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An experimental study to assess the effectiveness of fresh amla juice with elemental iron versus elemental iron supplementation on anemia among adolescent girls in selected school at Chennai

Devi JK*[1], Jainvanitha[2], Fabiola Dharaj[3], Vasantha S[4]

[1]Meenakshi Academy of Higher Education and Research, Chennai, Tamil Nadu, India
[2]GRT College of Nursing, Thirutani, Tamil Nadu, India
[3]Meenakshi College of Nursing, Kanchipuram, Tamil Nadu, India
[4]Shenbagha College of Nursing, Tamil Nadu, India

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ABSTRACT

The present study was undertaken to assess the effectiveness of fresh amla juice with elemental iron versus elemental iron supplementation on anaemia among adolescent girls in selected school at Chennai. A total of 50 adolescent girls within the age group of 13-16years with mild to moderate anaemia from selected schools in Chennai were part of the study after obtaining the written informed consent and assent as per guidelines. After recruiting, the participants were randomly grouped into two groups. Group 1: (n=25) 20ml fresh amla juice was given before lunch daily for 30 days and elemental iron 100 mg per week. Group 2: (n=25) 100mg of elemental iron per week for 30 days. Result – after intervention in the experimental group I the mean haemoglobin level increased (1.03gm/dl) than in control group II. The present study provides further evidence for the beneficial effects of amla juice in the management of anaemia. It concluded that fresh amla juice helps in iron absorption thereby increasing the HB level in experimental group I. We recommend further detailed studies in this area to recommend amla juice as a nutritive supplement for the management of anaemia.

* Corresponding Author

Name: Devi JK
Email: saisailesh.kumar@gmail.com

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INTRODUCTION

The word adolescent comes from the Latin word "adolescent" which means to come to maturity. As per the definition of WHO the individual in the age group of 10 – 19 years are considered adolescent. Adolescence is the transient period from childhood to adulthood. In this period of life where the maximum amount of physical, psychological and behavioural change takes place. Adolescence because of the rapid growth, expansion of total blood volume and onset of menstruation, increase iron requirement making them more susceptible to anaemia. Anaemia is a pathological condition where there is a decrease in the red blood cells or haemoglobin content of the body. Anaemia is one of the most widespread public health problems especially in developing countries like India. Even mild anaemia can lead to fatigue and interfere with a child's ability to perform at school. State anaemia begins in childhood worsens during adolescence in girls and get aggravated during pregnancy (Acheson S. K *et al.,* 1999; Ahlstrom S. K *et al.,* 2004; Andersen S. L *et al.,* 1997). There is a strong need to diagnose and manage anaemia in adolescent girls to avoid future complications. Amla is one of the precious gifts of nature to mankind. Amla is a rich source of vitamin C, among 1gm of Vit C per 100ml fresh amla juice and requisite for the synthesis of collagen, which is liable for keeping the cells of the body together. It has the same amount of vitamin C present in two

oranges. Amla is a good absorption agent for iron. Ascorbic acid is highly present in amla which increases the red blood cells count and helps to promote good health (Sheila John, 2007; Shrinandan-Bansal, 2008; Sharon manti. K, 2007). The present study was undertaken to assess the effectiveness of fresh amla juice with elemental iron versus elemental iron supplementation on anemia among adolescent girls in selected school at Chennai.

MATERIALS AND METHODS

Research design: True experimental research design.

Study setting: The study was conducted in selected schools in Chennai. A pilot study was conducted at Presidency govt girls Hr. Sec. School and Pathipaga Semmal P Ganapathy govt girls Hr. Sec school Chennai.

Study participants: A total of 50 adolescent girls within the age group of 13-16years.with mild to moderate anaemia from selected schools in Chennai were part of the study after obtaining the written informed consent as per guidelines. Multi-stage random sampling technique was used. In the first stage, two schools were selected randomly out of 20 schools found in Chennai district. In the second stage out of two schools by simple random experimental group I and control group II was selected. In the third stage according to inclusion criteria, the sample was selected by simple random sampling technique, lottery method was used.

Inclusion criteria

- ✓ In the age group 13-16years.
- ✓ Available during the data collection.
- ✓ Willing to participate in the study.
- ✓ Studying in 7th, 8th, and 9th standard.
- ✓ Having a haemoglobin level less than 12gms/dl. (Mild and Moderate)
- ✓ Attained menarche.

Exclusion criteria

- ✓ Having menstrual flow at the time of blood testing.
- ✓ Under treatment for anaemia
- ✓ Had major surgery within six months.
- ✓ Not given consent to get their blood test.
- ✓ Severe anaemia (<8gms% Hb)

After recruiting, the participants were randomly grouped into two groups.

Group 1: (n=25) 20ml fresh amla juice was given before lunch daily for 30 days and 100mg elemental iron per week.

Group 2: (n=25) 100 mg elemental iron per week is given for 30 days.

Preparation of fresh amla juice

1 kg of fresh amla was washed and cut into small pieces (pulp), and the seed was removed. Grind it in the juicer and strained it with extractor, 500ml of fresh amla juice was collected. 20ml of fresh amla juice daily and elemental iron 100 mg per week was administered to each adolescent girls in group I.This was done on each and every day for 30 days. Under the supervision of a dietician.

Standardisation of fresh amla juice

The standardisation of fresh amla juice was done at scientific food testing service (P) Ltd. Chennai. The result of the analysis showed that Vitamin c-134mg and iron-0.25mg per 20ml.of amla juice.

Outcome variables

Development of tool: The tool consists of two parts.

Part I consists of 2 sections.

A. Demographic variable proforma

Demographic variable proforma consist of age in years, educational status, religion, educational status of the mother, family income per month in rupees, dietary pattern, type of family, number of children in the family, the source of knowledge regarding anaemia.

