31%. The mean age of children with vitamin supplement was 2.4±1.1 years older than those without vitamin supplement, 1.5±0.6 years (Table 2). Vitamin supplementation was not different between the sexes, but it was significantly higher in children older than 2 years (93%) when compared with those aged 1-2 years (64%). Regarding parental knowledge of vitamins, 57% knew the benefits, such as healthy status, adequate nutrient requirement, normal growth, and immunity. However, seventy-four percent did not know the toxic effects of vitamins. The prevalence of vitamin supplementation was significantly high in children whose parents knew

Table 1. Prevalence of vitamin supplementation

Vitamin supplements	Overall (%)	Vitamin C (%)	MTV (%)	Cod-liver oil (%)
Single and combined	378 (76)	308 (62)	177 (35)	98 (20)
Single	216 (43)	156 (31)	45 (9)	15 (3)

Table 2. Vitamin supplements according to the sexes and children's age

Vitamin supplements	Yes	No	*p*-value
Age (year)			
Mean ± SD	2.4±1.1	1.5±0.6	-
Age group (%)			
1-2 year	188 (64)	108 (36)	<0.001*
More than 2 year	190 (93)	14 (7)	
Sex (%)			
Male	206 (74)	72 (26)	0.44
Female	172 (78)	50 (22)	

the health benefits of vitamins (82%), but there was no difference in vitamin supplementation related to the knowledge of toxic effects of vitamins (Table 3). The reasons for vitamin supplementation were poor feeding 63%, under-weight 23% and unhealthy status such as frequent illnesses 14%. The supplements were obtained from over-the-counter in 59%, healthcare services 40%, and friends 1%. Vitamins from over-the-counter were obtained by the suggestions of friends (38%), health personnel (30%), pharmacists (17%), parental concern (9%), and media (6%). Nutritional statuses of these children were normal 53%, over-nutrition 27%, stunting 15%, and wasting 10%. Multi-vitamin supplement was significantly high in wasted and stunted children, and vitamin C supplementation was significantly low in children with over-nutrition (Fig. 1, 2).

Discussion

In the present study, 57% of parents knew the health benefits of vitamins and 62% of their children were supplemented with vitamins, which were significantly higher than those children whose parents did not know the benefits. Majority of parents (74%) did not know the toxic effects of vitamins; however, knowledge of toxic effects did not affect supplementation.

Supplemental vitamin use is common in the United States[17]. Prevalence of vitamin supplementation in the present study was 76% which was higher than some published studies, including 31% in German children[18], 54.4% of all US preschool children[13], two-thirds of US children, according to the National Health Interview Survey in 1981[19]; and 34% of children and adolescents in the 1999-2004 National Health and Nutrition Examination Survey (NHANES)[17]. The prevalence of supplementation among toddlers 12 to 24 months in the present study was 64%, which was higher than 31% from the other published study[20]. This was similar to the data from a global survey conducted by the Nielsen Company, which showed that the highest level of vitamin usage and dietary supplementation was in Thailand (66%)[21]. In the present study, a single vitamin supplement was given in 43%, mainly vitamin C (31%) which was lower than vitamin C supplement in German children (72%)[18].

In the present study, vitamin supplementation

Table 3. Vitamin supplements according to parental knowledge of vitamins

Parental knowledge of vitamins	Vitamin supplements		*p*-value
	Yes	No	
Know health benefits (%)			
Yes = 287 (57)	234 (82)	53 (18)	0.0005*
No = 213 (43)	144 (68)	69 (32)	
Know toxic effects (%)			
Yes = 128 (26)	99 (77)	29 (23)	0.7
No = 372 (74)	279 (75)	93 (25)	

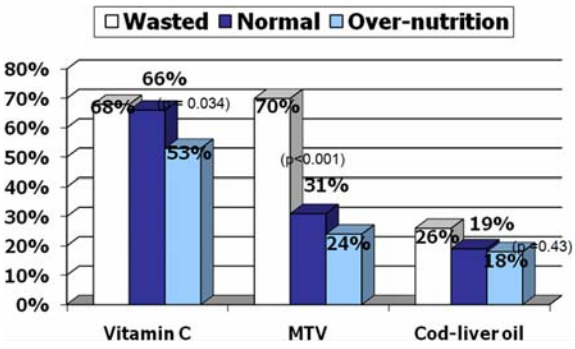

Fig. 1 Vitamin supplementations among nutritional statuses of the children.

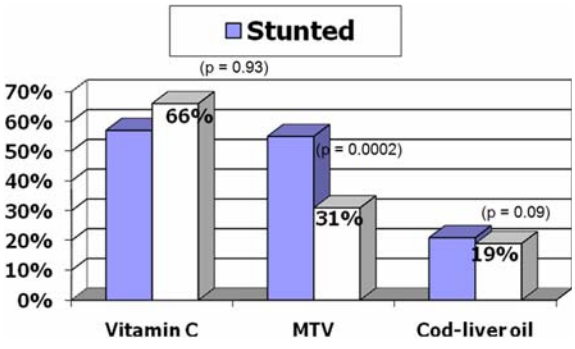

Fig. 2 Vitamin supplementations between stunted and normal children.

significantly increased with age, being high in children older than 2 years (93% vs. 64% in children aged 1-2 years). This was similar to the German study, which showed 19% supplementation among infants 6 to 11 months and increasing to 31% among toddlers 12 to 24 months[18]. In a cohort study, most young children obtained adequate nutrients from diet alone for the first 24 months of life[3], and the prevalence of inadequate intakes in younger-aged children was low (below 1-2%). Only some vitamin intakes were less than the estimated average requirement[20]. Use of nutrient supplementation is common during the first 2 years of life[3]. However, health educators should emphasize that adequate nutrients can be obtained through appropriate consumption of a nutritious diet[22].

