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A Study to Assess the Effectiveness of Beetroot Juice on Hemoglobin Level Among Adolescent Girls in Government Inter College, Mothrowala, Dehradun, Uttarakhand

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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. Teenagers falling approximately between the ages of 10 to 19 years, adolescence are characterized by physical changes, more complex and hidden changes occur in an adolescent's attitude, outlook, and self-identity. Heavy monthly flow puts female adolescents at risk for iron deficiency anemia, with an incidence of about 9%, and another 15% to 20% of them have iron insufficiency without anemia. The prevalence of anemia among six groups as per the National Family Health Survey 5 (2019-21), is 25.0 percent in men (15-49 years) and 57.0 percent in women (15-49 years). 31.1 percent in adolescent boys (15-19 yrs.), 59.1 percent in adolescent girls,52.2 percent in pregnant women (15-49 years) and 67.1percent in children (6-59 months). Beetroot juice is possibly the best natural remedy for anemia. It has a high iron content that restores red blood cells while supplying oxygen and increasing the blood count.

Methodology: In this study Quantitative research approach was used for this study. A study was to assess the effectiveness of beetroot juice on hemoglobin level among adolescent girls in government Inter college. The research design selected was pre and post-test design by purposive sampling techniques. The study was conducted in 60 adolescent girls of government inter college, Dehradun. The standardized hemoglobin scale as per who criteria was as a tool for data collection. The research tool consists of 2 sections. section A include demographic variable section B include standardized hemoglobin scale as per who. The collected data was analyses and interpreted by using descriptive and inferential statistics.

Result- Statistical finding revealed that in the pre-test, mean score of hemoglobin in experimental group was 10.88 ± 1.124 and the pos- test mean was 11.87±1.194. The mean difference was 0.99 and the calculated paired 't' value 3.957 was found to be statistically at $P \leq 0.05$ level. In the pre-test, mean score of hemoglobin in control group was 11.24 ± 0.972 and the post-test mean score was 11.34 ± 0.959. The mean difference was 0.1 and the calculated paired 't' value 0.00017 was found to be statistically not significant at $P \leq 0.05$ level. In the pre- test mean score of hemoglobin was 10.88 in experimental group whereas in the control group the pre -test mean score was 11.24. The mean difference was 0.36 and the calculated unpaired 't' value 0.1063 was found to be statistically not significant at $p \leq 0.05$ level. In the post- test mean score of hemoglobin was 11.87 in experimental group whereas in the control group the

post -test mean score was 11.34. The mean difference was 0.53 and the calculated unpaired 't' value 2.65 was found to be statistically significant at $p \leq 0.05$ level.

Conclusion- This study concluded that beetroot juice administration was effective in increasing the hemoglobin level among adolescent girls.

Keywords: Adolescent girls, beetroot, hemoglobin, anemia

1. INTRODUCTION

Adolescence is a period in life that everyone must 'survive' in order to become an adult, although some goes through it more turbulently than others. Adolescence is also a sensitive period particularly for girls. Adolescents experience rapid physical, cognitive and psychosocial growth. This affects how they feel, think, make decisions, and interact with the world around them. Adolescent girls may experience a number of changes during menstruation, including: Menstrual cycle irregularities Periods may be irregular, especially in the first two years after a girl starts her period. Heavy or frequent periods. Heavy monthly flow puts female adolescents at risk for iron deficiency anemia, with an incidence of about 9%, and another 15% to 20% of them have iron insufficiency without anemia. Anemia is a condition in which the number of red blood cells or the haemoglobin concentration within them is lower than normal. Haemoglobin is needed to carry oxygen and if you have too few or abnormal red blood cells, or not enough haemoglobin, there will be a decreased capacity of the blood to carry oxygen to the body's tissues. There are multiple causes of anemia including genetic and dietary factors. The most common symptom of all types of anemia is fatigue (tiredness). Anemia Prevalence (NFHS4 and NFHS-5) in India- Adolescent girls age 15-19 years who are anemic: NFHS- 4 - 54.1 (%), NFHS - 59.1 (%) Anemia is a serious health problem whose prevalence worldwide according to WHO reaches 2.3 billion people and is generally experienced by women and children (United Nations Sub-Committee on Nutrition (ACC/SCN), 2000). Iron deficiency is the main cause of anemia, where blood hemoglobin levels are below normal levels (Camaschella, 2015). Anemia is a serious health problem whose prevalence worldwide according to WHO reaches 2.3 billion people and is generally experienced by women and children (United Nations Sub-Committee on Nutrition (ACC/SCN), 2000). A Beetroot naturally contains Vitamins B1, B2, B3, B6 and Vitamin C, phosphorus, calcium, sodium, potassium, iodine, iron and copper. From the ground and of the ground, many of these elements are picked up through the soil the vegetables grow within. In a similar way that gold finds its way into trees, then iron, calcium and copper is also absorbed by the plant in a similar fashion. These beetroot extract benefits combined bring a variety of Beetroot health benefits and attributes to the human diet.

