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# A Quasi experimental study to assess the effectiveness of beetroot juice to increase the level of hemoglobin among anemic adolescent girls in selected school at Bilaspur (C.G.)

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## Abstract

Adolescence is a time of intense physical growth. It is also a stage of stress and strain. Most of them are having poor access to proper health care, nutrition and education. Beetroot juice is particularly beneficial as an anemia remedy for children and teenagers. Many studies proved that beet root also contribute to improve the hemoglobin level in the blood. Hence a study was conducted to assess the effectiveness of beet root juice on hemoglobin among adolescent girls. Anemia is condition in which the hemoglobin concentration is lower than normal, reflects the presence of fewer than normal RBCs within the circulation Anemic adolescent girls who had undergone sign and symptoms and haemoglobin level.

### Keywords: Beetroot Juice, Anemic, Adolescent, Girls, benefit

### Introduction

Almost one sixth of India's population comprises of adolescents. An adolescent boy or girl is still a developing child. Among adolescents, girls constitute a vulnerable group, particularly in developing countries where they are married at an early age and exposed to a greater of reproductive morbidity and mortality. Anemia is established if the hemoglobin is below the cut-off points of World Health Organization. Most frequent cause of nutritional anemia is iron deficiency, and less frequently folate or Vitamin B12.

According to ICMR recommended dietary intake of iron for 13-15years is 28mg and 16- 18years is 30mg. And the daily allowances of vitamin C for adolescents are 30-50mg. Park K., (2009) <sup>[1]</sup> Lack of dietary iron is the world's leading nutritional deficiency and the most common cause of anemia. Other vitamins that are needed for the body to make red blood cells include folate (folic acid) and Vitamin B12. A lack of these in the diet can also cause anemia.

Anemia is condition in which the hemoglobin concentration is lower than normal, reflects the presence of fewer than normal RBCs within the circulation Anemia is a condition in which the number of red blood cells or their oxygen carrying capacity is insufficient to meet physiologic needs, which vary by age, sex, altitude, smoking and pregnancy status Anemia is defined as low hemoglobin concentration, and may be due either to a low red cell mass or increased plasma volume.

Iron deficiency anemia, one of the most common chronic hemolytic disorders, is found in 10% to 30% of the population in the United States. Regardless of economics or geography, iron deficiency anemia is most common in infants, children, women who are pre-menopausal or pregnant and older adults. Iron deficiency anemia is the most widespread form of malnutrition. In Tamil Nadu 57% of women have some degree of anemia i.e. 37% of women are mildly anemic, 16% are moderately anemic and 4% are severely anemic. International Journal of Advance Research in Multidisciplinary

Prevalence of anemia is slightly higher for young women less than age 25 than for older women. It is higher for rural women (59%) than for urban women (52%). The anemic levels for children age 3 to 35 months is 69% including 25% mild anemic, 40% moderately anemic and 7% severely anemic. Children aged 12 to 23 months; children of higher order births, children in rural areas, and children of working women and children with low standard of living have high levels of anemia. Anemia is estimated to affect 3.5billion individuals in the developing world or over two persons out of three. More than 320million people in India suffer from iron deficiency anemia with the highest prevalence among women and children (40 to 80 percent expectant women, 60 to 70 percent children and 50 percent adolescent girls).

# Literature Review

Pushpaanjali. G, Brundha M, Leslie Rani et al. (2020)<sup>[2]</sup> Anaemia is a common name for a range of disorders that affect red blood cells. Red blood cells contain haemoglobin, which is responsible for carrying oxygen in the blood. To generate red blood cells, the body needs vitamin B12, iron and folic acid. If one or more of these factors are deficient, anaemia will develop. It is one of the most under-diagnosed conditions, if left untreated and can lead to many serious complications such as cardiovascular disease and compromised immune function. This aim of the study is to assess and evaluate the role of beetroot juice in increasing the Haemoglobin level and other Haematological parameters like MCV, MCH and MCHC. A group of 9 people with anaemia were selected for the study. Beetroot juice mixture was given to the group twice a day for 3 weeks.

Safruddin (2020)<sup>[3]</sup> this study aims to determine the effect of beetroot juice on haemoglobin levels and the VO2Max value of an athlete. This research is an experimental study using a true experimental design with a pre-test-post-test control group design approach. This study used 36 badminton athletes divided into 3 groups. The results showed that there were significant differences in haemoglobin levels in badminton athletes after consuming beetroot juice, the 200 ml beetroot juice group (p = 0.001) the 300 ml beetroot juice group (D = 0.002) There was a difference in the levels of Haemoglobin in badminton athletes after treatment between consuming 200 ml beetroot juice and a group consuming 300 ml beetroot juice but not significant (p = 0.744 > p = 0.05). There were significant differences in VO2Max values after consumption of beetroot juice in the 300 ml group (p = 0) but there were no significant differences in VO2Max values in the control group (p = 0.007).

