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A Comparative study to assess the effectiveness of Drumstick Leaves (Moringa Leaves) Juice on Hemoglobin level among adolescent girls in selected Urban and Rural school, Bilaspur (C.G)

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Abstract

The most significant changes in one's physical appearance, mental makeup, and behavioural patterns occur throughout adolescence, a pivotal phase of life. Nutrition and micronutrient requirements are rather high at this period. Consequently, iron insufficiency is more common among teenagers, especially females, between the ages of 13 and 18, when needs are highest. The samples selected for this study were Adolescent's girls with mild and moderate hemoglobin level who were studying at Govt. School Mopka and Govt. school Lagra Bilaspur. 60 Adolescent girls with mild and moderate hemoglobin level aged between 13 to 18 years Bringing attention to the issue of anemia in teenage girls was the intended goal of this research. The researchers set out to compare the rates of anemia and its severity among rural and urban high school girls, as well as to learn more about the frequency and severity of anemia across these two groups. As a serious health concern among rural adolescents, anemia was more common among rural females than urban girls.

Keywords: High school, Adolescent girls, Anemia, Urban, Rural, Prevalence

Introduction

The World Health Organization has defined adolescence as the time in a person's life from the ages of ten to nineteen. The most significant changes in one's physical, mental, and behavioural characteristics occur during this time of life, which is called the formative years. Despite the fact that this is a particularly susceptible time for nutritional anemia to develop in humans, public health initiatives have consistently disregarded it. There are a number of reasons why girls have it worse than boys. Neglect of the female kid is more common in low-income families. She is used as a helper around the home and doesn't get enough to eat or an education. Period blood loss, whether regular or excessive, adds another layer of difficulty and often triggers crises. The increased iron needs of the body throughout adolescence make teenage females more vulnerable to iron deficiency anemia.

The total iron demand rises from around 0.7-0.9 mg fe/d in pre-adolescence to about 2.2 mg fe/d throughout puberty,

and maybe even higher in young women who menstruate extensively. Worldwide, anemia is a huge issue when it comes to people's health. Research has shown that between 65% and 75% of teenage females in India suffer from anemia. Because they have the potential to become mothers and housewives, adolescent girls play a significant role in our society. Iron deficiency occurs when the body does not produce enough hemoglobin, which is why it is considered a micronutrient. The World Health Organization (WHO) recommends that teenage females maintain a hemoglobin level of 12 g/dl. Anemia is defined as a hemoglobin level below 12 gms/dl.

Physical and mental development are stunted in the adult females who were anemic as adolescents. These mothers were already underweighting before becoming pregnant, and they have an increased risk of maternal mortality and low birth weight infants.

According to the National Rural Health Mission (2013), a significant number of teenage girls in India, namely those in

rural regions, suffer from anemia. The incidence of this condition is particularly high among this age group (15–17 years old). Iron deficiency anemia affects 60-70% of teenage girls in India, making it the country with the greatest incidence of this condition among women globally. An investigation of the frequency of anemia among rural and urban teenage girls was undertaken by the Karnataka government's department of public health and preventive medicine in 2002. According to the survey, 34.4% of school-aged teenagers in Karnataka state, whether they live in an urban or rural area, have anaemia. Vitamin C, which is abundant in amla, aids in iron absorption and protects against anemia. Vitamin C powerhouse is another name for it. Because of its high iron content, jaggery might boost hemoglobin levels when eaten on a regular basis. Extraction from pumpkin leaves promotes HB regeneration, according to many studies. It has a lot of iron and vitamin C. The blood iron level may be raised by eating iron-rich meals and taking vitamin C. A typical adult typically absorbs just 10–15% of the iron they consume, according to the office of dietary supplements. Vitamin C and other nutrients affect the absorption of heme iron, which is better absorbed than non-heme iron found in plants; iron from meat is also a good source of heme iron.