STATEMENT OF THE STUDY

A study to assess the effectiveness of beetroot juice on Hemoglobin level among adolescent girls in Government Inter college, Mothrowala, Dehradun.

OBJECTIVES OF THE STUDY

1. To assess the pre and post-test hemoglobin level among adolescent girls in experimental and control group.
2. To evaluate the effectiveness of beetroot juice on hemoglobin level among adolescent girls in experimental group.
3. To find out the association of pre- test hemoglobin level among adolescent girls with their selected

demographic variables.

2. Material and method

The study was conducted at Govt. inter college, mothrowala, Dehradun, India. Written permission was obtained from authorities, Principal of government inter college and written consent was obtained from the subjects and after explaining the purpose of the study. The parents of the subjects are informed through daily dairy and written permission was obtained. Demographic variables, were used to collect the data from the adolescent girls. The Sample was selected by purposive sampling technique. Pre and post assessment was done using the digital hemoglobinometer method for checking hemoglobin level. The beetroot juice was prepared by cutting 100gm of fresh beetroot into small pieces and grind, the beetroot juice prepared for this was mixed with 50 ml of water and one teaspoon sugar. 100 ml of beetroot juice was given to each adolescent girl for 15 days in morning. Collected data was coded, tabulated and analyzed by descriptive and inferential statistics. It shows increase in level of hemoglobin in experimental group, thus suggesting that beet root juice was effective in increasing haemoglobin level.

3. DESCRIPTION OF TOOLS

The tool consists of 2 sections

Section A – demographic variables

Background variables which consist of Age, Age of menarche, Menstrual status, Education status of participants, Type of dietary pattern, Religion, Type of family, Occupation, Status of family members, Residential area, Family income per month, Any previous source of knowledge.

Section B – Standarized hemoglobin scale as per WHO criteria

Section B consist of the standardized scale which was originally developed by world health organization. It consists of 4 items Normal, Mild anemia, Moderate anemia and Severe anemia

The content validity of the tool was subjected to 9 experts from the field of community health nursing department. The pilot study was conducted among sample of 10 adolescent girls to ensure the feasibility and reliability of the tool at government inter college maldevta, Raipur. The study was conducted from 1-5-2024 to 15-5-2024.

4. **Statistical analysis** – Data analysis was based on the objectives and used descriptive and inferential statistics to analysis the data.

Descriptive Statistics

- Frequency and percentage distribution were used to analysis the demographic variables and level of hemoglobin among adolescent girls.
- Mean and standard deviation were used to describe the hemoglobin

Inferential Statistics

- Unpaired t-test was used to compare the pre- and post- test mean score of hemoglobin among adolescent girls received beetroot juice in experimental and control group
- Chi square test was used to find the association of pre-test level of hemoglobin with the selected demographic variables

5. Ethical consideration

- Written permission was taken from principal of state college of nursing, 107, Chander nagar, Dehradun
- Written permission was taken from ethical committee, state college of nursing, 107, Chander nagar, Dehradun
- Written permission was taken from principal of government inter college, maldevta, Dehradun for pilot study.
- Written permission was taken from principal of government inter college, mothrowala, Dehradun for main study.
- Consent was taken from parents and assent was taken from participants.
- The confidentiality was maintained throughout the study.

