
PUBLIC HEALTH RESEARCH

Knowledge and Perception of Calcium Intake among Students in University Technology MARA

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ABSTRACT

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Introduction	Osteoporosis-related fractures have been recognized as a major health problem, particularly in the elderly with a high morbidity and mortality rate. The aims of the study were to identify knowledge and perception toward calcium intake among students at UiTM and to explore the differences between genders in dietary calcium intake.
Methods	A cross sectional study was conducted through 336 students aged 18 to 34 years old. The participants were randomly chosen from the student's enrolment list. A modified questionnaire was used to obtain the knowledge and perception of the participants.
Results	More than half of the participants have low knowledge regarding dietary calcium intake (58.6%), positive view towards the benefits of calcium intake and low perception towards the barrier of calcium intake. Chi square analysis showed a significant difference between male and female for knowledge ($p=0.034$) and barrier ($p=0.002$) for calcium intake.
Conclusions	Intervention programs should be adopted to increase the knowledge among young adults to improve their health and prevent risk factors. So, health education specifically on calcium intake will be very useful to improve the knowledge and behavior of students.
Keywords	Calcium - Intake - Knowledge - Osteoporosis - Perception.

INTRODUCTION

Calcium is one of the most important elements in the diet because it is a structural component of bones, teeth, and soft tissues and is an essential in many of the body's metabolic processes. It accounts for 1% to 2% of adult body weight which is 99% of it stored in the bones and teeth¹. Aside from strengthening the teeth and bone, calcium in body fluids at the cellular level also exerts critical metabolic functions, binding to proteins, and operates as a signal transmitter and protein activator within cells. Furthermore, muscle contraction and nerve transmission are two of the many body functions that rely on calcium for activation. Heaney and Miller defined calcium as an essential nutrient required for many critical biological functions in our body such as nerve conduction, squeezing and relaxing muscles, cell adhesiveness, mitosis, clotting blood, and structural support of the skeleton^{2,3}.

Peak bone mass is usually achieved during late adolescence and serves as the bulk of bone mass for life⁴. It is supported by other article which found that, during adolescence bone mass normally increases and crests in the third decade and in the five years after menopause there is a rapid acceleration of bone loss⁵.

Calcium is a vital nutrient for adolescents because of the high incidence of osteoporosis⁶. In addition, obtaining adequate calcium helps ensure adequate mineralization of the skeleton to maintain bone health throughout life. The highest priority is to encourage calcium consumption in children, adolescents and young adult. Higher calcium intake in the form of dairy products during the childhood is positively associated with greater peak bone mass in adult life⁷. Studies proved that from middle adolescence (secondary school) to young adults (over 18), females and males respectively reduced their daily calcium intakes by an average of 153mg and 194mg respectively⁸. And during the transition, although 38% of females and 39% of males increased their intake of calcium over 5 years, the majority of the sample reduced their intake.

Nowadays, people gain new knowledge about the relation between calcium and life, and calcium and disease. They will eventually know the importance of calcium supplementation, and calcium as a life source helping them to live healthier and fulfilling lives⁹. According to Riaz, Asian women living in Australia had a lower calcium intake (< 800 mg/day) and their knowledge about osteoporosis was poor¹⁰. Findings by Chemaly showed that most of the study group (91%) knew the functions of calcium and this suggests that adolescents are aware of the major health benefits of calcium, but lack specific information on daily requirements⁶.

Therefore, this study evaluated the level of knowledge and perception regarding calcium intake

among students and to identify the differences in gender regarding dietary calcium intake. The need for identifying the knowledge, perception and behavior was to provide the baseline data for further improvement regarding the calcium intake among the adolescents.

METHODS

This cross sectional study was carried at UiTM, Puncak Alam campus. The participants were selected based on random sampling from the student's enrolment list. The students in UiTM were from the Malays and the indigenous population. The inclusion criteria were included; student at UiTM Puncak Alam campus, aged range 18 to 34 years old. Approval from Research Ethics Committee of the faculty had been obtained prior to conducting this study. Participants had given informed consent prior to the study. There were 336 participants (76 male and 260 female) in this study.

This study used the modified questionnaires develop by Kim, Horan and Gendler¹¹. The study was carried out using the English version of the questionnaire. The reliability of the questionnaire was 0.69¹¹.

The first eight items of the questionnaire present the demographic data of the participants and the next eight items comprise of knowledge of calcium. Scores for the calcium knowledge test had a possible range from 0 to 8. The correct item is marked by 1 and incorrect items are 0. Total score 1 to 4 is considered as low knowledge and 5 to 8 is categories as high knowledge.

