

Knowledge, Attitude, and Behavior of Young Women towards Dietary Calcium IntakeRania Abd El Hamid Hussein ^{1,2}, Bashair Sameer Ashqan ¹, Rana Hashem Jamalallail ¹, Asrar Salem Alafeef ¹¹Clinical Nutrition Department, Faculty of Applied Medical Sciences, King Abdulaziz University.²Permanent address: Gamal Abd El Nasser Hospital, Health Insurance Organization, Alexandria, Egypt.
rahussein2002@yahoo.com

Abstract: Background: The prevalence of osteoporosis continues to steadily increase. Studies have shown that a low calcium intake, and a sedentary lifestyle confer an increased risk of developing osteoporosis; however, data relating osteoporosis to lack of awareness have not been sufficiently studied. **Material and methods:** We studied the Knowledge, attitude, and behavior of young women towards calcium intake, through a cross sectional study, where a convenience sample of 400 female non medical students was recruited from King Abdulaziz University (KAU). Participants answered a self administered questionnaire covering personal information, family, medical history, practices of students towards calcium intake, as well as knowledge, attitude towards calcium intake. **Results:** We found a significant association between mother's level of education and total calcium knowledge among adolescent girls, and a significant positive association between peers' care about eating healthy food with number of servings of milk consumed. **Conclusion:** The majority of young females had fair knowledge with positive attitude and environments. Parents 'knowledge and peers' attitude were affecting adolescent's intake of milk.

[Rania Abd El Hamid Hussein, Bashair Sameer Ashqan, Rana Hashem Jamalallail and Asrar Salem Alafeef. **Knowledge, Attitude, and Behavior of Young Women towards Dietary Calcium Intake** *Life Sci J* 2013; 10(3): 2491-2496] (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 361

Key words: calcium; knowledge; peers; parents; attitude; milk.

1. Introduction

Calcium is an important element involved in bone health ⁽¹⁾. In addition, it serves as a calcium bank ⁽²⁾ Peak bone mass achieved during adolescence and young adulthood is an important determinant of osteoporosis risk later in life ^(3, 4). However; results of national surveys suggest that young people are not consuming adequate amounts of calcium ⁽⁵⁾.

Milk and dairy products are the best source. Other sources of calcium include green leafy vegetables, salmon and sardines eaten with their soft bones, nuts and dried beans, and blackstrap molasses ⁽⁶⁾.

In addition to cognitive factors, dietary calcium intake of male and female adolescents could be explained by a combination of personal factors (taste preference for milk, lactose intolerance, health/ nutrition attitudes, body satisfaction, self-efficacy to make healthful food choices, time to eat breakfast), behavioral factors (sport participation, breakfast intake, lunch intake, dinner intake, unhealthful weight control behaviors, fast-food intake, and soft drink intake), and socio environmental factors (social support for healthful eating, family socio economic status, availability of milk at meals, home availability of soft drinks, and parental presence at meals) ⁽⁷⁾.

2. Material and Methods

We conducted a cross sectional study, where our target population was adolescence and young adult women aging 18-28 years, students at KAU, Jeddah.

The following groups were excluded:

- Medical college students, sciences, food and nutrition students.
- Pregnant students.
- Those not completing the Questionnaires.

Total number of students comprised in the study after exclusion were 400 females.

Participants and procedures:

-Before conducting the study, an official approval was obtained from the ethics research committee of the institution.

-First, researchers arranged with administrators and coordinators about a convenient time, and place for the participants; then through a group administered questionnaire, researchers introduced themselves, explained the study in short; then each respondent was handed a questionnaire, and asked to complete it. Questionnaires were completed in 15-20 minutes.

Data were collected over three months (February, March, and April 2013).

Bias was minimized by:

- 1-Convenient time for respondents to answer the question.
- 2- Respondents could ask for clarification, at the same time that there was no interviewing bias.
- 3-Assuring the respondents about anonymity and confidentiality, and that their participation is voluntary.

