

Beet root juice on haemoglobin among adolescent girls

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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 haemoglobin level in the blood. Hence a study was conducted to assess the effectiveness of beet root juice on hemoglobin among adolescent girls. The objective of the study was to assess the effectiveness of beetroot juice on hemoglobin among adolescent girls. True experimental study design was adopted and the study conducted in Aringar Anna Government Higherv Secondary School, Chennai, Tamilnadu. 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. The freshly prepared beetroot juice was administered to the samples for 20 days in mid morning. Pre and post assessment was done using the checklist for assessing the signs and symptoms of anemia and cyanmethemoglobin method for checking hemoglobin level. The data analysis was done by using descriptive and inferential statistics. Samples in the experimental group showed a highly significant improvement in hemoglobin level following the administration of beetroot juice ($p < 0.001$), in comparison with the control group. The nurses have to play a vital role in building the knowledge and understanding the importance of prevention of anemia. This can be facilitated by motivating the nurse to improve the theory based knowledge to educate the community to use locally available resources to improve the health. By this the anemia can be prevented among the adolescent girls and in future the complications due anemia can be prevented.

Keywords: Adolescent girls, haemoglobin, anemia

I. Introduction:

Adolescence is also a sensitive period, particularly for girls. Most of them are having poor access to proper health care, nutrition and education. Adolescence is a time of intense physical growth. Girls typically start puberty around age 10-12 and achieve their full adult height by the age of 15. Inadequate nutrition during late childhood and adolescence can therefore have a significant impact on a woman's adult health and the health of her children. Under nutrition during childhood and adolescence is associated with higher risk for preterm delivery and still birth or miscarriage, women with low body mass index and/ or short statures are at increased risk for under nutrition, perinatal and neonatal mortality. South Asia contains some of the highest national rates of thinness and stunting in young women in the world, as well as alarmingly high rates of anemia. According to corporate social responsibility in women health care with **Federation of Obstetric and Gynaecological Societies of India (FOGSI)** says that about 20% of maternal death occurs due to anemia. According to **WHO statistics (2009)** MMR is 250. According to National Family Health Survey (NFHS2009) has reported that a large percentage of women and children in India are anemic. According to **International Center for Research on Women (ICRW) (2009)** adolescent girls 58% are having $< 12\text{gm}\%$ and 1.3% are having $< 7\text{gm}\%$. In Tamil nadu, 44.8% adolescent girls are there, in that 2.1% are having severe anemia, 6.3% are having moderate anemia and 35.5% are having mild anemia. In that premenarcheal anemia are 40.7% post menarcheal anemia are 45.2%. Beetroot is commonly cooked, but the juice of raw beetroot contains host of health benefits and is classed as a "super food" in today's nutritional jargon. The pigment that gives beetroot juice its rich, red and purple color is called betaine. Some of the benefits of beetroot juice are lowering blood pressure by dilating the blood vessel and relaxing smooth muscles, increasing the oxygen level, improving the stamina by decreasing the oxygen during exercise, treating anemia by increasing the blood count and improving blood circulation and oxygen carrying capacity of erythrocytes (red blood cells), preventing birth defects by folate and folic acid, preventing hypertension and stroke, cleansing intestine, reducing kidney stone, improving rheumatoid arthritis, gout and improving menstrual problems. Beetroot juice is particularly beneficial as an anemia remedy for children and teenagers, according to **H.K. Bakhru** author of 'food that heal'. **Easton Patrick (2011)** says that consuming beet root juice or beet as cooked vegetable in salad is highly beneficial in treating anemia. **Nirman Walker, D.Sc (2010)**, in fresh vegetables and fruit juices, claims that beets build red corpuscles and add tones to blood so that it increases haemoglobin level in blood. Many studies proved that beet root contribute to

improve the haemoglobin level in the blood. The cost is low when compared with other iron rich vegetables and it can be stored easily.

II. Materials and Methods

2.1 Statement of the problem

A study to assess the effectiveness of beet root juice on haemoglobin among adolescent girls at the selected school, Chennai, Tamilnadu.

2.2 Objectives of the study

- To assess the haemoglobin level among study and control group.
- To determine the effectiveness of beetroot juice on haemoglobin between study and control group
- To associate the haemoglobin level with selected demographic variables.

