

Effectiveness Of A Structured Teaching Program On Knowledge Regarding Vitamin D Deficiency Among Adolescents In Selected School, Aizawl, Mizoram

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Abstract:

Background: Adolescence is a critical developmental phase requiring adequate nutrition for optimal growth and health. Vitamin D deficiency is increasingly prevalent among adolescents due to limited sun exposure, indoor lifestyles, and inadequate dietary intake. Lack of awareness further aggravates this hidden micronutrient deficiency, leading to potential long-term health consequences.

Materials and Methods: A quasi-experimental one-group pre-test and post-test design was adopted. The study was conducted among 30 adolescents aged 10–19 years studying in class VIII at a selected school in Aizawl, Mizoram, India. Convenient sampling technique was used. Data were collected using a structured knowledge questionnaire and demographic performa. A structured teaching program was administered, followed by post-test assessment.

Results: Post-test knowledge scores were expected to show a statistically significant improvement compared to pre-test scores, indicating the effectiveness of the structured teaching program. ($p < 0.05$).

Conclusion: The structured teaching program was effective in enhancing adolescents knowledge regarding vitamin D deficiency, emphasizing the importance of school-based educational interventions for preventive health promotion.

Key Word: Adolescents, Vitamin D Deficiency, Structured Teaching Program, Knowledge, Health Education.

Date of Submission: 05-04-2026

Date of Acceptance: 15-04-2026

I. Introduction

In today's adolescents are in a crucial stage of physical and mental development, where adequate nutrition plays a crucial role. However, due to changing lifestyles and increasing indoor activities, many adolescents are unknowingly at risk of micronutrient deficiencies, particularly vitamin D deficiency. This issue often goes unnoticed due to limited awareness on its importance and sources. Vitamin D deficiency during adolescence can lead to various health issues, including poor bone development, weakened immunity, fatigue, and long-term complications such as osteoporosis. Despite the vital role of vitamin D in adolescent health, many young individuals are unaware of the significance of sunlight exposure, dietary sources, and preventive measures. Based on this, the study analyzes the effectiveness of a Structured Teaching Program designed to improve the knowledge of adolescents aged 10-19 years regarding vitamin D deficiency. It will assess the differences in knowledge levels before and after the educational intervention, focusing on their understanding of causes, symptoms, consequences, and prevention of the deficiency.

II. Material And Methods

This study employed a quantitative approach with a quasi-experimental one-group pre-test and post-test design to assess the effectiveness of a structured teaching program on knowledge regarding vitamin D deficiency among adolescents. The study was conducted in St. Francis of Assisi School, Durtlang, Aizawl, Mizoram. A total of 30 adolescents aged 10–19 years studying in class VIII were selected using a convenient sampling technique. Data were collected using a structured questionnaire consisting of demographic variables and an 18-item knowledge assessment tool. Content validity of the tool was established through expert opinion, and a pilot study was conducted to ensure feasibility and reliability. Ethical permission was obtained from the concerned authorities, and informed consent was secured from parent's of participants.

Study Design: A quasi-experimental one-group pre-test and post-test research design was adopted to evaluate the effectiveness of the structured teaching program.

Study Location: The study was conducted at St. Francis of Assisi School, Durtlang, Aizawl, Mizoram, India.

Study Duration: September 2025 to October 2025.

Sample size: The sample comprised adolescents aged 10–19 years studying in class VIII. A sample of 30 adolescents was selected using convenient sampling technique.

Sample size calculation: The sample size was not calculated using a statistical formula due to limited duration of the study. A total of 30 samples were selected, which is considered adequate for quasi-experimental studies at undergraduate level. The sample size was justified based on feasibility, time limitation, and the Central Limit Theorem.

Subjects & selection method: A sample of 30 adolescents was selected using convenient sampling technique.

Inclusion criteria:

1. Adolescents aged between 10 to 19 years old.
2. Students enrolled in class VIII of St.Francis of Assisi School at the time of data collection.
3. Adolescents who are able to read and understand the language used in the teaching program.
4. Adolescents who are willing to participate and have obtained parental/guardian consent.

Exclusion criteria:

1. Children below 10 years of age.
2. Young adults above 19 years of age.
3. Adolescents not willing to participate or without parental consent.
4. Adolescents with cognitive or learning disabilities.

