Intervention for Enhancement of Knowledge, Attitude, and Practice on Prevalence of Anaemia among Adolescent girls in Palani Block: An application of Linear Regression model

M.Abirami[1] ,   K.S.Pushpa[2]
[1] Ph.D. Research Scholar, Department of Home Science, The Gandhigram Rural Institute (Deemed to be University) Gandhigram.
[2] Professor and Head, Department of Home Science, The Gandhigram Rural Institute (Deemed to be University) Gandhigram.
Email - mabirami303@gmail.com

Abstract: *Lack of knowledge concerning nutrition is one of the most significant reasons for nutritional problems and consequently, inappropriate nutritional practices can lead to numerous complications. The study aimed to obtain general information on the personal, family, and socioeconomic background of the selected adolescent girls, to find KAP on anaemia, and to examine linear regression on the impact of KAP on anaemia among adolescent girls. A cross-sectional study of 328 adolescent girls with the respective age of 13-17 years was selected in the government schools in Palani Block, Dindigul District, Tamil Nadu. The results indicated that the majority 25.0% of the girls in the age group of 14-16 years. Socioeconomic scores computed for the respondents revealed that 49.4 % of them belonged to Upper Lower Class, and 50.3 % of them belonged to Lower Middle Class. The summary statistics of the regression model predict the practice through the knowledge and attitude of the anaemic adolescent girls. The R square value (0.777) in the table explains the amount of variance in the dependent variable that can be explained by the independent variables. From this, it is found that knowledge and attitude create 77.7% of the variance in the practice followed by adolescent girls. The R value (0.881) indicates the total correlation between the knowledge, attitude, and practice of the respondents, which is positive. The standardised coefficient t value (t = 12.096, p = 0.000) for constant shows that the intercept is significantly different from zero. Along with that the t value for Knowledge and Attitude scores of anaemia among adolescent girls (t = 3018 and 11.008, p < 0.05) shows that the regression is significant. Thus the Nutrition education intervention has a blow on improving knowledge, attitude, and practices of anaemia prevalence among adolescents compared with the control group. Therefore health education will play a valuable role in improving the health of adolescents by increasing their knowledge and shifting their attitude*

Key Words: *Adolescence, Anaemia, Intervention, Knowledge, Prevalence.*

1. INTRODUCTION :

Adolescence is defined as the period of growth and development after childhood and before adulthood (10 to 19 years). During this period, adolescents not only undergo physical and sexual development but also experience social and economic independence, development of identity, abstract reasoning, and acquisition of skill among many others. Anaemia has been linked to affecting all these developmental processes an adolescent experiences increasing the chances of psychiatric disorder, developmental delay, and mental retardation besides increasing reproductive morbidities among adolescent girls during their womanhood **(1)**.

The WHO has recognised iron deficiency anaemia (IDA) as the most common nutritional deficiency in the world, with 30% of the population being affected by this condition. While IDA is more prevalent in children and women, adult men are also susceptible depending on their socioeconomic status and health conditions. Although the most common causes of IDA are gastrointestinal (GI) bleeding and menstruation in women, decreased dietary iron intake and absorption are also culpable causes **(4)**.

However, other micronutrients, principally folate and vitamin B12, are equally necessary for erythropoiesis, and the extent to which these deficiencies contribute to anaemia in India is not known. Small studies done among children and adolescents in India indicate that folate deficiencies might be as high as 42–50% and vitamin B12 deficiencies 62–68%; however, a high prevalence of biochemical deficiencies might not necessarily translate into a

comparable prevalence of anaemia. Genetic haemoglobinopathies contribute to anaemia through defective haemoglobin formation and compensatory efforts at erythropoiesis, and consequently, iron, folate, and B12 deficiencies **(8).**

To tackle IDA, India was the first country to launch a National Nutritional Anaemia Prophylaxis Programme in 1970. The National Nutrition Policy was launched in 1993and this formed the basis for the National Plan of Action on Nutrition 1995, which laid out the sectoral Plan of Action to tackle anaemia. As the standard national guideline is in place, the next question is whether girls and women were receiving the recommended supplementation of IFA that is to be distributed through school teachers/Anganwadi workers to adolescent girls; through auxiliary nurse midwives/accredited social health activists to pregnant and lactating mothers; and through accredited social health activists to women of reproductive age (15–49 years). Although no evaluation study has yet been conducted to measure the effect of IFA supplementation, some observational studies have indicated that IFA intervention has helped to improve haemoglobin levels in adolescent girls in India. However, poor uptake and adherence remain a challenge to India's public health system **(6).**