2.3 Null Hypotheses

- **NH1** There is no significant difference between the pretest and posttest level of haemoglobin in study group.
- **NH2:** There is no significant difference in post test level of haemoglobin between study and control group.
- **NH3:** There is no significant association between the posttest level of haemoglobin with selected demographic variables of study and control group.

2.4 Methodology:

The research design used for this study was true experimental design. The sample size selected for this study consists of 60 adolescent girls of age 15-17 years who were studying XI standard at Govt.Hr.Sec.School and fulfilled the inclusion criteria. The beetroot juice was prepared by cutting 100gm of fresh beetroot into small pieces and grind, the beetroot extract prepared for this was mixed with 50 ml of water and 15gm of sugar. 100 ml of beetroot juice was given to each adolescent girl for 20 days in mid morning. Multi-stage random sampling technique was used to select the samples. The tool used in this study was background variables, Clinical signs checklist, Clinical symptom checklist.

2.5 Description of the tool

2.5.1 Background variables which consists of age, religion, type of family, family income per month, number of children in the family, type of food, meals per day, does their meal contain more vegetables, do they have anemia before, if yes, are they taking any treatment, menstrual cycle, height, weight, body mass index, clinical proforma used to measure the haemoglobin level by using cyanmethemoglobin.

Haemoglobin level classified as per WHO criteria

- 12gm% -Normal(excluded)
- 10-11.9gm%- Mild anaemia
- 7-9.9gm%-Moderate anaemia
- <7gm%-Severe anemia(excluded)

2.5.2 Clinical signs check list consists of ten items and maximum score was 10 and minimum score was 0. And the score interpretation was mild anemia(1-3), moderate anemia(4-6) and severe anemia(7-10).

2.5.2 Clinical symptom checklist consisted of ten items with a single answer. Scoring '2' was given when the clinical symptoms were always present, scoring '1' was given when the clinical symptoms were occasionally present and scoring '0' was given when the clinical symptoms was never present. Total score of the items was '20'. Maximum score was 20 and minimum score was 0. And the score interpretation was mild anemia (1-7), moderate anemia (8-14) and severe anemia(15-20).

2.6 Validity and reliability of the tool

The validity of the tool was established in consultation with nursing experts, nutritionist, paediatrician, obstetrics & gynaecologist, biochemistry, biostatistician. The reliability was established by inter-rater method to assess the internal consistency of the test. The reliability score was $r=0.96$. The reliability of the Cyanmethemoglobin (CMG) method was checked in two different laboratories to check the consistency of the test

III. Method of data collection

The study was conducted at Arignar Anna Govt.Hr.Sec.School, Besant nagar, Chennai, India. Written permission was obtained from authorities and oral consent was obtained from the subjects after explaining the

purpose of the study. The data was selected for period of one month. Background variables, clinical signs check list and clinical symptom checklist were used to collect the data from the adolescent girls. Collected data was coded, tabulated and analyzed by descriptive and inferential statistics by using SPSS software package.

IV. Results

4.1 Background Variables:

Majority of the adolescent girls in the study group 17(56.6%) were aged 16 years and in the control group 20(66.6%) were aged 16 years. In relation to religion, majority of girls in the study group 26(86.67%) were Hindus and in control group 27(90%). With regard to type of family, 25(83.3%) in study group and 24(80%) in control group were from nuclear family. Regarding family monthly income, study group 11(36.67%) and in control group 14(46.67%) had income of Rs.3001-5000. Regarding type of food, study group 27(90%) and control group 27(90%) were non vegetarian. With regard to history of anaemia, girls in the study group 30(100%) and control group 30(100%) had no history of anemia. In relation to menstrual cycle, majority of girls in the study group 26(86.6%) had regular menstrual cycle and in control group 22(73.33%) had regular menstrual cycle.