4-Assembling students in group administered questionnaire, assuming a good physical environment to them and a high response rate.

A 10-page structured Self-administered data collection sheet comprised the following data:

1 -Knowledge, attitude, and behavior towards calcium intake assessment:

1.1 - knowledge about calcium:

It has been tested by 12 questions. They were assigned to 8 main categories:

- 1- Which nutrient calcium is?
- 2- Role of calcium
- 3- Where is it stored in the body?
- 4- The age of peak calcium deposition in bone.
- 5- Sources calcium in the diet.
- 6- Number of dairy servings necessary to take calcium requirements daily.
- 7- The vitamin necessary for calcium absorption.
- 8- Best source to take this vitamin.

The response of knowledge questions was scored as follows:

- Correct: 2
- Incorrect: 1

The score for dietary knowledge ranged between 12 and 24. It has been grouped into:

12-15 was considered poor.

16-20 was considered fair.

21- 24 were considered satisfactory.

1.2 - Attitude towards calcium intake:

It has been tested by 7 statements:

1. I like Milk taste.
2. I dislike flatulence after milk intake
3. Dairy products can substitute unhealthy foods and beverages
4. Dairy products can make someone feel better
5. Dairy products can help control body weight
6. Dairy products raise level of serum cholesterol
7. Dairy intake can protect against osteoporosis

Rating scales were used to evaluate attitudes towards dairy products' intake. Answers to these statements were made on 3 point Likert scale. The interviewee indicated the degree of agreement with each statement from agree to disagree: the answer included strongly agree, neutral, disagree.

Each attitude statement was scored as follows:

- Positive attitude: 3
- Undecided attitude: 2
- Negative attitude: 1

Response to attitudes ranged from 7-21. It has been categorized into:

7- 11 was considered negative attitude.

12-16 was considered undecided attitude.

17- 21 was considered positive attitude

1.3 Environmental factors:

In addition, enquiry about the role of environmental factors was done, through 5 statements:

1. Milk is always available at home.
2. Soft drinks are always available at home
3. Dairy products are expensive
4. Peers encourage me to drink milk, and eat dairy products.
5. My parents encourage me to drink milk, and eat dairy products.

Rating scales were used to evaluate environmental factors. Answers to these statements were made on 3 point Likert scale. The interviewee indicated the degree of agreement with each statement from agree to disagree: the answer included strongly agree, neutral, disagree.

Each statement was scored as follows:

- Positive environment : 3
- Undecided environment : 2
- Negative environment : 1

Response to environmental factors ranged from 5-15. It has been categorized into:

5- 8 was considered negative environment

9-11 was considered neutral environment

12-15 was considered positive environment

1.4 – Behavior towards calcium intake:

It has been tested by asking about number of servings of milk and dairy products consumed daily.

2. Assessment of other variables:

- Sociodemographic information, family, and medical history.

Statistical analysis:

Statistical analysis was performed using the SPSS package version 16. ⁽⁸⁾.

Descriptive statistics:

At the end of the study, data obtained were coded, tabulated, and presented by percentage frequency in case of categorical variables.

Analytical statistics:

Data were analyzed using Chi square (χ^2) for testing association between 2 categorical variables.

3.Results

The percent of those with fair level of knowledge was (52%), while those with good knowledge were (47%). The percent of young women who had an undecided attitude was (40.5%) while the percent of those who had a positive attitude was (59.5%). A minority had a negative environment towards calcium consumption (6.8%), while the percent of undecided and positive environment were (44.2%) and (49%) respectively. **(Figure 1)**.