Nutrition education, which is practical and adapted to suit the socio-economic conditions, food habits, and local food resources, can tackle the problem to a great extent. Adolescents are one of the most important groups in any society but are nutritionally vulnerable to iron deficiency because of the double demand for growth and activity. Nutrition education might be of the important strategies to combat iron deficiency anaemia in adolescent girls, stressing the importance of hemopoietic nutrients and consumption of green leafy vegetables which are an excellent source of iron and micronutrients. So, there is a need to promote nutrition education on anaemia and its prevalence, causes, and consequences. The importance of nutrition education as a means for improving the nutrition and health of the community has been increasingly realized in recent years **(9).**

2. METHODOLOGY :
The methodology of the study was presented under the following headings.
Objectives of the study
- To obtain general information on the personal, family, and socioeconomic backgrounds of the selected adolescent girls.
- To find out the knowledge, attitude, and practices on anaemia of the selected adolescent girls.
- To examine linear regression on the impact of Knowledge, Attitude, and Practices on anaemia among adolescent girls.

Research design
In the present study, a cross-sectional study was carried out to find the prevalence rate of anaemia among adolescent girls. The research method chosen for the present study was Quantitative and Qualitative method to explore the Knowledge, Attitude, and Practice on anaemia prevalence among adolescent girls. The true experimental study (Pre-test, post-test, control group) research design was adopted in the present study. Quantitative research is based on the measurement of quantity or amount. It applies to phenomena that can be expressed in terms of quantity. Qualitative research, on the other hand, is concerned with the qualitative phenomenon, i.e., phenomena relating to or involving quality or kind **(3).**

The population of the study
The study consists of 328 adolescent girls from four Government Higher secondary and High schools which is located in Palani Block, Dindigul District, Tamil Nadu, India. Convenient sampling technique as used by the investigator to select the subject. The adolescent girls were selected at the age of 15-17 years and those who are under treatment for anaemia and who are terminally ill are excluded from the study. Permission was obtained from the District Educational Officer and Head Master for the recruitment of the study participants. Hemoglobin (Hb) estimation was recorded from the Primary Health Center of the Palani Block.

Sample technique
A convenient sampling technique was used by the researcher to select the subjects. In this method, the investigators enroll subjects according to their availability and accessibility. Therefore, this method is quick, inexpensive, and convenient. It is called convenient sampling as the researcher selects the sample elements according to their convenient accessibility and proximity **(2).**

Tool for data collection

A structured close-ended questionnaire and scale were constructed and finalised by nutrition experts. The tool was administered to all the selected respondents from each school. The validated questionnaire and Knowledge, Attitude, and Practice scale was distributed to the Experimental and Control Group at the initial stage of the study The questions were translated into the regional language. The investigator administered the questionnaire and collected it after their completion. After intervention (three months) to the experimental group, the same KAP scale was distributed to the experimental and control group once again to find out the impact of nutrition education on anaemia prevalence.

Analysis and interpretation of the data

The quantitative data generated were manually sorted, entered, and coded into International Business Machines Corporation- Statistical Package for Social Science (IBM-SPSS) version 23 software. The following tests were applied in different places.

Descriptive Statistics:

Frequencies, percentage, mean, median, and standard deviation were used to describe the demographic variables regarding the prevalence of anaemia among adolescent girls.

Inferential statistics:

Paired "t" test was used to assess the effectiveness of the anaemia prevalence on the KAP scale among adolescent girls.

Linear regression was analysed to find the effectiveness of the KAP scale on anaemia.

3. RESULTS AND DISCUSSION :

Table 1
Personal Background of the Adolescent Girls

Variables	Adolescent Girls (N=328)	
	No.	**%**
Age (in years)		
13-14	72	22.0
14-15	82	25.0
15-16	82	25.0
16-17	44	13.4
17-18	48	14.6
Average age: 14.7		
Stage of Adolescence		
Early Adolescence Stage	154	47.0
Middle Adolescence Stage	174	53.0
Class of Study		
Middle School	72	22.0
High School	164	50.0
Higher Secondary School	92	28.0
Ordinal Position		
1	147	45.0
2	156	47.5
3	18	5.4
4	7	2.1

Table 1 reveals that 25% of the girls were in the age range of 14 to 16 years. Nearly 22% of the adolescent girls were in the age range of 13 to 14 years. About 14.6 % of the adolescent girls were in the age range of 17 to 18 years and the remaining 13.4% of the adolescent girls were in the age range of 16 to 17 years. **(5)** conducted a cross-sectional study among early, middle and late adolescent girls in an urban slum of Bhopal. It also reports that 53 % of the adolescent girls belonged to the Middle adolescent stage and the rest of the adolescent girls constituted 47 % respectively.