Procedure methodology

On 1st September 2025, pilot study was conducted at Bambatini School, Durtlang, Aizawl, Mizoram, India. Permission was taken from the Principal and written consent was obtained from the parents for the pilot study. Data were collected from 3 class VIII students where Convenient Sampling Technique was used. The students were given the tools printed on a sheet of paper where they answered the questions. Pre-test questionnaire were distributed with no prior interventions and the correct answers for the questionnaire were told through structured teaching program followed by answering Post-test questionnaire.

The questionnaire consists of two parts,

Part A: Demographic data such as age, occupation of mother, occupation of father, religion, family income per month, type of family, type of diet and source of obtaining information regarding vitamin D which do not have scoring.

Part B: Vitamin D: Knowledge Assessment Questionnaire which consists of questionnaire to assess the level of knowledge on vitamin D deficiency among adolescents (aged 10-19 years). It contains 18 questions, each 2,3 and 4 options. The total score is 18 where each correct answers carries 1 point. Scoring of 0-5 indicates poor knowledge, 6-10 indicates average knowledge, 11-15 indicates good knowledge and 16-18 indicates excellent knowledge.

Sl. No.	Level of knowledge	Score
1.	Poor	0-5
2.	Average	6-10
3.	Good	11-15
4.	Excellent	16-18

TABLE:1 Description of knowledge questionnaire

Statistical analysis

Descriptive statistics

- Frequency, percentage distribution, mean and standard deviation were used for analyzing the demographic data.

Inferential statistics

- Chi-square test and paired *t*-test were used to analysed the association between level of knowledge regarding Vitamin D deficiency and demographic data.

III. Result

A total of 30 adolescents participated in the study. The majority of participants (93.3%) were aged 13–14 years, while 6.6% were aged 15–16 years. Most mothers were homemakers (60%), and most fathers were

business/private employees (40%). All participants belonged to the Christian religion. Regarding family income, 40% had a monthly income of Rs. 5001–20,000, followed by 36.7% with Rs. 40,000 and above. A majority of adolescents (73.3%) belonged to joint families, and 86.6% consumed a mixed diet. The primary sources of information regarding vitamin D were social media and school (36.6% each).

In the pre-test assessment, 70% of adolescents had good knowledge, 26.6% had average knowledge, and 3.3% had excellent knowledge regarding vitamin D deficiency. No participants had poor knowledge. Following the structured teaching program, post-test results showed improvement, with 63.3% demonstrating good knowledge and 36.6% achieving excellent knowledge. No participants remained in the poor or average knowledge categories.

The mean pre-test knowledge score was 11.37 ± 1.38 , while the mean post-test score increased to 14.80 ± 1.49 . The mean difference between pre-test and post-test scores was 3.43. Paired t-test analysis demonstrated a statistically significant improvement in knowledge after intervention ($p < 0.01$) indicating significance at the 0.05 level which shows the effectiveness of the structured teaching program.

Chi-square analysis revealed a significant association between level of knowledge regarding vitamin D deficiency and type of diet. No significant association was found between knowledge level and other demographic variables such as age, parent’s occupation, religion, family income, type of family or source of information.

Section I

**Table:2 Distribution Of Demographic Variables Among Adolescents Of Class VIII Students Of St.Francis Of Assisi School
N=30**

S.NO	DEMOGRAPHIC VARIABLES	Frequency	Percentage
1.	Age in years-	10-12 years old	0 0%
		13-14 years old	28 93.3%
		15-16 years old	2 6.6%
		17 years old and above	0 0%
2.	Occupation of the mother	Home maker	18 60%
		Laborer	3 10%
		Business/Private employee	5 16.6%
		Government Servant	4 13.3%
3.	Occupation of the father	Laborer	6 20%
		Employee	3 10%
		Business/Private employee	12 40%
		Government servant	9 30%
4.	Religion	Christian	30 100%
		Buddhist	0 0%
		Others	0 0%
5.	Family income per month	Below Rs.5000	0 0%
		Rs.5001 /- Rs.20000	12 40%
		Rs.20001 /- Rs.40000 /-	7 23.3%
		Rs.40000 & Above	11 36.7%
6.	Type of family	Nuclear family	8 26.6%
		Joint family	22 73.3%
		Extended family	0 0%
7.	Type of diet	Vegetarian	2 6.6%
		Non-vegetarian	2 6.6%
		Mixed	26 86.6%
8.	Information regarding Vitamin D is known from-	Social Media	11 36.6%
		Parent/Relatives	5 16.6%
		School	11 36.6%
		All of the above	2 6.6%
		Zero knowledge	1 3.3%