Ms Kundan Johnson, (2020)<sup>[4]</sup> Adolescence has been defined by the World Health Organization as the period of life spanning the ages between 10 to 19 years. This is the formative period of life when the maximum amount of physical, psychological, and behavioral changes take place. Beet root juice is particularly beneficial as an anemia remedy for children and teenagers. Many studies proved that beetroot also contribute to improve the haemoglobin level in the blood. The aim of present study is planned to assess the effectiveness of beetroot juice to improve the haemoglobin level in level among First year B.Sc. nursing girls by using the cyanmethemoglobin. A quasi experimental study was

conducted to assess the effectiveness of beetroot juice on haemoglobin among First year B.Sc. nursing girls in Adesh College of nursing, Bathinda, Punjab.

Jeba Saranya, (2015)<sup>[5]</sup> was conducted a study to evaluate the effectiveness of beetroot extract upon iron deficiency anemia among adolescent girls in selected school at Kaniyakumari. Adolescence is a time of intense physical growth. It is also a stage of stress and strain. Most of them are having poor access to proper health care, nutrition and education. Beetroot juice is particularly beneficial as an anemia remedy for children and teenagers. Many studies proved that beet root also contribute to improve the hemoglobin level in the blood. Hence a study was conducted to assess the effectiveness of beet root juice on haemoglobin among adolescent girls. Objectives: To assess the haemoglobin level among study and control group. To determine the effectiveness of beetroot juice on haemoglobin level between experimental and control group to associate the haemoglobin level with selected demographic variables Methodology: Quasiexperimental study design was adopted and the study conducted in Government Higher Secondary School, Kanyakumari, Tamil Nadu.

Dr. N. Gayathri Priya et al. (2013) [6] It is also a stage of stress and strain. Most of them are having poor access to proper health care, nutrition and education. Beetroot juice is particularly beneficial as an anemia remedy for children and teenagers. Many studies proved that beet root also contribute to improve the haemoglobin level in the blood. Hence a study was conducted to assess the effectiveness of beet root juice on haemoglobin among adolescent girls. The objective of the study was to assess the effectiveness of beetroot juice on haemoglobin among adolescent girls. True experimental study design was adopted and the study conducted in Aringar Anna Government Higher Secondary School, Chennai, Tamil Nadu. A total of 60 adolescent girls were selected for the study, in that 30 girls were in experimental and 30 girls were in the control group who fulfilled the inclusive criteria were selected by using simple random sampling technique.

### **Research Methodology**

The sample size for the study comprises of 60 anemic adolescent girls who had satisfied the inclusion criteria. Initial permission was sought from the institution and formal permission was sought from the principal for conducting the study. Consent was obtained from the participants 6 anemic adolescent girls' participants were administered beetroot juice mid-morning for 7 days. Results of the pilot study, gave the evidence that the tools were reliable. Anemic adolescent girls who had undergone sign and symptoms and haemoglobin level. Verbal and written consent was taken. The sample of 60 anemic adolescent girls was selected. The post-test was done on 16<sup>th</sup> day with haemoglobin test kit method and sign and symptoms of anemia. Towards end, researcher thanked anemic adolescent girls for their co-operation.

### **Data Analysis**

Distribution of subjects according to socio demographic variables by using frequency and percentage

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Table 1: Distribution of subject according to age in year

Age In Years	Frequency (F)	Percentage (%)
13-14 years	19	31.67
15-16 years	23	38.33
17-18 years	18	30
Total	60	100

Table 1 depicts that 23(38.33%) anemic adolescent girls belong to age group of 15-16 years, 19(31.67%) anemic adolescent girls belong to age group of 13-14 years of age remaining 18(30%) anemic adolescent girls are in age group of 17-18 years.

Table 2: Distribution of subject according to education

Education	Frequency (F)	Percentage (%)
Primary school	0	0
Secondary	42	70
Higher secondary school	18	30
Total	60	100

Table 2 reveals that 18(30%) anemic adolescent girls had secondary (high school), 42(70%) had higher secondary education.

Table 3: Distribution of subject according to type of family

Type Of Family	Frequency (F)	Percentage (%)
Nuclear family	35	58.33
Joint family	25	41.67
Total	60	100

Table 3 depict that 25(41.67%) anemic adolescent girls belong joint family, rest 35(58.33%) anemic adolescent girls are belonging nuclear family.

Table 4: Distribution of subject according to number of siblings

Number Of Siblings	Frequency (F)	Percentage (%)
1	26	43.33
2	28	46.67
>=3	6	10
Total	60	100

Table 4 revels 28(46.67%) anemic adolescent girls have 2 siblings, 26(43.33%) anemic adolescent girls have 1 sibling and 6(10%) have more than 3 siblings.

 
 Table 5: Distribution of Subject According to Income Per Month (Parents)

<b>Income Per Month (Parents)</b>	Frequency (F)	Percentage (%)
<rs.10000< td=""><td>4</td><td>6.67</td></rs.10000<>	4	6.67
Rs10000-Rs.15000	17	28.33
Rs 15001-20000	18	30
>Rs 20000	21	35
Total	60	100

Table 5 revels 21(35%) anemic adolescent girls (parents) have monthly income between >Rs 20000/-, 18(30%) anemic adolescent girls (parents) have monthly income between Rs 15001/-20000/-, 17(28.33%) anemic adolescent girls (parents) have monthly income between Rs10000/- 15000/-, 4(6.67%) anemic adolescent girls (parents) have monthly income below <Rs 10000/-.