4.2 Assessment of pretest and posttest level of haemoglobin in study and control groups

In the study group pretest haemoglobin level revealed 18(60%) have mild anaemia, 12(40%) have moderate anemia, and in the posttest haemoglobin level revealed 27(90%) have normal hemoglobin level, 3(10%) have moderate anemia. And in the control group pretest haemoglobin level revealed 24(80%) have mild anaemia, 6(20%) have moderate anemia, and in the posttest haemoglobin level revealed 25(83.33%) have mild anaemia, 5(16.67%) have moderate anemia.(Table-I)

Table –I: Frequency and percentage distribution of pre & post test level of haemoglobin in the study group and control group (N=60)

Haemoglobin	Normal ≥ 12gm%		Mild Anaemia 10-11.9gm%		Moderate Anaemia 9-9.9gm%	
	No.	%	No.	%	No.	%
Study Group						
Pretest	0	0	18	60.0	12	40.0
Posttest	27	90.0	3	10.0	0	0
Control Group						
Pretest	0	0	24	80.0	6	20.0
Posttest	0	0	25	83.33	5	16.67

Clinical signs in the study group revealed in the pretest 1(3.33%) has mild anemia, 28(93.33%) have moderate anemia, 1(3.3%) has severe anemia and in the posttest 29(96.6%) have mild anemia, 1(3.33%) has moderate anemia. And in the control group, pretest 29(96.67%) have moderate anemia, 1(3.3%) has severe anemia and in the posttest 30(100%) have moderate anemia.(Table-II)

Table-II .Frequency and percentage distribution of pre & post test level of clinical signs in the study group and control group (N=60)

Clinical signs	Mild (1-3)		Moderate(4-6)		Severe(7-10)	
	No.	%	No.	%	No.	%
Study Group						
Pretest	1	3.33	28	93.33	1	33.3
Posttest	29	96.67	1	3.33	0	0
Control Group						
Pretest	0	0	29	96.67	1	3.33
Posttest	0	0	30	100	0	0

Clinical symptoms in the study group showed pretest 1(3.33%) has mild anemia, 29(96.7%) have moderate anemia and in post test 30(100%) have mild anemia. And in the control group revealed in the pre test 4(13.33%) have mild anemia,26(86.67%) have moderate anemia and in the posttest 6(20%) have mild anemia, 24(80%) have moderate anemia.(Table-III)

Table –III. Frequency and percentage distribution of pre & post test level of clinical symptoms in the study group and control group (N=60)

Clinical symptoms	Mild (1-3)		Moderate(8-14)		Severe(15-20)	
	No.	%	No.	%	No.	%
Study Group						
Pretest	1	3.33	29	96.67	0	0
Posttest	30	100.0	0	0	0	0
Control Group						
Pretest	4	13.33	26	86.67	0	0
Posttest	6	20.0	24	80.0	0	0

4.3 Effectiveness of Beetroot juice in improving haemoglobin level

In the study group overall pretest mean score of haemoglobin was 10.04 with SD of 0.58 and the overall posttest mean score of Hb was 12.67 with SD of 0.09. It proved that after the administration of beetroot juice, there was a significant improvement in the Hb level of adolescent girls with a 't' value of 17.787 at $p < 0.001$. Whereas in control group overall pretest mean score of Hb was 10.14 with SD of 0.49 and the overall posttest mean score Hb was 10.14 with SD of 0.48. It showed that, there was no significant improvement in the Hb level of adolescent girls. (Table IV)

Table –IV. Comparison of pretest and posttest haemoglobin score in the study and control group (N=60)

Haemoglobin	Mean	SD	't' Value
Study Group			
Pretest	10.04	0.58	't' =17.787 p=0.001
Posttest	12.67	0.99	
Control Group			
Pretest	10.14	0.49	't' =10.005 p=0.996
Posttest	10.14	0.48	

Table- V.Comparison of posttest haemoglobin score between the study and control group (N=30)

Hemoglobin	Mean	S.D	't' V alue
Study group	12.67	0.99	't'=12.633 p=0.001
Control group	10.14	0.48	

V. Major findings of the study

The findings of the study unfolded that the overall pretest mean score of haemoglobin was 10.04 with SD of 0.58 and the overall posttest mean score of haemoglobin was 12.67 with SD of 0.99. It showed that after the administration of beetroot juice, there was a high significant improvement in the haemoglobin level of adolescent girls with a 't' value of 17.787 at $p = 0.001$. (Table-IV)

Hence the NH_1 stated earlier that 'there is no significant difference between the pretest and posttest level of haemoglobin in study group at $p = 0.001$ was rejected. The findings of the study were consistent with the study conducted by Sherin Nithya(2009) [1] on effectiveness of beetroot juice on haemoglobin level among 60 school children. The study revealed that pretest mean score of haemoglobin was 9.67 with SD OF 0.52 and the overall posttest mean score of hemoglobin was 12.87 with sd of 0.99.

