

International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622
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www.gynaecologyjournal.com
2019; 3(5): 385-391
Received: 21-07-2019
Accepted: 25-08-2019

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Prevalence of calcium deficiency symptoms among adolescent girls in Tamil Nadu a cross sectional study

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DOI: <https://doi.org/10.33545/gynae.2019.v3.i5f.380>

Abstract

Background: Low calcium intake during adolescence may lead to decreased bone mass accrual thereby increasing the risk of osteoporosis. There is very little information about diet, nutritional status of adolescents in India. Therefore, there is a need to develop a database on the diet and nutritional status of the adolescents from different parts of the country to enable the governments and other non-governmental agencies to formulate policies and initiate strategies for the well-being of adolescent girls.

Aims: To study the Prevalence of calcium deficiency symptoms and confirmed by laboratory test for all participating adolescent girls.

Methodology: All Adolescent attending Tagore medical College for a period of one year from April 2018 to March 2019. Adolescents having chronic medical disorders excluded from the study. Consent form in regional language obtained from the participants.

Keywords: Prevalence, deficiency symptoms, adolescent girls, Tamil Nadu

Introduction

Adolescence is a period of rapid growth when an individual gains 35 per cent of adult weight and 11-18 per cent of adult height. These dramatic changes in physical growth and development over a period of time have to be met with special nutrition needs

The nutritional status of adolescent girls, the future mothers, contributes significantly to the nutritional status of the community. It is only recently that efforts, although small, have been made to include adolescent girls as beneficiaries in some of the health and nutrition intervention programmes.

Calcium is one among important minerals is the most important elements in the diet because it is a structural component of bones, teeth, and soft tissues and is essential in many of the body's metabolic processes.

Low calcium intake during adolescence may lead to decreased bone mass accrual thereby increasing the risk of osteoporosis. There is very little information about diet, nutritional status of adolescents in India. Therefore, there is a need to develop a database on the diet and nutritional status of the adolescents from different parts of the country to enable the governments and other non-governmental agencies to formulate policies and initiate strategies for the well-being of adolescent girls.

Novelty: The period of adolescence comprises nearly half of the growing period. Besides the obvious changes in Physical size and shape associated with adolescent growth and the onset of Puberty, there are social and psychological changes that are equally transformative in Magnitude. With the profound growth, comes increased demand for nutrients like proteins, energy, vitamins and minerals. So, there is a need to study and correct calcium deficiency symptoms of the adolescent girls at an early stage which is overlooked due to their lack of awareness. A scoring system may be modulated for evaluation of calcium deficiency.

Applicability: The demand for calcium is more during adolescent period and this deficiency may be reflected in their pregnancy as pre-Eclampsia, dental pain, or low birth weight etc. An Indian study conducted by Dr. Iqbal Singh Ahuja, Gynecologist, Ludhiana, reveals that 20% of adolescent girls between the age group 14 to 17 were suffering from calcium deficiency. As there is very limited study and hence it is needed to conduct this study to study the prevalence of calcium deficiency symptoms of southern adolescent girls from both urban and rural Tamil Nadu.

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Objectives

- To study the Prevalence of calcium deficiency symptoms and confirmed by laboratory test for all participating adolescent girls.

Inclusion criteria

- All the Adolescent girls.

Exclusion criteria

- The Adolescent girls with any other medical disorders.

The information will be collected on a pre structured pre tested interview schedule in local language regarding:

- Socio Economic status
- Income.
- Height
- Weight
- BMI
- Type of activities.
- Calcium products (Milk, Curd, Cheese, Processed milk)
- Type of diet (veg / non-veg)
- Fruits/ Vegetables.
- Water intake.
- Sun exposure.

All the relevant classification details enclosed in the proforma.

The 24 hour dietary recall and food frequency questionnaire will be carried out with the Adolescents to identify the calcium intake daily. The average Recommended Dietary Allowance for Calcium (Adolescent Girls) is 1300 mg (Milli grams).

Calcium Deficiency Signs & Symptoms

	Symptoms
1	Muscle cramps
2	Muscle aches
3	Muscle pain
4	Muscle twitching
5	Muscle spasms
6	Insomnia
7	Tooth decay
8	Weak bones
9	Premenstrual cramps
10	Giddiness

Statistical analysis: Categorical data will be tested for significance with the χ^2 and Fisher. Exact tests. Continuous data will be evaluated for normal distribution and testing for significance with the Student's *t*-test. Statistical significance will be defined as $P < 0.05$ at 95% Confidence Interval (CI). All respondents will be included in the analysis.

Results**Table 1:** BMI Group * calcium deficiency

Crosstab					
			calcium deficiency		Total
			No	Yes	
Bmi Group	<25	Count	69	3	72
		% within calcium deficiency	87.3%	27.3%	80.0%
	>=25	Count	10	8	18
		% within calcium deficiency	12.7%	72.7%	20.0%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	21.775 ^a	1	.000		
Continuity Correction ^b	18.183	1	.000		
Likelihood Ratio	17.167	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	21.533	1	.000		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (Confirmed by laboratory test) adolescents 72.7% were BMI ≥ 25 . Statistically significant.