As depicted in Table 1, about 50% of adolescent girls are in High school, 28% of the adolescent girls are in Higher secondary school and the remaining 22% belong to Middle school.

As presented in Table 1, the majority of the girls were either the first or second born. The third and fourth-born children constituted 5.4 % and 2.1 %of the sample respectively.

Figure 1

Distribution of the Adolescents by Family Size

■ Small sized family   ■ Medium sized family   ■ Large sized family
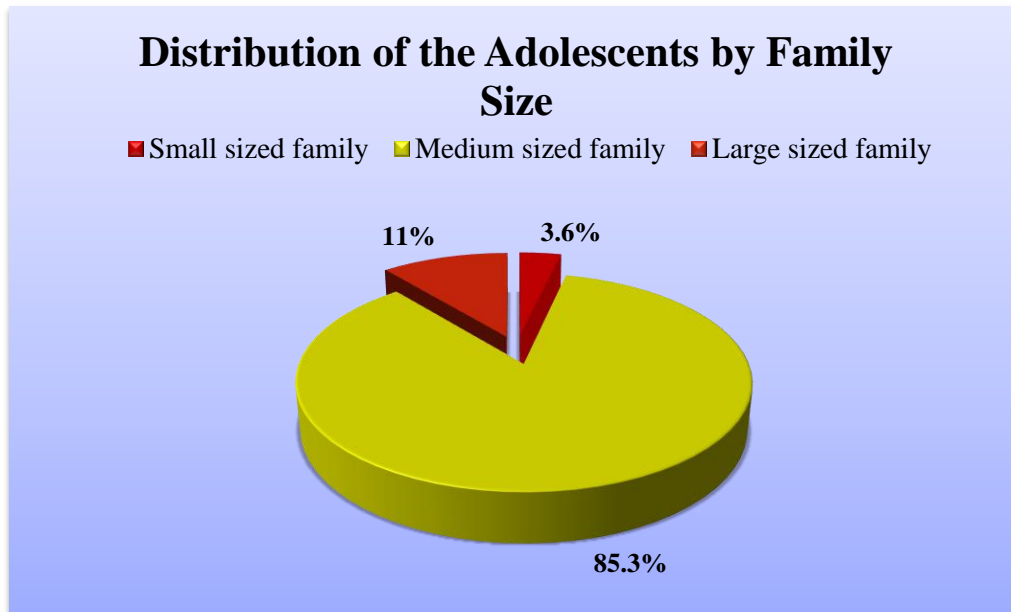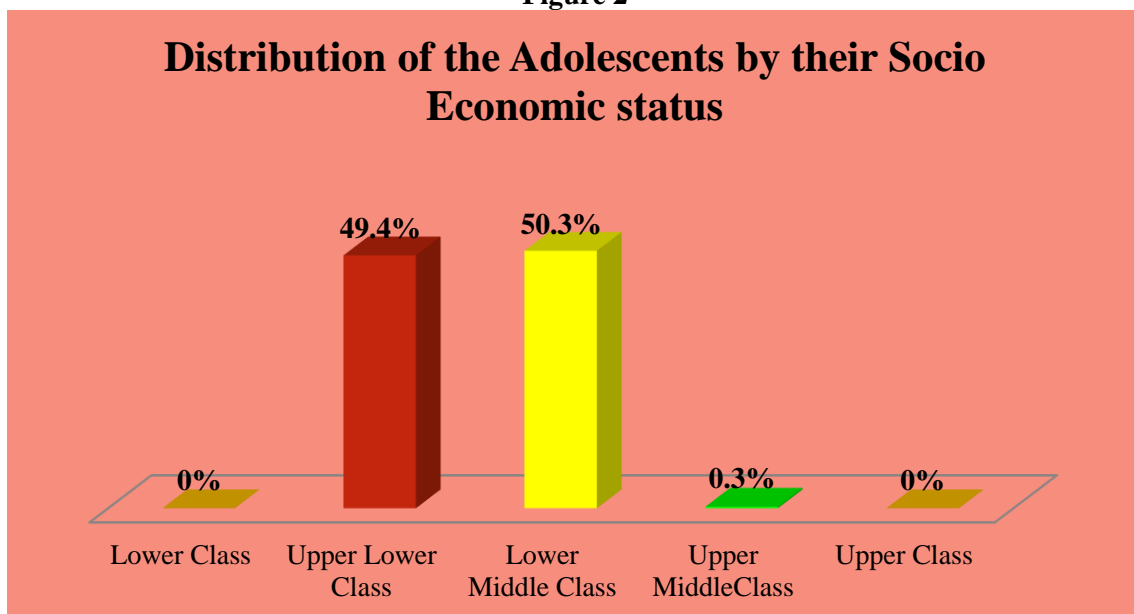
11%   3.6%

85.3%

Figure 1, clearly reveals that a majority of the girls belonged to medium-sized families with two to four members and eleven percent belonged to large families with four to six members. Very few girls 3.6 % belonged to small families with two and below two members.