The majority recognized calcium essential roles, and that it is stored in bones ((89.8%) and (98.2%) respectively) ; still only (35.8%) had a good knowledge regarding dietary sources of calcium, and (50%) recognized the number of dairy servings to be taken daily. **(Table I)**Lactose intolerance (26.8%) , fear from

high cholesterol content in milk (24.5%) , lack of peers' support to drink milk(46.8%) , and availability of soft drinks at home (34.5%) were the main negative attitudes and environmental factors to consuming dairy products. **(Table II)**

The majority of young women in the study were taking less than 4 cups of milk/week (67.2%); while only (11.8%) were taking 5-7 cups/week, and (21%) were taking 2 cups or more/day. All young women whose knowledge was poor were taking less than 4 cups/ week (100%). The majority of young women with fair knowledge were taking less than 4 cups/ week (66.82%). Also the majority of young women with good knowledge were taking less than 4 cups/ week (67.02%) while only (10.10%) and (22.87%) of them were taking 5-7 cups/week, 2 cups or more/day respectively. $p = 0.49$ **(Table III)**.

With increasing level of father's education, the prevalence of those with fair knowledge decreased (57.5 % to 54.6% to 50% to 50.3%), and that of the good knowledge category increased (42.4% to 44.4% to 49.1% to 48.1%). $p=0.94$ **(Table IV)**. Concerning maternal education, the highest prevalence of those with

good knowledge belonged to the category of the highest level of maternal education (59.29%), while those with fair knowledge were only (39.82%). On the contrary, those whose mothers had no formal qualification showed a higher prevalence of fair knowledge, and a lower prevalence of good knowledge (55.5%, and 44.4% respectively). $P = 0.04^*$

Number of cups taken daily did not differ significantly according to parents' care. $p = 0.25$ **Figure 2**, but differed significantly according to peers' opinion. $P = 0.02^*$ **Figure 3**. The majority of young women who disagreed that their friends cared about healthy food were drinking less than 4 cups/week (74.86%) , while the prevalence of this negative behavior in those with undecided opinion and those with caring friends was gradually declining (61.93%, and 56.89% respectively). Similarly, the prevalence of those drinking 5-7 cups/week increased as this attitude became positive from 10.16% to 11.61%, to 17.24%. Finally the prevalence of those drinking 2 cups or more/day increased as well with increasing positivity of this attitude (14.9 % to 26.4% to 25.8%).

Table I: Distribution of the whole sample according to knowledge about calcium:

	Poor freq (%)	Fair freq (%)	Good freq (%)
Which nutrient calcium is	144 (36)		256 (64)
Role of calcium	41 (10.2)		359 (89.8)
Where is it stored in the body	7 (1.8)		393 (98.2)
The age of peak calcium deposition in bone.	245 (61.2)		155 (38.8)
Sources of calcium in the diet.	16(4)	241(60.2)	143(35.8)
Number of dairy servings necessary to take calcium requirements daily.	67(16.8)	133(33.2)	200(50)
The vitamin necessary for calcium absorption.	163(40.8)		237(59.2)
Best source to take this vitamin.	148(37)		252(63)

Table II: Distribution of the whole sample according to attitude and environment regarding calcium:

	Disagree freq (%)	Neutral freq (%)	Agree freq (%)
I like Milk taste	57(14.2)	123(30.8)	220(55)
Milk causes flatulence	173(43.2)	120(30)	107(26.8)
Dairy products can substitute unhealthy foods and beverages	75(18.8)	110(27.5)	215(53.8)
Dairy products can make one feel better	47(11.8)	122(30.5)	231(57.8)
Dairy products can help control body weight	36(9)	138(34.5)	226(56.5)
Dairy products raise serum cholesterol	128(32)	174(43.5)	98(24.5)
Dairy intake can protect against osteoporosis	1(0.2)	26(6.5)	373(93.2)
Milk is always available at home.	44(11)	98(24.5)	258(64.5)
Soft drinks are always available at home	140(35)	122(30.5)	138(34.5)
Dairy products are expensive	233(58.2)	118(29.5)	49(12.2)
Peers encourage me to drink milk, and eat dairy products.	187(46.8)	155(38.8)	58(14.5)
My parents encourage me to drink milk, and eat dairy products.	31(7.8)	90(22.5)	279(69.8)

Table III: The relationship between young women total calcium knowledge and the number of cups of milk taken :