Table 2: Milk * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
Milk	YES	Count	24	2	26
		% within calcium deficiency	30.4%	18.2%	28.9%
	NO	Count	55	9	64
		% within calcium deficiency	69.6%	81.8%	71.1%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.699 ^a	1	.403		
Continuity Correction ^b	.232	1	.630		
Likelihood Ratio	.757	1	.384		
Fisher's Exact Test				.500	.328
Linear-by-Linear Association	.692	1	.406		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 81.8% were not consuming milk. Statistically significant.

Table 3: Curd * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
Curd	Yes	Count	54	6	60
		% within calcium deficiency	68.4%	54.5%	66.7%
	No	Count	25	5	30
		% within calcium deficiency	31.6%	45.5%	33.3%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.829 ^a	1	.363		
Continuity Correction ^b	.324	1	.569		
Likelihood Ratio	.796	1	.372		
Fisher's Exact Test				.496	.279
Linear-by-Linear Association	.819	1	.365		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (Confirmed by laboratory test) adolescents 45.5% were not consuming curd. Statistically not significant.

Table 4: NV * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
NV	YES	Count	59	0	59
		% within calcium deficiency	74.7%	0.0%	65.6%
	NO	Count	20	11	31
		% within calcium deficiency	25.3%	100.0%	34.4%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23.851 ^a	1	.000		
Continuity Correction ^b	20.658	1	.000		
Likelihood Ratio	26.515	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	23.586	1	.000		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 100% were vegetarian...Statistically significant.

Table 5: Egg * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
Egg	YES	Count	76	0	76
		% within calcium deficiency	96.2%	0.0%	84.4%
	NO	Count	3	11	14
		% within calcium deficiency	3.8%	100.0%	15.6%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	68.029 ^a	1	.000		
Continuity Correction ^b	60.902	1	.000		
Likelihood Ratio	52.291	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	67.273	1	.000		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 100% were not eating egg..Statistically significant.

Table 6: Fruits * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
Fruits	YES	Count	55	5	60
		% within calcium deficiency	69.6%	45.5%	66.7%
	NO	Count	24	6	30
		% within calcium deficiency	30.4%	54.5%	33.3%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.537 ^a	1	.111		
Continuity Correction ^b	1.566	1	.211		
Likelihood Ratio	2.395	1	.122		
Fisher's Exact Test				.170	.107
Linear-by-Linear Association	2.509	1	.113		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 54.5% were not taking fruits. Statistically significant.

Table 7: Dates * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
Dates	Yes	Count	15	0	15
		% within calcium deficiency	19.0%	0.0%	16.7%
	No	Count	64	11	75
		% within calcium deficiency	81.0%	100.0%	83.3%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.506 ^a	1	.113		
Continuity Correction ^b	1.326	1	.250		
Likelihood Ratio	4.307	1	.038		
Fisher's Exact Test				.200	.118
Linear-by-Linear Association	2.478	1	.115		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 100% were not taking dates. Statistically significant.

Table 8: Junk * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
Junk	NO	Count	49	3	52
		% within calcium deficiency	62.0%	27.3%	57.8%
	YES	Count	30	8	38
		% within calcium deficiency	38.0%	72.7%	42.2%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.780 ^a	1	.029		
Continuity Correction ^b	3.462	1	.063		
Likelihood Ratio	4.786	1	.029		
Fisher's Exact Test				.048	.032
Linear-by-Linear Association	4.727	1	.030		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 72.7% were taking junk food. Statistically significant.

Table 9: Sun_expo * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
Sun_expo	YES	Count	74	0	74
		% within calcium deficiency	93.7%	0.0%	82.2%
	NO	Count	5	11	16
		% within calcium deficiency	6.3%	100.0%	17.8%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	57.959 ^a	1	.000		
Continuity Correction ^b	51.728	1	.000		
Likelihood Ratio	46.965	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	57.315	1	.000		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 100. % were not exposed to sun. Statistically significant.

Table 10: Anemia * calcium deficiency

			calcium deficiency		Total
			NO	YES	
Anemia	NO	Count	49	0	49
		% within calcium deficiency	62.0%	0.0%	54.4%
	YES	Count	30	11	41
		% within calcium deficiency	38.0%	100.0%	45.6%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14.977 ^a	1	.000		
Continuity Correction ^b	12.580	1	.000		
Likelihood Ratio	19.152	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	14.810	1	.000		
N of Valid Cases	90				

From the above table, infer that out of calcium deficiency (Confirmed by laboratory test) adolescents 100% were anemic. Statistically significant.

