Factors associated with vitamin D intake among preadolescent boys and girls: a secondary analysis of PREBONE-Kids study

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Undergraduate

Introduction

Poor vitamin D status reported amongst preadolescent children in Malaysia[1] attributed to the low intake of vitamin D rich foods. However, limited data is available to describe the factors associated with vitamin D intake among Malaysian preadolescent children.

This study aims to assess the vitamin D intake of preadolescent school children and differentiate their vitamin D intake according to serum 25-OH vitamin D status.

Methodology

- **Design**: A secondary analysis (Baseline data from PREBONE-Kids study)
- **Setting**: 3 primary school in Bangsar and Brickfields
- **Participants**: 242 children aged 9 to 11 years

Inclusion
- Healthy
- Tanner stage 1 or 2
- Able to provide assent

Exclusion
- History of serious medical condition & medication intake interfering with bone metabolism

- **Ethical approval** was obtained from IMU JC committee (IMU R235/2021).

Dietary Assessment
- Assessed using 7-day diet histories.
- Food composition data from Singapore, USDA, and nutrition facts label from processed foods.

Food Sources & Meal Patterns
- **Food groups:** Dairy products, milk-based sweeteners, cereal and cereal products, fish and seafoods, meats, poultry, and products, supplement, soup, beverages, and fats and oils.
- **Meals:** Breakfast, lunch, dinner, snack.

Vitamin D status
- Vitamin D sufficiency and insufficiency was classified by using IOM RDA cut-off values of serum 25-OHD 50nmol/L.

Statistical Analysis
- Data was analyzed using SPSS version 28, Kolmogorov-Smirnov test, Independent t-test and Mann-Whitney U Test.
- Significance level: P < 0.05

Results & Discussion

Sociodemographic data

- Median age: 10.2(1.2) years
- Ethnicity: Malay (90.5%), Indian (9.5%)

Vitamin D status and intake

- Mean 25-OH vitamin D levels of boys were higher than girls (50.4 ± 13.7nmol/L vs 36.8 ± 11.9nmol/L vs ; p<0.001).
- Participants only achieved 7.2% of RNI for vitamin D.
- Boys had significantly higher median vitamin D intake compared to girls (1.24µg/day vs 0.93µg/day; p=0.023) which were consistent with findings from previous studies[1,2].

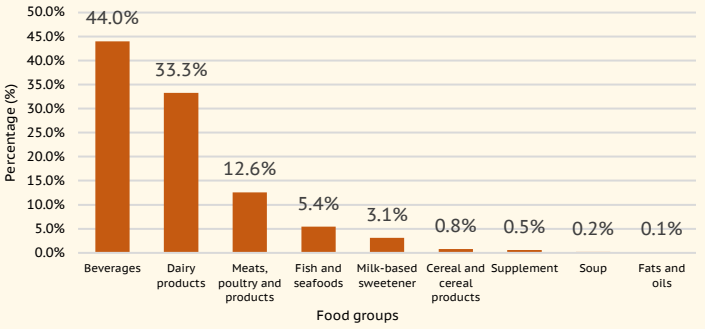

Figure 1: Percentage contribution of vitamin D from food groups (%)

Food groups

- Main contributors of vitamin D intake were beverages (cocoa-based & malted drinks) and dairy products (Figure 1).
- Boys: 48.3% of vitamin D were contributed by beverages.
- Girls: 43.1% of vitamin D were contributed by dairy products.
- Boys had higher median vitamin D intakes from beverages and fats and oils than girls (p<0.05) due to their frequent consumption and higher preference towards cocoa-based and malted drinks[3,4].
- Participants with vitamin D sufficiency obtained more vitamin D from beverages and meats than vitamin D insufficiency group (p<0.05).

Meal patterns

- Most vitamin D intakes were consumed at breakfast and during snacks (Table 1).
- No significant differences was observed in the median vitamin D intake from all meals between boys and girls (p>0.05).
- Participants with vitamin D sufficiency had significantly higher vitamin D intake during snacks than their counterparts (p=0.001).
- Breakfast: 53.1% of vitamin D were contributed by dairy products and not ready-to-eat breakfast cereals as found in other study[5].
- Snack: 62.1% of vitamin D were contributed by beverages as Malaysian children had habits of snacking and consumed chocolate drink during snack[6,7].

Table 1: Comparison of contribution of vitamin D from meals between vitamin D sufficient and insufficient preadolescents (N=242)

	Total (N=242)	Sufficient (n=74)	Insufficient (n=168)	P-value
		median(IQR)		
Vitamin D intake from meals (µg/week)				
Breakfast	1.24 (6.97)	2.00 (6.03)	1.02 (6.99)	0.709
Lunch	0.40 (1.07)	0.57 (1.42)	0.34 (0.91)	0.224
Dinner	0.48 (1.48)	0.45 (1.15)	0.49 (1.64)	0.249
Snack	0.69 (4.87)	2.17 (6.88)	0.46 (4.25)	0.001*

*Significant difference at p<0.05 between groups by Mann-Whitney U test.
Data expressed as median (IQR).

Conclusion

Malaysian preadolescent children had poor dietary vitamin D intake and most vitamin D intakes were contributed from fortified sources. This indicated the need to increase public health awareness on vitamin D rich food sources and the consideration for mandatory vitamin D fortification in food products to improve vitamin D status of Malaysian children.

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