			Number of cups of milk taken daily			Total
			< 4 cups / week	5-7 cups/ week	≥ 2cups / day	
Total calcium knowledge	Poor	freq	4	0	0	4
		%	100	0	0	100
	Fair	freq	139	28	41	208
		%	66.82	13.46	19.71	100
	Good	freq	126	19	43	188
		%	67.02	10.10	22.87	100
	Total	freq	269	47	84	400
		%	67.25	11.75	21	100
	$X^2=3.38; P=0.49$					

Table IV: Distribution of the whole sample according to relationship between young women's total calcium knowledge and their parents' educational level:

			Total Calcium knowledge			Total
			Poor	Fair	Good	
Father's Educational level	No formal qualification	freq	0	19	14	33
		%	0	57.57	42.42	100
	Primary or intermediate degree	freq	1	59	48	108
		%	0.92	54.62	44.44	100
	High school degree	freq	1	62	61	124
		%	0.80	50	49.19	100
	University degree or more	freq	2	68	65	135
		%	1.48	50.37	48.14	100
	Total	freq	4	208	188	400
		%	1	52	47	100
$X^2= 1.66; p=0.94$						
Mother's Educational level	No formal qualification	freq	0	25	20	45
		%	0	55.55	44.44	100
	Primary or intermediate degree	freq	1	95	64	160
		%	0.62	59.37	40	100
	High school degree	freq	2	43	37	82
		%	2.43	52.43	45.12	100
	University degree or more	freq	1	45	67	113
		%	0.88	39.82	59.29	100
	Total	freq	4	208	188	400
		%	1	52	47	100
$X^2= 12.82; p=0.04^*$						

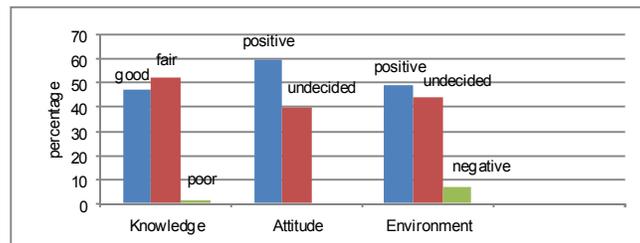


Figure 1: Distribution of the whole sample according to their total knowledge, attitude, and environment towards calcium intake

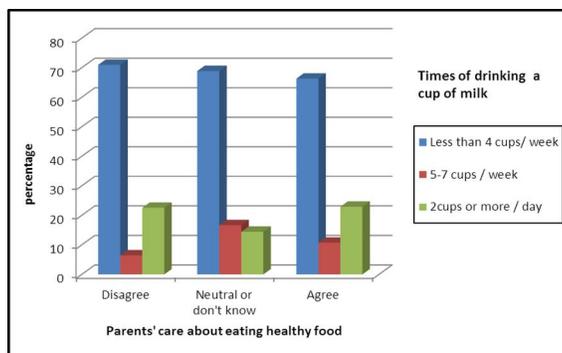


Figure 2: Distribution of the whole sample according to the relationship between times of drinking milk and parents' care about their offsprings' eating healthy food

Test used: spearman chi- square X^2 ; $X^2 = 5.34$; $P = 0.25$

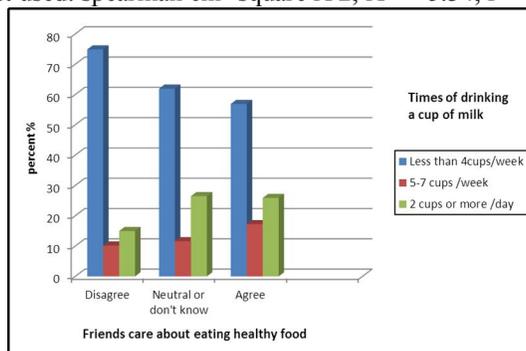


Figure 3: Distribution of the whole sample according to the relationship between times of drinking milk and friends' care about eating healthy food