Table 6: Distribution of subject according to religion

Religion	Frequency (F)	Percentage (%)
Hindu	53	88.33
Muslim	5	8.33
Christian	2	3.33
Other	0	0
Total	60	100

Table 6 shows that 53(88.33%) anemic adolescent girls belong to Hindu religion, 5(8.33%) anemic adolescent girls belong to Muslim religion, 2(3.33%) anemic adolescent girls belong to Christian religion.

Table 7: Distribution of subject according to residential area

Residential	Frequency (F)	Percentage (%)
Rural	28	46.67
Urban	32	53.33
Total	60	100

Table 7 depict that 28(46.67%) anemic adolescent girls leaving in Rural area, and rest 32(53.33%) anemic adolescent girls leaving in Urban area.

 Table 8: Distribution of subject according to type of food consumption

<b>Type Of Food Consumption</b>	Frequency (F)	Percentage (%)
Vegetarian	22	36.67
Non-Vegetarian	38	63.33
Total	60	100

Table 8 shows that 38(63.33%) anemic adolescent girls are consuming non-vegetable, 22(36.67%) anemic adolescent girls are consuming vegetables.

#### Pre-Test and post-test level of haemoglobin among anemic adolescent girls in selected school at Bilaspur (C.G.)

Table 9: Level of Hemoglobin among anemic adolescent girls

	Lev				
	Severe anemia (<8)	Moderate anemia (8.0-9.9)	Mild anaemia (10.0-10.9)	No anaemia (11.0-11.9)	Total
Pretest	0	42(70%)	18(30%)	0(0%)	60(100%)
Posttest	0	12(20%)	14(23.33%)	34(56.67%)	60(100%)



Fig 1: Bar diagram depicting level of hemoglobin among anemic adolescent girls

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Table 9 (figure 1) depicts that 42(70%) moderate anemia, and 18(30%) mild anemia result found in pre- test level of hemoglobin among anemic adolescent girls.

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Adolescent girls have 34(56.67%) no anemia, 14(23.33%) mild anemia, and 12(20%) moderate anemia result found in post-test level of hemoglobin.

Table 10: Effectiveness of beet root juice to increase the level of Hemoglobin among anemic adolescent girls

	E	Effectiveness of beet root juice to increase the level of Hemoglobin among anemic adolescent girls				
	Mean	SD	Gain	Paired 'z' value	<b>DF/Critical value</b>	Significance
Pretest	9.45	0.85	1.02	14.22	50/2 46	
Posttest	10.68	1.02	1.23	1.23 14.22	59/5.40	<i>p</i> <0.001 HS

Parametric Paired z test has been used to test the significance of the observed difference in pre-test and posttest mean Haemoglobin. On applying the test highly significant difference (p<0.001) was found in the mean

Haemoglobin among anemic adolescent girls. This shows beet root juice to increase the level of Haemoglobin among anemic adolescent girls is highly effective.

Table 11. Level of Hemoglobin among anemic adolescent gin	Table 11: Level	of Hemoglobin	among anemic	adolescent gi	rls
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Level of Hemoglobin among anemic adolescent girls						
Severe anemia (<8)	Moderate anemia (8.0-9.9)	Mild anemia (10.0-10.9)	No anemia (11.0-11.9)	Total		
0	42(70%)	18(30%)	0(0%)	60(100%)		
0	12(20%)	14(23.33%)	34(56.67%)	60(100%)		
	<b>Severe anemia</b> (<8) 0 0	Severe anemia (<8)         Moderate anemia (8.0-9.9)           0         42(70%)           0         12(20%)	Level of Hemoglobin among anemic adolescent girls           Severe anemia (<8)         Moderate anemia (8.0-9.9)         Mild anemia (10.0-10.9)           0         42(70%)         18(30%)           0         12(20%)         14(23.33%)	Level of Hemoglobin amorg anemic adolescent girls           Severe anemia (<8)         Moderate anemia (8.0-9.9)         Mild anemia (10.0-10.9)         No anemia (11.0-11.9)           0         42(70%)         18(30%)         0(0%)           0         12(20%)         14(23.33%)         34(56.67%)		

Chi square value=51.17 df=2 p<0.001 HS

#### Conclusion

The above table compares pre-test and post-test Hemoglobin level among adolescent girls. In pretest out of 60 subjects 18(30%), 42(70%) were having mild and moderate Hb level. Where as in post-test 34(56.67%) were having no Anemia, 14(23.33%) with mild Anemia and 12(20%) in moderate Anemia. Chi-square test analysis shows a highly significant (p<0.001) difference in the distribution of pretest and post-test samples according to the Haemoglobin level. This shows the beetroot juice was very effecting in raising the level of Hb among adolescent girls.

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