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Level of vitamin d and its associated factors among private university students in shah alam, Selangor

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Abstract
Good nutritional status is important in maintaining human's well-being, growth and development, and resistance towards illnesses. The aim of this study was to determine the level of Vitamin D and its associated factor among private university students in Shah Alam, Selangor. A cross-sectional study was done to evaluate Vitamin D status and possible associated factors of this status in three-hundred ten students, healthy young adults aged 18-29 years of age. For this study, Vitamin D status was assessed via six Vitamin D rich food items such as Oily Fish, Beef, Liver, Margarine, Butter and Eggs,. These items were chosen based on National Nutrition Survey. Dietary intake of Vitamin D and Calcium were assessed subjectively via Food Frequency Questionnaire (FFQ). Finding shows the mean for each specific Vitamin D rich food are Eggs (Median = 6.83, butter (Mean = 6.59) and margarine (Mean = 6.37). There was a significant association between gender, course of study and status of vitamin D. As a conclusion, significant percentage of students are suffering from vitamin D insufficiency. More health education should be focused on vitamin D sources among young generation.

Keywords: level of vitamin d, university students, nutritional habits

Introduction
Vitamin D is important for our bodies for so many reasons, first of all to have and maintain healthy bones and teeth as well as protecting the body from different conditions like cancer, multiple sclerosis, type 1 diabetes and others.
The sources of vitamin D are dietary intake (vitamin D2 and D3), sun exposure so the skin is able to produce vitamin D3. Both D2 and D3 are come in a form of tablets and found in fortified foods. Previous studies suggested that Vitamin D3 have a higher stability in blood compared to vitamin D2 due to the higher ability of binding protein towards vitamin D3 [1].
Many foods fortified with vitamin D such as eggs, soy beverage, grain products, orange juice, and some fats and oils [2]. Fortified foods with vitamin D such as milk, cereals can increase vitamin D in the diet [3]. Previous study suggest good outcomes with vitamin D supplementation in patients with deficiency. One study concluded that after one year of vitamin D intervention using supplements, there is an evidence of increased lean mass, bone area, and bone mass [4].
Vitamin D is an essential micronutrient with major consequences for human health. Approximately one billion persons globally have been reported to have Vitamin D deficiency [5]. In addition to its well-known role in calcium/phosphorus homeostasis and bone physiology, Vitamin D is central to the optimum functioning of other organ systems, including the cardiovascular, endocrine and immune systems [6]. Persons could be poor vitamin D for many causes such as older age, higher BMI, chronic kidney disease and living above 35˚ in winter months, some medications, liver disease, dark skin pigmentation (melanin absorbs UVB photons) [7].
The aim of this study was to determine the level of Vitamin D and its associated factor among private university students in Shah Alam, Selangor.

Method
A Cross-sectional study was conducted among 310 students at private university in Shah Alam, Selangor. Non-probability convenience sampling was used to collect the data between April and May 2017. Inclusion criteria for this study include Healthy students aged 18-29 years, attending the university at the undergraduate or graduate level which volunteered for the study and answered the questionnaire survey. Students were also excluded from the study if they had a pre-existing condition affecting Vitamin D, or calcium metabolism including

Liver or kidney disease, eating disorder, skin diseases, pregnancy and breast-feeding status.

Each of the students completed a measurement consisting of basic anthropometric data (weight and height) and Food Frequency Questionnaire.

The first part of the questions consists of socio-demographic background of the respondents.

The Body Mass Index (BMI) measurement was done using digital weighing scale without their shoes. Height was measured using a tape measure after asking the students to stand against the wall and take off their shoes.

The Food Frequency Questionnaire used in this study adopted from validated 34-item short questionnaire for calcium by Colver *et al.* 2007 [8] this 34-item questionnaire was validated for use in adults against a 4-day nonconsecutive food record for recording calcium intake.

To assist students in estimating the serving size of food they consumed a number of sample items such as standardized teaspoons, tablespoons and cups where used to illustrate the standard serve sizes uses in the FFQ.