Table 11: Physical activity * calcium deficiency

physical activity * calcium deficiency Crosstabulation					
			calcium deficiency		Total
			NO	YES	
physical activity	YES	Count	61	3	64
		% within calcium deficiency	77.2%	27.3%	71.1%
	NO	Count	18	8	26
		% within calcium deficiency	22.8%	72.7%	28.9%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.723 ^a	1	.001		
Continuity Correction ^b	9.418	1	.002		
Likelihood Ratio	10.524	1	.001		
Fisher's Exact Test				.002	.002
Linear-by-Linear Association	11.593	1	.001		
N of Valid Cases	90				

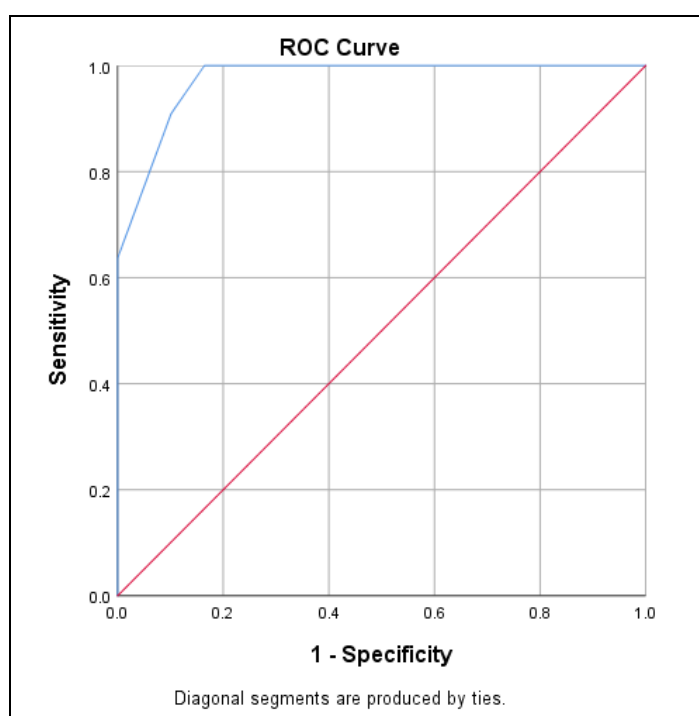
From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 72.7% were not done any physical activities. Statistically significant.

Table 12: Score group * calcium deficiency

Crosstab					
			calcium deficiency		Total
			NO	YES	
score_group	0-5	Count	61	0	61
		% within calcium deficiency	77.2%	0.0%	67.8%
	6-10	Count	18	4	22
		% within calcium deficiency	22.8%	36.4%	24.4%
	11 & aboe	Count	0	7	7
		% within calcium deficiency	0.0%	63.6%	7.8%
Total		Count	79	11	90
		% within calcium deficiency	100.0%	100.0%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	59.495 ^a	2	.000
Likelihood Ratio	45.977	2	.000
Linear-by-Linear Association	47.890	1	.000
N of Valid Cases	90		

From the above table, infer that out of calcium deficiency (confirmed by laboratory test) adolescents 63.6% were above 10 calcium sympom score...Statistically significant.



Criterion: >9 Score.

Area Under the Curve				
Test Result Variable(s): Base_Score				
Area	Std. Error ^a	Asymptotic Sig. ^b	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.974	.016	.000	.942	1.000

From the above table, infer that Using calcium deficiency symptoms score more than 9, then Area Under curve is 0.974, we can predict calcium deficiency (Confirmed by laboratory test) adolescents. Statistically significant.

Summary

1. Out of calcium deficiency (Confirmed by laboratory test) adolescents 72.7% were BMI ≥ 25 . Statistically significant.
2. Out of calcium deficiency (Confirmed by laboratory test) adolescents 81.8% were not consuming milk. Statistically significant.

3. Out of calcium deficiency (Confirmed by laboratory test) adolescents 45.5% were not consuming curd. Statistically not significant.
4. Out of calcium deficiency (Confirmed by laboratory test) adolescents 100% were vegetarian...Statistically significant.
5. Out of calcium deficiency (Confirmed by laboratory test) adolescents 100% were not ating egg. Statistically significant.
6. Out of calcium deficiency (Confirmed by laboratory test) adolescents 54.5% were not taking fruits. Statistically significant.
7. Out of calcium deficiency (Confirmed by laboratory test) adolescents 100% were not taking dates. Statistically significant.
8. Out of calcium deficiency (Confirmed by laboratory test) adolescents 72.7% were taking junk food. Statistically significant.
9. Out of calcium deficiency (Confirmed by laboratory test) adolescents 100. % were not exposed to sun. Statistically significant.
10. Out of calcium deficiency (Confirmed by laboratory test) adolescents 100% were anemic. Statistically significant.
11. Out of calcium deficiency (Confirmed by laboratory test) adolescents 72.7% were not done any physical activities. Statistically significant.
12. Out of calcium deficiency (Confirmed by laboratory test) adolescents 63.6% were above 10 calcium sympom score...Statistically significant.

Conclusion

Calcium is one among important minerals is the most important elements in the diet because it is a structural component of bones, teeth, and soft tissues and is essential in many of the body's metabolic processes.

Low calcium intake during adolescence may lead to decreased bone mass accrual thereby increasing the risk of osteoporosis. our study clearly indicate that most of the adolescents were not taking proper nutritional diets and physical activities. Therefore, there is a need to develop a database on the diet and nutritional status of the adolescents from different parts of the country to enable the governments and other non-governmental agencies to formulate policies and initiate strategies for the well-being of adolescent girls.

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