Table 2
Socio–Economic Background of the Adolescent Girls

Variables	Adolescent Girls (N=328)	
	No.	**%**
Lower Class	0	0
Upper Lower Class	162	49.4
Lower Middle Class	165	50.3
Upper Middle Class	1	0.3
Upper Class	0	0

Figure 2

Distribution of the Adolescents by their Socio Economic status

49.4%   50.3%

0%   0.3%   0%

Lower Class   Upper Lower Class   Lower Middle Class   Upper MiddleClass   Upper Class

As per the scale values, the total score for Lower Class <5, Upper Lower Class 5-10, Lower Middle Class 11-15, Upper Middle Class 16-25, and Upper Class 26-29. **(7)** describes the total score of Kuppuswamy SES ranges from 3 to 29 and it classifies families into 5 groups, "upper class, upper middle class, lower middle class, upper lower and lower socio-economic class." The scale has been revised interminable over the past years because the parameter of the overall income of the family from all the sources scale loses its pertinence following the devaluation in the worth of the Indian rupee while the occupation of the head of the family and education of the head of the family remains the same with time.

As shown in Table 2 and Figure 2, the Socioeconomic scores computed for the respondents revealed that 49.4 % of them belonged to Upper Lower Class, 50.3 % of them belonged to Lower Middle Class and very few 0.3 % of them belonged to Upper Middle Class. None of the adolescent girls belonged to Lower Class or Upper Class.

4. THE HYPOTHESIS OF THE STUDY
H_{01}: There is no significant mean difference between the control group and experimental group in the pre and post-test in the Knowledge of the adolescent girls.
H_{02}: There is no significant mean difference between the control group and experimental group in the pre and post-test in the Attitude of the adolescent girls.
H_{03}: There is no significant mean difference between the control group and experimental group in the pre and post-test in the Practice of the adolescent girls.

Table 3
Paired sample 't' test of Nutrition Educational Intervention on anaemia Knowledge, Attitude and Practice among adolescent girls

Parameters	Group	Test performed	Mean± SD	Mean difference	t value	p-value
Knowledge scores	Control	Pre test	0.27±0.088	0.008	-1.635	.104
		Post test	0.28±0.113			
	Experimental	Pre test	0.30±0.87	0.675	-103.131	000**
		Post test	0.97±0.017			
Attitude scores	Control	Pre test	2.90±0.090	0.123	-12.736	.000**
		Post test	3.02±0.083			
	Experimental	Pre test	2.93±0.098	1.465	-123.394	.000**
		Post test	4.39±0.103			
Practice scores	Control	Pre test	3.03±0.190	0.047	-2.325	.021
		Post test	3.08±0.164			
	Experimental	Pre test	2.97±0.200	1.114	-62.220	.000**
		Post test	4.08±0.105			

Note: Significant at 0.05 % level**

Knowledge Scores
It is clear from Table 3, that there was a significant difference in the Knowledge scores for pre test (M = 0.30 ± 0.87) and post test (M=0.97±0.017) in the experimental group. This mean difference in the experimental group is statistically significant at 5% level t(163) = -103.131; p < .05). On the other hand the mean score of the respondents who are in the control group in pretest (0.27 ± 0.088) and post test (0.28±0.113) is statistically not significant (t(163) =-1.635; p > .05). It is found that the experimental group gets the significant difference in pre and post test, but not the control group. Therefore it is concluded that the $H0_1$ is rejected and there is a significant mean difference between the control group and experimental group in the pre and post test in the Knowledge of the adolescent girls.

Attitude Scores
It is clear from Table 3, that there is a significant difference in the attitude scores for pre test (M = 2.93 ± 0.098) and post test (M = 4.39 ± 0.103) in the experimental group. This mean difference in the experimental group is statistically at 5% level (t (127) = -123.394; p< .05). On the other hand the mean score of the respondents who are in the control group in pre test (2.90 ± 0.090) and post test (3.02 ± 0.083) is also statistically significant (t (127) = -12.736; p< .05). It is found that the control and the experimental group gets the significant difference in pre and post test. Therefore it is concluded that the $H0_2$ is accepted and there is a significant mean difference between the control group and experimental group in pre test and post test in the Attitude of the adolescent girls.