**Table:3 Distribution Of Level Of Pre-Test Knowledge On Vitamin D Deficiency Among Adolescents Of Class VIII Students Of St.Francis Of Assisi School
N=30**

S.NO	Variables	Poor		Average		Good		Excellent	
		N	%	N	%	N	%	N	%
1.	Knowledge	0	0%	8	26.6%	21	70%	1	3.3%

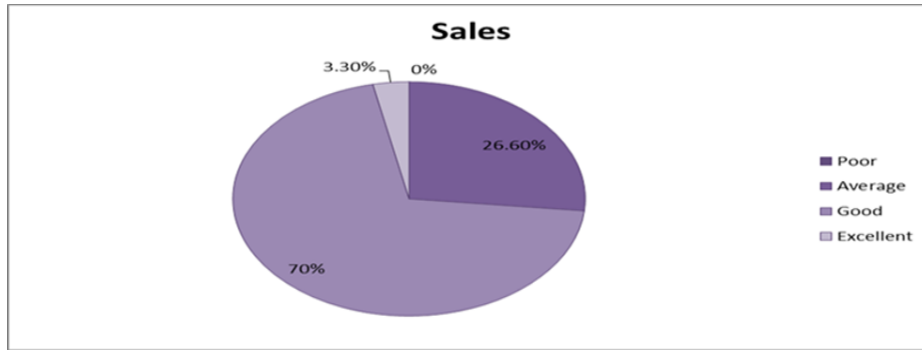
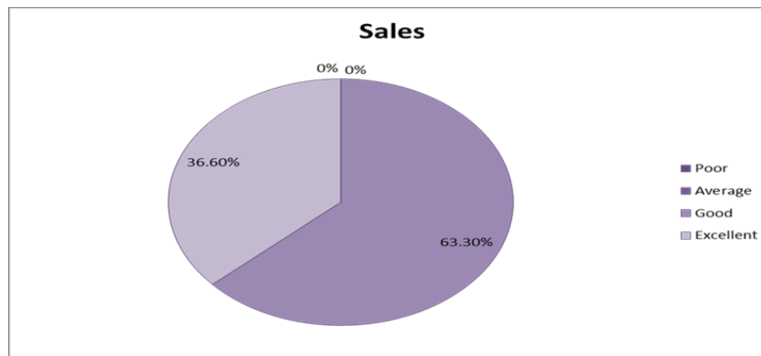


Table:4 Distribution Of Level Of Post-Test Knowledge On Vitamin D Deficiency Among Adolescents Of Class VIII Students Of St.Francis Of Assisi School N=30

S.NO	Variables	Poor		Average		Good		Excellent	
		N	%	N	%	N	%	N	%
1.	Knowledge	0	0%	0	0%	19	63.3%	11	36.6%



Section II

Table:5 Interrelationship Between Pre-And Post- Test Level Of Knowledge Of Vitamin D Deficiency Among Adolescents Of Class VIII Students Of St.Francis Of Assisi School N=30

	Variables	POST-TEST									
		Poor (0-5)		Average (6-10)		Good (11-15)		Excellent (16-18)		Total	
		N	%	N	%	N	%	N	%	N	%
P R E - T E S T	Poor (0-5)	0	0%	0	0%	0	0%	0	0%	0	0%
	Average (6-10)	0	0%	0	0%	5	16.6%	3	10%	8	26.6%
	Good (11-15)	0	0%	0	0%	13	43.3%	8	26.6%	21	70%
	Excellent (16-18)	0	0%	0	0%	0	0%	1	3.3%	1	3.3%
	Total	0	0%	0	0%	18	60%	12	40%	30	100%

Table 5 : Reveals, the qualitative association between pre and post-test scores on level of knowledge. In pretest 0% (0) were having poor knowledge, 26.6% (8) had average knowledge, 70% (21) had good knowledge and 3.3% (1) had excellent knowledge.