Eleven items were used to assess the perception of calcium intake. Each item was rated by using a 5 point Likert scale with 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, scores had a possible range from 11 to 55. The perceived benefit of calcium intake had a possible score ranged from 5-25. The Scores classified from 5-12 are categorized as low perceived benefit calcium intake, 13-19 categorized as moderate and 20-25 is considered as a high perceived benefit.

Perceived barriers to calcium intake were categorized by two groups. Score ranged from 6-15 considered as lower perceived barriers and 16-30 considered as high perceived barriers.

Questions related to consumption of calcium intake include 4 items. Each item questions from 1-3 is rated by using 1= none per week, 2=one per week, 3=two per week, 4= three per week, 5=four per week, 6=five per week, 7=six per week, 8= seven per week, 9=two per day, 10=three per day. Question 4 is rated as 1=no and 2=yes to answer the question intake of calcium supplement. For analysis of the consumption of calcium intake, three grouping were established by Sizer and Whitney¹². Less than four serving a week

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classified as inadequate intake, five to seven servings a week classified as moderate intake and two to three servings a day classified as adequate intake.

The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 16. Descriptive analysis was used to describe the percentage and frequency of the respondents. Values of perception and barrier to calcium intake were expressed in mean and standard deviation. Level of knowledge was expressed in percentage of correct answers compare with non accurate. The difference in gender was evaluated using the Chi

square test. The significance level is set $\alpha < 0.05$ was applied for estimation.

RESULTS

The majority of the sample were female (77.4%) and the main age category was 19 to 22 (53.9%) and the lowest category was 25 to 27 (3.3%). Most of the students were from health science (36.9%) and mainly from degree level (58.9%). The vast majority of the participant revealed that there was no one in family member diagnosed as osteoporosis (95.2%) and did not have any bone disease (97.3%) (Table1).

Table 1 Demographics variables of the Study Sample (n=336)

Demographic	Frequency (Percent)
Gender	
Male	76 (22.6%)
Female	260 (77.4%)
Age (years)	
16-18	23 (6.8%)
19-21	181 (53.9%)
22-24	121 (36.0%)
25-27	11 (3.3%)
Faculty	
Health science	124 (36.9%)
Office management	54 (16.1%)
Foundation	111 (33.0%)
Pharmacy	47 (14.0%)
Level of current study	
Diploma	24 (7.1%)
Degree	198 (58.9%)
Foundation	114 (34.0%)
Family members diagnoses as osteoporosis	
Yes	16 (4.8%)
No	320 (95.2%)
Having bone disease	
Yes	9 (2.7%)
No	327 (97.3%)

Table 2 represented the respondents' level of knowledge on food which are good source of calcium. The level of knowledge classifies according to the correct answer in percent, so the students can identify the correct answer in four times (88.1%), (89.9%), (52.1%) and (68.2%). However, they were not able to recognize alternate sources of calcium with (69.3%), (51.2%), (67.7%), and (85.7%). The level of knowledge was classified into two levels; low and high and according to that, the results showed that more than half of the students were having low knowledge (56.8%).

Perception of calcium intake was divided into two categories which are the perception of

benefits to calcium intake and the perception of the barriers to calcium intake. The mean of perception of calcium intake was 20.3 (SD 2.85) and the percentage of high perception benefits of calcium intake was 63.6%. Overall, the results showed that the participants had a positive view towards the benefits of calcium intake (Table 3).

The perceived barrier to calcium intake was low with mean 15.0 (SD 4.21) and more than half of the participants (56.8%) think positively toward calcium intake which is; they have low perceived towards the barrier of calcium intake despite of their lower intake of calcium diet (Table 3).

Table 2 Level of knowledge on Calcium Intake among students (n=336)

Questions	Percentage (%)	
	Correct	Not correct
Which of these is a good source of calcium?	88.1%	11.9
Which of these is a good source of calcium?	30.7%	69.3%
Which of these is a good source of calcium?	48.8%	51.2%
Which of these is a good source of calcium?	89.9%	10.1%
Which of these is a good source of calcium?	32.4%	67.6%
Which of the following is the recommended amount of calcium intake for an adult	14.3%	85.7%
How much is the recommended amount of intake for an adult	52.1%	47.9%
Which of the following is the best reason for taking a calcium supplement	68.2%	31.8%

Table 3 The students perception and barrier to calcium intake (n=336)

Constructs	Mean (SD)	perception Level	Number (%)
Perception benefits of calcium intake	20.3 (2.85)	Low	3 (1.0)
		Moderate	119 (35.4)
		High	214 (63.6)
Perception barriers to calcium intake	15.0 (4.21)	Low	191 (56.8)
		High	145 (43.2)

Table 4 showed the results of the Chi square for the difference in level of dietary intake between genders. There is a significant association between male and female regarding the level of knowledge $\chi^2 (1) = 4.99, P=0.034$. Moreover, barrier to calcium intake have a significant difference between male and female $\chi^2 (1) = 10.32, P=0.002$. In the level of knowledge significant was found between the genders. But benefit from

calcium did not show any significant difference between male and female.