Ethical approval was obtained from Management and Science University Research Ethics. Verbal and written explanation of the study was provided to the students in detail. All the students were informed about the study and were required to read and sign a consent form on presentation at the data collection sites.

Data entry and analysis of data was achieved using the Statistical Package for Social Sciences (SPSS) software version 23, independent samples t-test and Anova were used in data analysis.

Results

We evaluated the Vitamin D status and possible associated factors of this status in three-hundred ten (N=310) students. For this study, Vitamin D status was assessed via six Vitamin D rich food items such as Oily Fish, Margarine, Butter, Eggs, Beef and Liver. These items were chosen based on National Nutrition Survey which showed margarine, fatty fish and eggs to be the major sources of Vitamin D in diet. Table 1 provides the mean and standard deviation showing the contribution of specific Vitamin D containing foods to the dietary Vitamin D intake of the sample. Eggs (M = 6.83 and SD = 4.20), butter (M = 6.59 and SD = 5.58) and margarine (M = 6.37 and SD = 5.79) made up the of the dietary Vitamin D intake for the students, with lower contributions to dietary Vitamin D made by oily fish and beef or liver.

Body mass index of the respondents shown in figure 1 with majority of them having normal weight status.

Association between Vitamin D status and gender, academic course of the students was shown in table 2. Result showed that there is significant association between Vitamin D status and gender (p=0.006). Also, academic course whether medical or non-medical was significantly associated with Vit D. level (p<0.001).

Table 3 shows the association between nutritional status and vitamin D status. Finding of this result shows the How often Do you eat breakfast? If you ate breakfast today, what did you eat? What do you normally eat for breakfast? and How often do you eat out?, was not statistically associated with Vitamin D status, the p-value for F-Test is greater than the significant level $\alpha = 0.05$, this study is failed to reject the null hypothesis, result shows that there is no significant difference between Vitamin D and nutritional status.

Table 4 shows the association between vitamin D status and supplement intake. Finding showed that Calcium tablets plus Vitamin D, Cod Liver Oil (Oil or Capsules), Other Fish Oils and Vitamin D tablets was not statistically associated with Vitamin D status, there was is no significant association between Vitamin D status and supplement intake.

Table 1: Level of Vitamin D Status among respondents

Vitamin D	Mean	Standard Deviation
How much sizes of Oily fish (e.g. salmon, tuna, sardines, anchovies, and mackerel) you eat per week?	2.29	0.82
How much margarine did you take per week?	6.37	5.79
How much butter did you take per week?	6.59	5.58
How much eggs did you take per week?	6.83	4.20
How much beef or liver did you take per week?	2.28	0.83

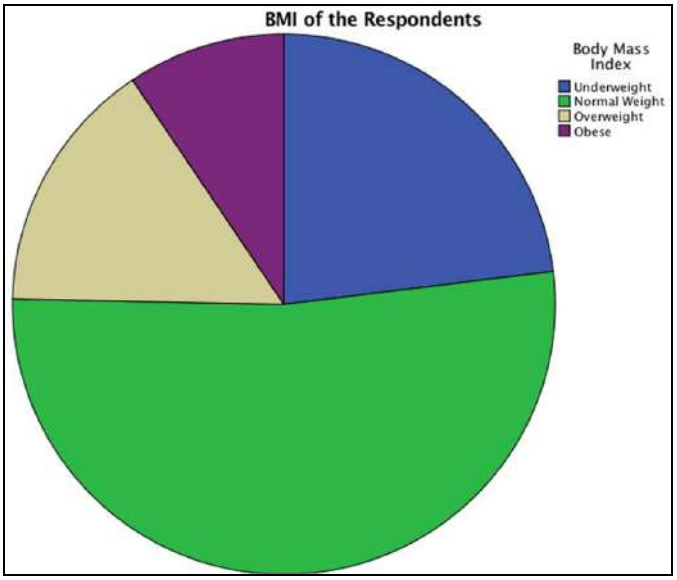

Fig 1: Body Mass Index (BMI) status of the respondents

Table 2: Association between Vitamin D status and gender, academic course of the students