Literature Review

Roy Daniel, M. Kalaivani, Shashi Kant et al. (2024) [11] A study was conducted to determine the prevalence of iron deficiency anaemia among adolescent girls in India. Anaemia is a significant public health issue, contributing to years lost to disability and death. Targeting adolescent girls can improve their nutritional health and obstetric outcomes. A systematic review and meta-analysis of community-based studies was conducted to obtain a comprehensive estimate of the prevalence of anaemia among adolescent girls in India. The study included 35 studies, comprising 152,640 participants, and used the random-effects model and 12 statistical methods to estimate the pooled prevalence and heterogeneity. The results showed a pooled prevalence of 65.7% among adolescent girls, with significant heterogeneity between studies (12.99.6%; $p<0.001$).

Jie Ma, Alauf J., Ching Cha, *et al*. (2023) [12] This study conducted "to identify the dietary patterns among children in rural areas of Guangzhou, China". And explore their association with iron deficiency anemia. Method: A total of 1476 children aged 9-16 years old were included in this study. A Cross-Sectional Study was done, Demographics, lifestyle, and anthropometric and dietary information were collected. Result: The prevalence of anemia in children was 10.4%, with 6.1% in boys and 15.4% in girls. Four dietary patterns were identified, including a fast-food pattern, a vegetarian pattern, a meat and egg pattern, and a rice and wheat pattern. A high score in the fast-food pattern was positively associated with risk of anemia in children entering puberty (PR = 1.767, 95% CI: 1.026~3.043, p = 0.039), especially in girls after menarche, with marginal significance (PR = 1.740, 95% CI: 0.977~3.097, p = 0.059).

Kamala Verma and Girish C. Baniya (2022) [13] A study was conducted to assess the Prevalence, knowledge, and related factor of anemia among school-going adolescent girls in a remote area of western Rajasthan, Method: In a rural area of western Rajasthan, a cross-sectional study of 625 adolescent girls aged 11 to 19 years was carried out. Participants completed a questionnaire that included sociodemographic, clinical, and knowledge questions about anemia and its related factors. An HemoCue was used for hemoglobin analysis and anemia diagnosis. Results: Anemia was found in 56.32% (n = 352) of the recruited population, with a mean of 9.92 (SD = 1.40). Mild, moderate, and severe anemia were found in 29.12%, 22.24%, and 4.96% of the participants, respectively. Girls aged 11 to 14 (AOR = 3.63, 95% CI: 1.76- 6.38, P value = 0.042).

Thounaojam Bidyani and Reena Thakur (2022) [14] The study aimed to assess the effect of Moringa oleifera leaves juice on increasing hemoglobin levels among anemic females. Anemia is a common cause of malnutrition, affecting children, adolescents, and reproductive age group women worldwide. Iron Deficiency Anemia is a major health issue in adolescent girls, which can be reduced by consumption of Drumsticks leaves. The World Health Organization estimates anemia prevalence at 56%, with a range of 35%-75% depending on geographic location. Data was collected from 30 anemic females aged 15-24 using non-probability purposive sampling technique. The results showed that Moringa Oleifera leaves juice effectively increased hemoglobin levels, with a mean increase of 2.34 gm in each anemic female.

Research Methodology
Research Design

According to Suresh K. Sharma- " Comparative descriptive research design involves comparing and contrasting two or more samples of study subjects on one or more variables, often at a single point of time". The research design selected for the study was a comparative research design adopted with two group pre-test post-test design.

Sampling Technique

Non probability Convenient sampling was used to select the sample for the study.

Samples: The samples selected for this study were Adolescent's girls with mild and moderate hemoglobin level who were studying at Govt. School Mopka and Govt. school Lagra Bilaspur [C.G.].

Sample Size

Sample represents the adolescent between the age group of 13-18 years. The sample size for this comparative study was arbitrarily determined to be 60 adolescent girls.

Reliability of the tool: Reliability was established through test pretest method. The tool was administered to 60 adolescent girls at Govt school Bilaspur C.G. After the gap of 21 days, the retest was done. The Karl Pearson's spearman brown of correlation was computed and the reliability was found to be 0.79. The tool was found to be reliable.

Data collection procedure

Data collection is the process of gathering information needed to discuss a research problem. Data collection was done for the period of 4 weeks. Before commencing the special project, the permission to conduct the study should

obtained by the list of school children was obtained from the principal and the samples were short listed based on sample selection criteria using non probability purpose sampling technique.60 adolescent's girls were selected.