The Chi square statistic shown significant in intake of cheese between male and female $\chi^2(1) = 10.894, p=0.004$. Most of the female students are in the inadequate category of eating cheese during an average week; whereas, there are no significant differences between gender in consumption of milk and yogurt.

Table 4 Differences in gender regarding knowledge, benefit, and barrier to calcium intake

Variables	Gender		p-value
	Male (% within group)	Female (% within group)	
Knowledge			
Low	53 (26.9)	144 (73.1)	0.034
High	23 (16.5)	116 (83.5)	
Benefit of Calcium			
Low	2 (66.7)	1 (33.3)	0.17
Moderate	28 (23.5)	91 (76.5)	
High	46 (21.5)	168 (78.5)	
Barrier to Calcium			
Low	31 (16.2)	160 (83.8)	0.002
High	45 (31.0)	100 (69.0)	
Consumption of calcium intake:			
Milk			
Inadequate	59 (22.5)	203 (77.5)	0.518

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Moderate	12 (24.5)	37 (75.5)	
Adequate	5 (20.0)	20 (80.0)	
Yogurt			
Inadequate	70 (21.9)	250 (78.1)	
Moderate	3 (30.0)	7 (70.0)	0.079
Adequate	3 (50.0)	3 (50.0)	
Cheese			
Inadequate	66 (20.9)	250 (79.1)	
Moderate	7 (43.8)	9 (56.3)	0.004
Adequate	3 (75.0)	1 (25.0)	

This study examined the knowledge, perception and consumption of dietary calcium intake. The findings clearly demonstrated the lack of knowledge towards sources of calcium and the recommended amount of calcium for an adult. This finding is similar with Edmonds, who found that the college students were unable to recognize the recommended amount of calcium for an adult. In comparison between genders, the female students are more knowledgeable regarding calcium intake¹³. This is supported by Harel¹⁴, found that only 19% of the participants among female adolescents knew about the recommended intake of calcium. The majority knew that dairy products are the main source of calcium, but only 10% knew about the calcium content of the various dairy products. Only half of them (45%) knew about vegetables such as spinach and broccoli as major non-dairy sources of calcium, and only 11% knew that sardines with bones could be a source of calcium. Moreover, Ford et al., found that the male has low knowledge of calcium intake compare to female¹⁵.

The present study also found a significant difference between the level of knowledge and both of perception's construct. Even though the students had lower knowledge of dietary calcium intake but they have a greater perception of benefit to calcium intake. The present study had revealed that the male students have higher perception of barrier to calcium intake compared to female students. Nevertheless, there was no association linking either knowledge or perception with the consumption of calcium in this study. This finding is in line with other study carried out among university students in one of the other local universities. A study among young adult age 18-21 indicates that level of knowledge of perception did not indicate any dietary practice¹⁶. On the other hand, Jalili et al found that woman aged 45 years and above reported a significant relationship between preventive behavioral practice and total knowledge score on osteoporosis prevention¹⁷. In addition, the college students who were informed

regarding osteoporosis had shown greater perception of calcium intake which influences their preventive behavior of osteoporosis¹⁵.

Several limitations to this study should be noted. First, the data would have been more balanced if there had been an equal representation of genders among the groups. Data will be balanced by gender and will provide an opportunity to reassess our objectives. Another possible limitation of this study is the questionnaires are more likely to be distributed among the Malays rather than other races. This is because the study setting institutions are mainly for Bumiputera citizens and mostly are Malays. Hence, we cannot differentiate the calcium intake between races.

CONCLUSIONS

An understanding of how knowledge, perception and behavior of calcium intake towards bone health status is a particularly important strategy for formulating appropriate, effective and innovative health and nutritional intervention programs to reduce probability of bone disease during young age. Ultimately, it could help to prevent the risk of osteoporotic fractures later in life.

Health care providers need to determine the population's knowledge and attitudes towards calcium intake in order to plan an effective calcium education program. Attention should be given to the promotion of bone health during the early years of life.

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