The findings unfolded that the overall posttest mean score of haemoglobin in the study group was 12.67 with SD of 0.99 and the overall posttest mean score of haemoglobin in the control group was 10.14 with SD of 0.48. It showed that after the administration of beetroot juice, there was a high significant improvement in the haemoglobin level of adolescent girls with a 't' value of 12.633 at $p = 0.001$. (Table.V) Hence the NH_2 stated earlier that 'there is no significant difference in posttest level of haemoglobin between study group and control group at $p = 0.001$ was rejected. The findings revealed that there was a significant difference between the study and control group in their haemoglobin level. The study findings were consistent with the study conducted by Ammu(2010) [2] experimental study on effectiveness of beetroot juice on improvement of haemoglobin among 60 adolescent girls. The study revealed that the mean score was 12.07 with SD of 0.96 during posttest. Association revealed that the demographic variable menstrual cycle was statistically significant association with the haemoglobin level at $p < 0.004$ and other demographic variables(age in years, religion, number of children in the family, type of food, number of meals per day, does their meal contain vegetables, do they have history of anaemia) had no statistically significant association with the haemoglobin. Hence, NH_3 stated earlier that 'there is no significant association between the posttest level of haemoglobin with selected demographic variables of study and control group at $p < 0.001$ was rejected for the menstrual cycle and was accepted for the other demographic variables.

VI. Conclusion:

Anaemia is a reduction in the oxygen carrying capacity of the blood; this may be caused by a decrease in red blood cell (RBC) production, or reduction in haemoglobin content of the blood, or combination of these. It is also a contributing factor to women developing health problems and dying during pregnancy and childbirth. In order to help to prevent anaemia in adolescent girls, the nurse must help them to understand the medical problems that affect in future. The beetroot juice contributes to improve the haemoglobin in the blood. The cost of the beetroot is low when comparing with other iron rich vegetables and it can be stored easily. So the researcher took the present study to show the effectiveness of beet root juice on improving haemoglobin level among the adolescent girls in selected school, Chennai. The researcher had her own limitation such as faced difficulty in seeking permission in selected school and could not control other foods rich in iron. The investigator recommending following points can be carried out in the future as All the adolescent girls who are anemic can take the beetroot juice for 20 days to improve their hemoglobin level, similar study can be conducted in larger samples, same study can be replicated in different settings, study can be combined with other available local resources (e.g. Plantain stem) and comparative study can be conducted between the beet root juice and beetroot juice with vitamin c rich food(lime).

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References:

Internet Resources:

- [1]. Chaudry, SM.Dhage VR., (2008) A study of anemia among adolescentfemales in the urban area of Nagpur, <http://www.ijcm.org.in>. DOI: 10.4103/0970-0218.43230
- [2]. Sudhagandhi,B (2011) Prevalence of anemia in the school children. <http://www.ijnpnd.com.article.DOI:0738.84212>
- [3]. World Health Organization(2001) .Iron deficiency anemia,Assessment prevention and control.A guide for programme managers NHD/ 01.<http://www.who.com>.
- [4]. Toteja,GS.(2006) Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India.Food and nutrition bulletin. <http://www.ncbi.nlm.nih.gov/pubmed/17209473>.
- [5]. Bulliyy.G (2007) Hemoglobin status of non school going adolescent girls in three districts of Orissa, India. International Journal of Adolescent Medicine and Health .<http://www.ncbi.nlm.nih.gov/pubmed/18348415>.

Unpublished Dissertation:

- [6]. Sherin Nithya(2009) Effectiveness of beetroot extract upon anemia among adolescent girls. Unpublished Dissertation.Dr.M.G.R University, Tamil Nadu.
- [7]. Ammu(2010) Experimental study on effectiveness of beetroot juice on level of anemia among adolescent girls. Unpublished dissertation.Dr.M.G.R University, Tamilnadu