	Mean± SD	Mean± SD	t	p
	Male	Female		
Vitamin D level	4.71±0.88	4.39±0.97	2.778	0.006*
	Medical	Non Medical		
	4.13±0.999	4.68±0.875	-4.982	<0.001*

*Independent t teat was performed. P value of <0.05 was taken as significant level

Table 3: The association between nutritional habits and Vitamin D status

Variable		Number	Mean Race	F-test	P-Value
How often do you eat breakfast	Rarely	210	4.53	0.562	0.64
	Once a week	16	4.26		
	2 -3 times a week	59	4.47		
	Everyday	25	4.39		

If you ate breakfast today, what did you eat?	Bread, Toast	88	4.41	0.819	0.621
	Cereal	21	4.55		
	Cracker/Biscuit	17	4.63		
	Eggs Benedict	5	4.88		
	Tea or Coffee	6	5.24		
	Pastries, Cakes	5	4.81		
	Flavoured Milk	4	4.14		
	Milk	7	4.16		
	Cooked Foods	71	4.54		
	Other Items	12	4.49		
	Not Eating Breakfast	34	4.39		
	Fruits	7	4.1		
What do you normally eat for breakfast	Bread, Toast	128	4.47	1.558	0.111
	Cereal	29	4.57		
	Cracker/Biscuit	24	4.49		
	Eggs Benedict	2	4.78		
	Tea or Coffee	3	5.8		
	Pastries, Cakes	1	6.53		
	Flavoured Milk	9	3.85		
	Milk	5	4.1		
	Cooked Foods	67	4.51		
	Other Items	7	4.6		
	Not Eating Breakfast	9	4.11		
	Fruits	4	4.58		
How often do you eat out?	Rarely	40	4.34	0.488	0.691
	Once a week	34	4.44		
	Very often (3-5 times a week)	159	4.53		
	Everyday	77	4.54		

Table 4: Association between vitamin D status and supplement intake

Variable	Mean Difference (95% CI of mean difference)	Standard Error	t-score	p-value
Calcium tablets plus Vitamin D: Yes (n=114) vs No (n=164)	0.003 (-0.22 - 0.23)	0.115	0.028	0.978
Cod Liver Oil (Oil or Capsules): Yes (n=108) vs No (n=181)	-0.099 (-0.33 - 0.128)	0.115	-0.856	0.392
Other Fish Oils: Yes (n=37) vs No (n=234)	0.207 (-0.12 - 0.53)	0.167	1.242	0.215
Vitamin D tablets: Yes (n=152) vs No (n=139)	-0.029 (-0.24 - 0.19)	0.109	-0.263	0.793

Discussion

The main findings of our current study, significant proportion of young adults are suffering from vitamin D insufficiency. There was a significant association between Vitamin D status with gender and course of study.

Our current results are in contrast to previous study done among private university students where participants scored a good knowledge of identifying the sources of vitamin D can be obtained. Out of 360 of those who had participated in that study, about 249 students had correctly identified the sun as the main source and 209 of students identified vitamin D supplements for vitamin D production [9].

Gender differences have been suggested for vitamin D status, with a higher rate of deficiency occurring especially in post-menopausal women, increasing the risk of bone fractures and osteoporosi [10]. For Finding of this result shows that there is significant difference between Vitamin D status and gender. Female displayed lower Vitamin D status and contrast significantly with males which have higher vitamin D status). In our study, result shows that there is no significant difference between Vitamin D statuses among the four different categories of race, this was similar with the vitamin D intake observed in the United States [11].

Our study showed a health-related major was associated with higher level of vitamin D status. There was no previous research on whether increased knowledge in health-related areas might influence vitamin D status: the evaluation of vitamin D status based on a student's academic major (health related versus non healthy related) was an exploratory question

Conclusion

A significant proportion of young adults are suffering from vitamin D insufficiency. Female, of a younger age, having a higher BMI and a sedentary lifestyle are at higher risk of having a lower vitamin D status. Steps should be taken to prevent the progression of vitamin D insufficiency and its associated health problems.

Conflict of interest: Authors declare no competence of interest

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