Test used: spearman chi- square X^2 ; $X^2 = 11.16$; $P = 0.02^*$

4. Discussion

Our study showed that all young women, whose knowledge was poor, were taking less than 4 cups /week (100%). Moreover, we found that (90%) believed that calcium is beneficial; still only (35.8%) had a good knowledge regarding dietary sources of calcium, and only (50%) recognized the number of dairy servings to be taken daily (**Table I**). Similarly, several studies proved that adolescents and young adults had limited knowledge regarding their needs and requirements from calcium. They were not able to identify calcium rich foods^(7, 9). If adolescents had more knowledge of calcium, they might consume larger amounts of this mineral⁽¹⁰⁾.

In our study, lactose intolerance (26.8%) and fear from high cholesterol content in milk (24%) were two negative attitudes to consuming dairy products. People who perceive themselves as lactose intolerant usually consume less dietary calcium sources than others⁽¹¹⁾. In addition, concerns related to weight gain and the fat content of calcium-rich foods was among the most frequently reported barriers to obtaining adequate dietary calcium^(12,13).

The results of our study revealed that with increasing level of fathers' education, there was an increased prevalence of good knowledge among their

off springs (though statistically insignificant). Indeed, father's education is required to ensure that adolescents understand how much calcium they should be taking in each day and how they can achieve that goal⁽¹⁴⁾. In addition, we detected a significant positive association between maternal education and total calcium knowledge ($P = 0.04^*$). In fact, maternal knowledge and her effort in educating her off springs about milk benefits, can lead to more consumption by them. Mother's education more than father's education had effects on her offsprings' nutritional status⁽¹⁵⁾. Moreover, parents do not raise their daughters in a similar way as they do with their sons where foods are concerned. Parents of daughters are more involved in educating them, and trying to modify their behavior than parents of boys⁽¹⁶⁾.

Individual cognitions and a supportive home environment are associated with adolescent healthy food intake. Parents primarily shape the home environment⁽¹⁷⁾. However, peer influence and acceptance may become more important than family values, creating a period of conflict between teens and parents⁽¹⁸⁾. We detected a significant difference in consumption of milk according to peers' opinion ($p=0.02^*$), which was concluded previously⁽¹⁹⁾. Many of the food and health choices adolescents make reflect

the opinions and actions of their peers⁽²⁾. When others perceive milk as “babyish,” a teen may choose soft drinks instead⁽²⁾. Some adolescents strive for nutritional autonomy and eat less healthy foods not because of their taste but as an act of parental defiance and peer solidarity⁽²⁰⁾. On the other hand, peers seem to influence the development of adolescent girls’ body image⁽²¹⁾. Females hence adjust their dietary intake to convey an image of healthy eating in front of their peers and friends⁽²²⁾.

Gatekeepers can set up the environment so that nutritious foods are available and can stand by with reliable nutrition information and advice, but the rest is up to the adolescents. Ultimately, they make the choices⁽²⁾.