The reasons for vitamin supplements appeared to be multifactorial[17]. The reasons or child health characteristics associated with the use of vitamin supplement in the present study were poor feeding 63%, under-weight 23% and unhealthy status 14%, similar to other studies which included eating problems, picky eating[18], or poor appetite[13]. Overall vitamin supplementation in the present study was related to the nutritional status of the children, except for Cod-liver oil supplement that had no correlation to the nutritional status. Vitamin supplementations were high in the under-nutrition (wasted and stunted) group, especially for MTV ($p<0.001$), and low in over-nutrition group, especially for vitamin C ($p = 0.034$). This was similar to the US survey (NHANES, 1999-2004), that showed greater vitamin supplementation in US children and adolescents who were underweight and/or had low body mass indices[17]. Although parents knew that inadequate or adequate vitamin intakes resulted from low or high food intakes, respectively, vitamins were still used to supplement their children with over-nutrition, especially vitamin C. This was because vitamin supplements were perceived to have physiological health benefits, better weight gain, improved immunity, and prevent illnesses in these children[19]. More than half (59%) of cases obtained vitamins from over-the-counter. Vitamins were obtained from healthcare services for only 40% of the children, which was similar to the National Health Interview Survey conducted in 1981, which showed that only one-third of children had been advised by a physicians[19]. This is because health professionals and health care providers generally screen, counsel, and make recommendations for nutrient supplementation of generally healthy children based on dietary adequacy[3], and vitamins are prescribed only when indicated[12], making sure that excessive intakes are avoided[20].

Conclusion

Vitamin supplementation in young Thai children was high in the present study and significantly related to parental knowledge of benefits from vitamins, children's age older than 2 years, and malnutrition, especially MTV supplement. Parents should be encouraged to use a balanced diet as a promoting factor for good health, and warned about the dangers of excessive vitamin consumption.

Acknowledgement

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Potential conflicts of interest

None.

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การเสริมวิตามินและภาวะโภชนาการในเด็กไทยอายุ 1-5 ปี

สุนทรี รัตนชูเอก

วัตถุประสงค์: *เพื่อประเมินความชุกของการเสริมวิตามินในเด็กไทยอายุ 1-5 ปี ความรู้ของผู้ปกครองเกี่ยวกับวิตามิน การเสริมวิตามินในเด็กและปัจจัยที่เกี่ยวข้องกับการเสริมวิตามิน เช่น ภาวะโภชนาการที่สถาบันสุขภาพเด็กแห่งชาติมหาราชินี*

วัสดุและวิธีการ: *เป็นการศึกษาแบบตัดขวาง โดยการสัมภาษณ์ผู้ปกครองของเด็กเล็กจำนวน 500 คน ที่คลินิกเด็กสุขภาพดี โดยใช้แบบสอบถามความรู้เรื่องวิตามินและการเสริมวิตามินแก่เด็ก ชั่งน้ำหนักและวัดความยาว/ส่วนสูงของเด็ก เพื่อนำมาประเมินภาวะโภชนาการ โดยใช้ค่าอ้างอิงการเจริญเติบโตของเด็กไทย หาความสัมพันธ์ระหว่างการเสริมวิตามิน ภาวะโภชนาการและปัจจัยอื่นที่เกี่ยงข้อง โดยใช้การทดสอบ Chi-square ค่า p-value ที่น้อยกว่า 0.05 ถือว่ามีนัยสำคัญทางสถิติ*

ผลการศึกษา: *ความชุกของการเสริมวิตามินในเด็กเล็ก 500 คน คิดเป็นร้อยละ 76 จำแนกเป็นการให้วิตามินซี วิตามินรวม และน้ำมันตับปลาร้อยละ 62, 35, และ 20 ตามลำดับ ผู้ปกครองร้อยละ 57 ทราบถึงประโยชน์ของวิตามิน แต่ร้อยละ 74 ไม่ทราบถึงพิษของวิตามิน เหตุผลที่ให้วิตามินเสริมเพราะกินน้อยร้อยละ 63 น้ำหนักน้อยร้อยละ 23 และสุขภาพไม่ดีร้อยละ 14 วิตามินที่เสริมส่วนมากซื้อจากร้านขายยาร้อยละ 59 จากสถานบริการสาธารณสุขร้อยละ 40 และจากเพื่อนร้อยละ 1 การเสริมวิตามินพบสูงในเด็กที่อายุมากกว่า 2 ปี เนื่องจากผู้ปกครองทราบถึงประโยชน์ของวิตามิน และเป็นเด็กที่ผอมหรือตัวเตี้ยอย่างมีนัยสำคัญ ($p<0.001$)*

สรุป: *การให้วิตามินเสริมในเด็กไทยพบสูงในเด็กอายุมากกว่า 2 ปี ที่มีภาวะทุโภชนาการและผู้ปกครองรู้ประโยชน์ของวิตามิน ผู้ปกครองควรได้รับคำแนะนำเกี่ยวกับอันตรายของการเสริมวิตามินเกินขนาด*