In post-test 0% (0) were having poor knowledge, 0% (0) had average knowledge, 60% (18) had good knowledge and 40% (12) had excellent knowledge.

Table:6 Mean, Standard Deviation Of Pre-And Post -Test Among Adolescents Of Class VIII Students Of St.Francis Of Assisi School

S. NO	VARIABLES	PRE-TEST		POST-TEST	
		MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION
1	KNOWLEDGE	11.37	1.38	14.80	1.49

Table 6: Shows, pre-test mean knowledge **11.37**, Standard Deviation **1.38**. Post-test mean knowledge **14.8**, Standard Deviation **1.49**.

Section III

Table:7 Effectiveness Of Structured Teaching Program

N=30

S. No	Variables	Pre-Test		Post-Test		Mean difference	Paired t-test (t-value)	
		Mean	Standard Deviation	Mean	Standard Deviation		t-value	p-value
1	Knowledge	11.37	1.38	14.80	1.49	3.43	3.26	p<0.01

Section IV

Table:8 Association Between Demographic Variables And Level Of Knowledge Regarding Vitamin D Deficiency Among Adolescents By Chi Square.

Level Of Knowledge													
S. No	Demographic Variables	Poor		Average		Good		Excellent		Chi-Square			
		Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test		Post-Test	
		N	N	N	N	N	N	N	N	Val.	Sig.	Val.	Sig.
1.	Age In Years												
	A.10-12 Years Old	0	0	0	0	0	0	0	0	1.42	0.99	NS	NS
	B.13-14 Years Old	0	0	8	0	18	19	1	11				
	C.15-16 Years Old	0	0	0	0	3	0	0	0				
	D.17 Years And Above	0	0	0	0	0	0	0	0				
2.	Occupation Of The Mother												
	A.Home Maker	0	0	0	0	12	11	0	6	10.87	0.28	NS	NS
	B. Labourer	0	0	8	0	3	1	0	2				
	C. Business/Private Employee	0	0	0	0	5	5	0	2				
	D.Government Servant	0	0	0	0	1	2	1	1				
3.	Occupation Of The Father												
	A.Labourer	0	0	1	0	5	4	0	1				

	B.Employee	0	0	0	0	4	3	0	0	X^2	P	X^2	P
	C.Business/ Private Employee	0	0	4	0	6	7	1	6	=	=	=	=
	D,Governme nt Servant	0	0	3	0	6	5	0	4	4.61	0.86	3.07	0.96
4.	Religion												
	A.Christian	0	0	8	0	21	19	1	11	X^2	P	X^2	P
	B.Buddhist	0	0	0	0	0	0	0	0	=	=	=	=
	C.Others	0	0	0	0	0	0	0	0	0	1	0	1
											NS		NS
5.	Family Income Per Month												
	A.Below Rs5000	0	0	0	0	1	0	0	1	X^2	P	X^2	P
	B.Rs5001- Rs20000	0	0	3	0	9	8	0	4	=	=	=	=
	C.Rs20001- Rs40000	0	0	2	0	5	5	0	2	2.64	0.97	2.03	0.99
	D.Rs40000& Above	0	0	3	0	6	6	1	4		NS		NS
6.	Type Of Family												
	A.Nuclear Family	0	0	3	0	4	4	1	4	X^2	P	X^2	P
	B.Joint Family	0	0	5	0	16	15	0	6	=	=	=	=
	C.Extended Family	0	0	0	0	1	1	0	0	4.13	0.65	1.71	0.99
											NS		NS
7.	Type Of Diet												
	A.Vegetarian	0	0	1	0	0	0	1	2	X^2	P	X^2	P
	B.Non- Vegetarian	0	0	1	0	1	0	0	0	=	=	=	=
	C.Mixed	0	0	5	0	21	17	0	9	17.21	0.01	4.65	0.58
											*		NS
8.	Information Regarding Vitamin D Is Known From												
	A.Social Media	0	0	3	0	6	3	1	8				

	B.Parent/ Relative	0	0	1	0	3	3	0	1	X ² = 3.57	P = 0.98 NS	X ² = 10.32	P = 0.58 NS
	C.School	0	0	3	0	9	9	0	2				
	D.All Of The Above	0	0	0	0	2	2	0	0				
	E.Zero Knowledge	0	0	1	0	1	2	0	0				

IV. Discussion

The study findings are compared and contrasted with other similar studies in various settings.