Analysis

Frequency and percentage wise description of adolescent girls in selected urban and rural school according to their socio demographic variables.

Table 1: Distribution of frequency and percentage of adolescent girls according to their age.

S. No.	Age In Years	Rural		Urban	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1	13 -14 years	20	66.6%	29	96.6%
2	15 -16 years	10	33.3%	1	3.3%
3	17-18 years	0	0%	0	0%
	Total	30	100%	30	100%

N=60 (Rural-30, Urban-30).

Table No.1 represents that majority of students in rural

school 20 (66.6%) belongs to the age group between 13-14 years, 10 (33.3%) belongs to the age group of 15-16 years. In urban school the maximum 29 (96.6%) belongs to the age group between 13-14 years, 1 (3.3%) belongs to the age group between 15 -16 years.

Table 2: Distribution of frequency and percentage of education status.

S.No.	Education	Rural		Urban	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1	9th Standard	24	80%	0	0%
2	10th Standard	6	20%	30	100%
3	11th Standard	0	0%	0	0%
4	12th standard	0	0%	0	0%
	Total	30	100%	30	100%

N=60 (Rural-30, Urban-30).

Table No.2 shows that maximum of students in rural school adolescent girls is 24(80%) in 9th Standard, 6 (20%) are in 10th Standard. In urban school the maximum adolescent girls are 30 (100%) in 10th Standard and 0 (0%) in 9th Standard. And 11th and 12th Standard are 0 (0%).

Table 3: Distribution of frequency and percentage of subject's education of father

S. No.	Education of Father	Rural		Urban	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1	Illiterate	5	16.6%	2	6.6%
2	Primary School	6	20%	7	23.3%
3	Middle School	0	0%	8	26.6%
4	High School	17	56.6%	10	33.3%
5.	Higher Secondary School	2	6.6%	3	10%
	total	30	100%	30	100%

N=60(Rural-30, Urban-30).

Table.3 regarding education of father in rural school 5 (16.6%) of subject's father were illiterate, 6(20%) of subject's father's education were primary school, 0(0%) of subject's father's education were middle school, 17 (56.6%) of subject's father's education were high school, 2 (6.6) higher secondary school. In urban school 2 (6.6%) of

subject's father were illiterate, 7(23.3%) of subject's father's education were primary school, 8(26.6%) of subject's father's education were middle school, 10 (33.3%) of subject's father's education were high school, 3 (10%) higher secondary school.

Table 4: Distribution of frequency percentage of Type of family

S. No.	Type of family	Rural		Urban	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1	Nuclear family	14	46.6%	18	60%
2	Joint family	16	53.3%	12	40%
3	Extended family	0	0%	0	0%
	Total	30	100%	30	100%

Table No.4 show's that, in rural school maximum adolescent girls 14 (46.6%) belongs to the nuclear family, 16 (53.3%) belongs to the joint family, 0 (0%) belongs to the extended

family and in urban school children 18 (60%) belongs to the nuclear family, 12 (40%) belongs to the joint family and 0 (0%) belongs to the extended family.

Table 5: Distribution of frequency and percentage of occupational status of the parents

| S. No.	Occupational status ofparents	Rural		Urban	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1	Govt. employee	0	0%	0	0%
2	Private employee	2	6.66%	4	13.33%
3	Business	10	33.33%	6	20%
4	Daily wagers	18	60%	20	66.66%
	Total	30	100%	30	100%

N=60 (30 Rural, 30 Urban)

Table. 5 Regarding occupation of parents in rural school adolescent girls0(0%) of subject's (adolescent girls) were not Government employee, 2(6.66%) of subject's (adolescent girls) were private employee, 10(33.3%) of subject's (adolescent girls) were self-businessman and 18(60%) of subject's (adolescent girls) (were daily wagers. In urban school adolescent girls 0(0%) of subject's (adolescent girls) were not Government employee, 4(13.3%) of subject's (adolescent girls) were private employee, 6(20%) of subject's (adolescent girls) were self-businessman and 20(66.6%) of subject's (adolescent girls) (were daily wagers.