Practice Scores

It is clear from Table 3 that there was a significant difference in the Practice scores for pre test (M = 2.97±0.200) and post test (M= 4.08±0.105) in the experimental group. This mean difference in the experimental group is statistically significant at 5% level (t(232) = -62.220; p < .05). On the other hand the mean score of the respondents who are in the control group in pre test (3.03±0.190) and post test (4.08±0.105) is statistically not significant (t(232) = -2.325 ; p > .05). It is found that the experimental group gets the significant difference in pre and post test, but not the control group. Therefore it is concluded that the $H0_3$ is rejected and there is a significant mean difference between the control group and experimental group in pre and post test in the Practice of adolescent girls.

Table 5
Regression Summary model on KAP scores of the Adolescent Girls

Model	R	R Square	Adjusted R square	Std. Error of the Estimate
1	0.881	0.777	0.775	0.12445

Predictors: (Constant), Practice scores

Table 5 showed the summary statistics of the regression model that predict the practice through knowledge and attitude of the anaemic adolescent girls. The R square value (0.777) in the table explains the amount of variance in the dependent variable that can be explained by the independent variables. From this, it is found that knowledge and attitude create 77.7% of the variance in the practice followed by adolescent girls.

The R value (0.881) indicates the total correlation between the knowledge, attitude, and practice of the respondents, which is positive. The adjusted R square alters the bios in R square. The standard error of the estimate (0.124) is a measure of the variability of the multiple correlations which gives very less. The following ANOVA table summarises the significance of the regression.

Table 6
ANOVA on KAP scores of the Adolescent Girls

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.519	2	8.759	565.573	.000**
	Residual	5.033	325	.015		
	Total	22.552	327			

Dependent variable: Knowledge and Attitude scores
Predictors: (Constant), Practice scores

The ANOVA table checks the significance of the regression model. From Table 6, F (2,325)= 565.573, p<0.05 and hence it can be concluded that the above regression is highly significant. The following coefficient output table gives the regression equation.

Table 7
The coefficient on KAP scores of the Adolescent Girls

Model		Unstandardised coefficients		Standardised coefficients	t	Significance
		B	Std.Error	β		
1	Practice scores	1.450	0.122		11.914	0.000**
	Knowledge scores	0.216	0.086	0.193	3018	0.003**
	Attitude scores	0.520	0.047	0.702	11.008	0.000**

Dependent variable: Knowledge and Attitude scores

From the Table 7, the unstandardised coefficients column explains the intercept value and the slope of the regression line. The standardised coefficients column gives the contribution that a variable makes to the model. The t value (t = 12.096, p = 0.000) for constant shows that the intercept is significantly different from zero. Along with that the t value for Knowledge and Attitude scores of anaemia among adolescent girls (t = 3018 and 11.008, p < 0.05) shows that the regression is significant. Therefore it is concluded that the null hypothesis (H0) is rejected as there is a highly significant impact of Knowledge, Attitude on Practice followed by anaemic adolescent girls.

Initiatives to combat Anaemia

To tackle IDA, India was the first country to launch a National Nutritional Anaemia Prophylaxis Programme in 1970. The National Nutrition Policy was launched in 1993and this formed the basis for the National Plan of Action on Nutrition 1995, which laid out the sectoral Plan of Action to tackle anaemia. In light of the high burden of anaemia in India, one of the goals of the 12th Five Year Plan (2012– 2017) of the Government of India was to reduce anaemia in girls and women by 50% – that is to 28% by 2017. The National Iron+ Initiative aimed to target IDA across all life stages, thus expanding existing guidance for children, pregnant women, and lactating mothers, to include adolescents (both boys and girls aged 10–19 years) and women of reproductive age (15–49 years). Concerning adolescents, the National Iron+ Initiative expanded on the 2012 Weekly Iron and Folic Acid Supplementation programmes for girls in and out of school, to include boys as well. WHO has developed guidelines for daily iron supplementation for pregnant women and girls, infants and children, and non-pregnant women and adolescent girls. However, in some cases, iron doses prescribed in the National Iron+ Initiative differ from the WHO recommendation **(6).**

5. CONCLUSION :

In the present study, the adolescent girls had insufficient knowledge of anemia prevention concerning dietary management, and health-seeking behavior. There was an expressive improvement in the anemia prevention knowledge, attitude, and practices of the participating adolescents after the educational intervention. School settings could also be an essential, successful, and efficient place to implement a complete nutrition education program to develop the knowledge, attitude, and practices of school-going adolescents with reverence to anemia hindrance which would further make possible reducing the disease burden. The findings of the present study show incredible knowledge of behavioural change in healthy food choices.

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