The findings of the study have been discussed under the following headings:

Section I: Discussion on the basis of frequency and percentage distribution of knowledge regarding Vitamin D deficiency among adolescents according to their demographic variables.

In the present study, the total number of participants were 30 students out of which majority 93.3 % were 13-14 years old, followed by 6.6 % between 15-16 years old. There are no age group between 10-12 years old and 17 years above.

Regarding the occupation of mother, the present study revealed that majority i.e. 60% were homemaker, followed by 16.6% were business/private employee, 13.3% were government servant and the lowest 10% were laborer.

Regarding the occupation of father, the present study revealed that majority i.e.,40% were business/private employee, followed by 30% were government servant, 20% were laborer and the lowest 10% were employee.

Regarding religion, 100% were Christian

Regarding family income per month, the majority i.e., 40% have income of Rs.5001/-Rs.20000, 36.7% have income of Rs.40000&above, 23.3% with income of Rs.20001/- Rs.40000/-

Regarding the type of family, the majority i.e.,73.3% were joint family, followed by 26.6% were nuclear family. There are no extended family present.

Regarding the type of diet, the majority i.e.,86.6% have mixed (vegetarian and non-vegetarian), 6.6% were vegetarian and other 6.6% were non-vegetarian.

Regarding source of getting Vitamin D information, majority i.e.,36.6% get information from social media and school, 16.6% from parent/relatives, 6.6% get information from all three and 3.3% have zero knowledge on Vitamin D.

Section II: Interrelationship and mean, standard knowledge score of pre-test and post-test assessment among adolescents

The interrelationship between pre-test and post-test scores on knowledge level reveals that in pre –test 26.6% (8) were having average knowledge, 70% (21) were having good knowledge, and 3.3 % (1) have excellent knowledge. No one falls under the category of poor knowledge.

In post-test 60% (18) were having good knowledge, and 40% (12) have excellent knowledge. No one falls under the category of poor and average knowledge.

The mean, standard knowledge score of pre-test and post-test assessment reveals that the pre-test mean score was 11.37 with a standard deviation of 1.38 indicating a moderate level of knowledge among participants. After the intervention, the post-test mean increased to 14.80 with a standard deviation of 1.49 showing improvement in knowledge.

Section III: Assessment of effectiveness of structured teaching program on knowledge score in pre-test and post-test by ‘paired t-test’.

In the present study, the paired t-test for assessment on effectiveness of knowledge on Vitamin D deficiency before and after implementation of structured teaching program. The mean difference between pre-test and post-test score was 3.43. The calculated ‘t’ value was 3.26 which was found higher than the tabulated t value [t=1.699, df=29] which was statistically significant (p<0.01) indicating significance at the 0.05 level. Therefore we accept the research hypothesis and conclude that the structured teaching program was effective in improving knowledge regarding vitamin D deficiency among class VIII students.

Section IV: Association between demographic variables and level of knowledge regarding Vitamin D deficiency among adolescents by chi square.

Data presented in section IV shows the chi square computed between knowledge regarding vitamin D deficiency among adolescents and selected demographic variables. The data shows that knowledge regarding vitamin D deficiency was significantly associated with type of diet ($p=0.01$). So, the researcher failed to accept the null hypothesis for the type of diet with knowledge of vitamin D deficiency. Hence, it can be concluded that level of knowledge regarding vitamin D deficiency was associated with type of diet.

But for the other selected demographic variables like age of adolescence, occupation of mother, occupation of the father, religion, family income per month, type of family, and source of information on vitamin D deficiency were not significantly associated with level of knowledge regarding vitamin D deficiency at 0.05 level of significance ($p>0.05$). So, for these variables the null hypothesis was accepted. Hence, knowledge regarding vitamin D deficiency among adolescents was independent and not associated with age, occupation of the mother, occupation of the father, religion, family income per month, type of family and source of information on vitamin D deficiency.

V. Conclusion

Our findings indicate a need to develop educational interventions in collaboration with the Government and certain health care teams. The importance of having awareness campaigns and health programs regarding vitamin D deficiency and its supplementation was found out as much of the participants were unaware of the disease at the first place.

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