Assess the pretest and posttest level of hemoglobin among adolescent girls in the urban and rural school

Table 6: Distribution of pretest and posttest level of hemoglobin among adolescent girls in the urban and rural school

	Rural				Urban			
	Mean	SD	Paired t-test value	Mean difference	Mean	SD	Paired t-test value	Mean difference
pretest	9.9	3.2	10.47 H.S.	-4.9	9.43	6.15	4.57 H.S.	-1.03
Posttest	14.8	24.3	10.47 H.S	-4.9	10.46	1.7	4.57 H.S	-1.03

Chi square paired t-test value 12.8 df 4, $p \geq 0.05$ HS.
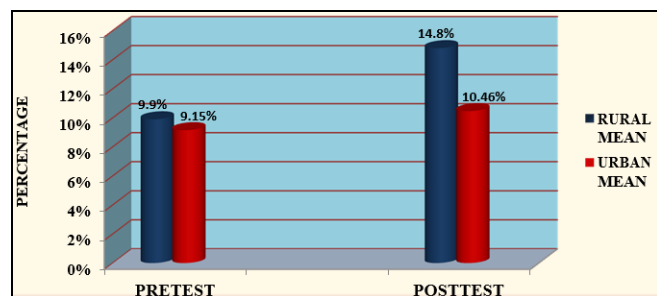
Fig 1: Pretest & posttest level of hemoglobin

Nonparametric chi square test has been used to test the significance of difference in distribution of subjects according to level hemoglobin among adolescent girls in the urban and rural school M, On applying the chi square test, difference in distribution was found to be significant.
Table no 6: shows the Pre and Post test mean standard deviation, Paired t-test value and mean difference. In rural school it reveals the pretest mean value 9.9 with standard deviation 3.2, Paired t-test value 10.47 and mean difference -4.9. Post test means 14.8, standard deviation 24.3, Paired t-test value 10.47, the mean difference is – 4.9. and In urban school it reveals the pretest mean value 9.43 with standard deviation 6.15, Paired t-test value 4.54 and mean difference - 1.03. Post test mean10.46, standard deviation1.7, Paired t-test value 4.57, the mean difference is -1.03 the 't' value is 4.57. This difference is small and it is statistically significant. It was confirmed by using paired t-test.

Compare the posttest level of hemoglobin among adolescent girls in the urban and rural school

Table 7: Analysis and compare of posttest level of hemoglobin in rural and urban school

School	Level of Hemoglobin			Total
	Mild (10.1 to 11.9 gm%)	Moderate (7 to 10 gm %)	Severe (<7 gm %)	
Rural (N= 30)	25 (83.33%)	05 (16.66%)	0 (0%)	30 (100%)
Urban (N= 30)	20 (66.66%)	10 (33.33%)	0 (0%)	30 (100%)

Chi square value 34.04 df-2, $p \geq 0.05$ H.S. Chi square test has been used to test the significance of difference in distribution of subjects according to compare the posttest level of hemoglobin On applying the chi square test, the difference in distribution was found to be high significant ($p \geq 0.05$) Table No. 8 show's that in rural school (83.33%) children have mild hemoglobin, 16.66% children have moderate hemoglobin, 0% children have severe hemoglobin and in urban school 66.66% children have mild hemoglobin, 33.33% children have moderate hemoglobin and 0% have severe hemoglobin, in these data the difference was found to be high significant.

Conclusion
The study's results suggest that iron deficiency anemia was prevalent among the teenage females, particularly those living in rural regions. For teenage females suffering from iron deficiency anemia, this herbal concoction worked wonders in raising their hemoglobin levels. Adolescents in rural regions face a significant health risk due to the greater frequency of anemia compared to urban females, according to the current research. Compared to moderate and severe anemia, light anaemia was more common. This highlights the need of educating the public about the benefits of iron-rich diets and supplementing with folic acid in order to reduce the overall incidence of anemia in teenage females. Nurses play a crucial role in maintaining age-appropriate growth and development among the school children. They help the parents in maintaining good health and performance of the children. The present study has implications in nursing practice, nursing education, nursing administration and nursing research. Regular consumption of drumstick leaves juice can help increase iron intake, which could lead to improved hemoglobin levels, especially in individuals with mild to moderate anemia.

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