6. Results

Table 1: Frequency and percentage distribution of subjects by pre-test and post-test level of hemoglobin of experimental group and control group N=60

Group	level of HB	Score	Experimental- group				Control- group			
			Pre- test		Post test		Pre- test		Post test	
			f	%	f	%	f	%	f	%
1	Normal	>12gm	09	30.1	13	43.4	09	30.1	07	23
2	Mild	10-11.9gm	11	36.6	17	56.6	16	53.3	21	70
3	Moderate	7-9.9gm	10	33.3	0	0	05	16.6	02	7

Table 2: Comparison between pre- and post- test level of hemoglobin among adolescent girls in experimental and control group N-60

Group		Mean	SD	Mean-Difference	t-value	P-value
Experimental group	Pre- test	10.88	1.124	0.99	3.957	0.0004 S
	Post- test	11.87	1.194			
Control Group	Pre- test	11.24	0.972	0.1	0.00117	0.996 NS
	Post- test	11.34	0.959			

Tabulated value- 2.00, df -59

Description of table no 2 interprets that in the experimental group paired 't' test value (calculated) was 3.957 and paired t test value (tabulated) was 2.05 at P≤0.05 level. Which indicate intervention with beetroot juice was effective in experimental group and increasing the level of hemoglobin among adolescent girls.

Table-3: Comparison between pre-and post- test level of hemoglobin in experimental group and control group.N=60

Group		Mean	SD	Mean-Difference	t-value	P-value

Experimental group	Pre- test	10.88	1.124	0.36	0.1063	0.9157 NS
Control Group	Pre- test	11.24	0.972			
Experimental group	Post- test	11.87	1.195	0.53	2.65	0.01 S
Control Group	Post- test	11.34	0.957			

Tabulated value- 2.00, df -58

Description of table no 3: shows that in Experimental group mean value was 10.88 ±1.124 and in the control group pre-test mean value was 11.34±0.957. The unpaired 't' test (calculated) value was 0.1063 and unpaired 't' test (tabulated) value 2.00 was observed and showed a non- significant value at p≤0.05 level.

In the experimental group the result shows that there is increase in the level of hemoglobin after the post-test i.e., experimental group mean value 11.87±1.195 and in the control group post-test mean value was 11.34±0.957. The un paired 't' test (calculated) value was 2.65 and unpaired 't' test (tabulated) value 2.00 was observed and showed a significant value i.e. 2.65 at p≤0.05 level. Which indicate intervention with beetroot juice was effective in increasing the level of hemoglobin among adolescent girls

7. Discussion:

The pre- test mean score of hemoglobin in experimental group was 10.88 ±1.124 and post- test mean score was 11.87 ± 1.194. The mean difference was 0.99 and paired 't' test value (calculated) was 3.957 and paired t test value (tabulated) was 2.05 at P<0.05 level. Which indicate intervention with beetroot juice was effective in experimental group and increasing the level of hemoglobin among adolescent girls. The pre-test mean score of hemoglobin in control was 11.24 ±0.972 and post-test mean score was 11.34 ± 0.959. the mean difference was 0.1 and paired 't' test value (calculated) was 0.1 and t-test value (tabulated) was 2.05 at P≤0.05 level. Which indicate intervention without beetroot juice was not effective in control group. The pre- test mean score of experimental groups was 10.88 and control group was 11.24 and the mean difference was 0.36 and the calculated unpaired t test value was 0.1063 found to be statically not significant at p≤ 0.05 level. The post-test mean score of experimental groups was 11.87 and control group was 11.37 and the mean difference was 0.53 and the calculated unpaired t test value 2.65 was found to be statically significant at p≤0.05 level. The finding was supported by the study **Lusiana Dewi Saputri (2023)** conducted a true experimental study find out the effect of effect of beetroot juice consumption on hemoglobin level in anemic female adolescents in senior high school, Kediri, east java. A sample of 50 female students was selected by cluster sampling. Mean of hemoglobin level before and after intervention was tested using paired t-test. The Results of research study were Hemoglobin level increased after consuming beetroot juice 12.7 ±0.33 compared to before 10.34± 0.31 with p≤0.05 level. The study Concludes that there is an increase in hemoglobin levels after consuming beetroot juice than before.

8. Conclusion

The research concluded that beetroot juice administration was effective in increasing the hemoglobin level among adolescent girls.

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