References

1. Emkey RD , Emkey GR. Calcium Metabolism and Correcting Calcium Deficiencies. *Endocrinol Metab Clin North Am* 2012; 41(3): 527-56.
2. Rolfes SR, Pinna K, Whitney E (editors). *Understanding normal and clinical nutrition*. 8th ed. Wadsworth (USA): Yolanda Cossio Publisher; 2009.
3. Wang MC, Crawford PB, Hudes M, Van Loan M, Siemering K, Bachrach LK. Diet in midpuberty and sedentary activity in prepuberty predict peak bone mass. *Am J Clin Nutr*. 2003;77:495-503.
4. Kalkwarf HJ, Khoury JC, Lanphear BP. Milk intake during childhood and adolescence, adult bone density, and osteoporotic fractures in US women. *Am J Clin Nutr*. 2003;77:257-65.
5. Yang YJ, Martin BR, Boushey CJ. Development and Evaluation of a Brief Calcium Assessment Tool for Adolescents. *J Acad Nutr Diet* 2010; 110 (1): 111-5
6. National institute of health (NIH). Calcium in diet. Medline Plus Medical Encyclopedia. available at <http://www.nlm.nih.gov/medlineplus/ency/article/002412.htm>. Accessed February 3 /2013.
7. Wahba SA, El-Shaheed AA, Tawheed MS, Mekki AA, Arrafa AM. Osteoporosis knowledge, beliefs, and behaviors among egyptian female students. *Journal of the American Society of Mining and Reclamation* 2010; 5(2):173-80.
8. Fiddler L, Hecht L, Nelson EE, Nelson EN, Ross J. SPSS for Windows 16.0: A Basic Tutorial. Social Science Research and Instruction Center. California State University. Accessed 25/8/2011. Available at <http://www.ssruc.org/trd/spss16>
9. Harrell JS, Gansky SA, McMurray RG, *et al*. School-based interventions to improve heart health in children with multiple cardiovascular disease risk factors. *Pediatrics* 1998; 102:371-80
10. Chemaly CT, MacIntyre UE, & Abrahamse H. Calcium intake and knowledge among white adolescent girls in Gauteng, South Africa. *South Afr J Clin Nutr* 2004; 17(3):102-8.
11. Nicklas TA, Qu H, Hughes SO, He M, Wagner SE, Foushee HR, & Shewchuk RM. Self-perceived lactose intolerance results in lower intakes of calcium and dairy foods and is associated with hypertension and diabetes in adults. *Am J Clin Nutr* 2011; 94(1):191-8.
12. Mahfouz EM, Kamel EG, Mosalem FA, & Sameh E. Osteoporosis-related lifestyle choices and knowledge among adolescent females. *EL-Minia Medical Bulletin* 2007; 18(1): 29-40
13. French MR, Vernace-Inserra F, & Hawker GA. A prospective study to identify factors affecting adherence to recommended daily calcium intake in women with low bone mineral density. *J Am Coll Nutr* 2008; 27(1): 88-95.
14. Ramsey E (editors). *The association of food sources of calcium with weight class in adolescent girls*. ProQuest; 2008.
15. Veghari G. Relation between milk consumption and ethnicity, economic status and parent's education level among primary school children in the north of Iran. *Sri Lanka Journal of Child Health* 2013; 42(1): 33-7.
16. Hussein R. Can knowledge alone predict vegetable and fruit consumption among adolescents? A transtheoretical model perspective. *J Egypt Public Health Assoc* 2011, 86:95–103
17. DeJong CS, van Lenthe FJ, van der Horst K, & Oenema A. Environmental and cognitive correlates of adolescent breakfast consumption. *Preventive medicine* 2009; 48(4):372-7.
18. Stang J. Nutrition In Adolescent. In: Mahan LK, Escot-Stump S (editors). *Krause’s Food And Nutrition Therapy*. 12th ed. Saunders Elsevier Publisher; 2008.p. 254-65.
19. Bruening M , Eisenberg M , MacLehose R , Nanney MS , Story M , & Neumark-Sztainer D. Relationship between Adolescents' and Their Friends' Eating Behaviors: Breakfast, Fruit, Vegetable, Whole-Grain, and Dairy Intake. *J Acad Nutr Diet* 2012; 112(10): 1608-13.
20. Trew K, Clark C, McCartney G, Barnett J, Muldoon O. Adolescents, Food Choice and Vegetarianism. In: Shepherd R, Raats M (editors). *The Psychology Of Food Choice*. 3rd ed. Frontiers In Nutritional Science ;2006. P.247-62.
21. Linville D, Stice E, Gau J, O'Neil M. Predictive effects of mother and peer influences on increases in adolescent eating disorder risk factors and symptoms: A 3-year longitudinal study. *Int J Eat Disord* 2011; 44(8): 745- 51.
22. Salvy SJ., Elmo A., Nitecki L A., Kluczynski, MA., & Roemmich, J N. Influence of parents and friends on children's and adolescents' food intake and food selection. *Am J Clin Nutr* 2011, 93(1), 87-92.