B. Clinical variable proforma

Clinical variable proforma consists of weight in kg, height in cm, BMI, level of haemoglobin, age at menarche, menstrual cycle, the frequency of menstrual cycle in days, number of days of menstruation flow, Number of pad wet per day, history of recent worms' infestation(<1yrs).

Part II Rating scale on the level of satisfaction of fresh amla juice and elemental iron supplementation. Rating scale on the level of satisfaction consists of the duration of administration, use, amount, taste, smell, no side effect, easily available, easy to administer, cost-effectiveness, easy to store.

Score description: Highly satisfied response is scored 3, a satisfied was scored 2, and the dissatisfied response was scored 1 — total score 30.

Score interpretation

>75% (21-30) Highly satisfied
51-75% (11-20) Satisfied
<50%(1-10) Dissatisfied

Estimation of haemoglobin: Haemoglobin levels were estimated using standard cyanmethemoglobin methods as per the guidelines of WHO.

Table 1: Distribution of demographic variables among the group I and group II

Sl. No	Demographic Data	Group I		Group II	
		Frequency	%	Frequency	%
1.	Age (in yrs.)				
	a) 13-14	23	92	20	80
	b) 15-16	2	8	5	20
2.	Educational status				
	a) VII std	4	16	2	8
	b) VIII std	8	32	12	48
	c) IX std	13	52	11	44
3.	Family income				
	a) <5000	2	8	1	4
	b) 5001-7000	2	8	2	8
	c) 7001-9000	2	8	10	40
	d) 9001-11000	17	68	11	44
	e) 11001-13000	2	8	0	0
	f) >13000	0	0	1	4
4.	Dietary pattern				
	a) vegetarian	6	24	3	12
	b) non vegetarian	19	76	22	88
5.	Type of family				
	a) Nuclear	16	64	17	68
	b) Joint	9	36	8	32
6.	Religion				
	a) Hindu	24	96	20	80
	b) Christian	1	4	5	20
	c) Muslim	0	0	0	0
7.	No. of children in the family				
	a) One				
	b) Two	2	8	3	12
	c) Three	17	68	15	60
	d) More than three	5	20	6	24
		1	4	1	4
8.	Source of knowledge regarding anaemia obtained from				
	a) Mass media	11	44	10	40
	b) Health professional	0	0	1	4
	c) Family member	6	24	5	20
	d) Health programmes	8	32	9	36

Table 2: Distribution of clinical variables among the group I and group II

Sl. No	Clinical variable	Group I		Group II	
		No.	%	No.	%
1	Weight in kg				
	a) 26-35	2	8	2	8
	b) 36-45	13	52	13	52
	c) 46-55	7	28	7	28
	d) 56-65	3	12	3	12
2	Height in cm				
	a) 130-139	1	4	0	0
	b) 140-149	7	28	6	24
	c) 150-159	17	68	19	76
	d) 160-169	0	0	0	0
3	BMI				
	a) Normal	13	52	14	56
	b) Underweight	11	44	10	40
	c) Overweight	0	0	1	4
	d) Obesity	1	4	0	0

Table 2: Distribution of clinical variables among the group I and group II (Contd….)

Sl. No	Clinical variable	Group I		Group II	
		No.	%	No.	%
4	Hb level in gm/dl				
	a) <8	0	0	0	0
	b) 8- 9.9	8	32	17	68
	c) 10 - 11.9	17	68	8	32
5	Age at menarche in yrs				
	a) 11	0	0	3	12
	b) 12	13	52	12	48
	c) 13	12	48	9	36
	d) 14	0	0	1	4
6	Menstrual cycle				
	a) Regular	12	48	14	56
	b) Irregular	13	52	11	44
7	The frequency of your menstruation cycle in days				
	a) <21	2	8	0	0
	b) 21-23	1	4	0	0
	c) 24-26	8	32	8	32
	d) 27-29	14	56	12	48
	e) >30	0	0	5	20
8	Number of days menstrual flow				
	a) <3days	6	24	0	0
	b) 3-5days	16	64	23	92
	c) >5days	3	12	2	8
9	Number of pads wet per day				
	a) 1	5	20	0	0
	b) 2	14	56	14	56
	c) 3	6	24	10	40
	d) 4	0	0	1	4
10	History of recent worm infection <1year				
	a) Yes	16	64	16	64
	b) No	9	36	9	36

Table 3: Mean and Standard deviation of haemoglobin Pretest and posttest in Group I and Group II

Level of haemoglobin	Study group	Mean	S.D.	't'value
Pre test	Group I	10.21	1.12	2.473
	Group II	9.38	1.24	
Post test	Group I	11.24	1.17	3.888
	GroupII	10.08	1.25	Significant

Mild anemia - 10-11.9gm/dl
Moderate anemia - 8-9.9gm/dl
Severe anemia - <8gms/dl

Ethical consideration

The present study was approved by the institutional human ethical committee. Informed consent and assent were obtained as per the guidelines of ICMR. Confidentiality of data was ensured.

Data analysis

Data were analysed using SPSS 20.0 version. Descriptive and inferential statistics were used to analyse data. Data was represented as frequency and percentage.

RESULTS

Table 1 explains the distribution of demographic variables among the group I and group II. Table 2 presents the distribution of clinical variables among the group I and group II. Table 3 presents the Mean and Standard deviation of haemoglobin Pretest in Group I and Group II. Table 3reveals that the mean pretest Hb value in group I was found to be 10.21 with standard deviation 1.12.and in group II The mean value 9.38 with standard deviation 1.24. with the t' value 2.473. In posttest mean HB value in group I was found to be 11.24 with standard deviation 1.17 and in group II the mean value was 10.08 with standard deviation 1.25 with t' value 3.888. It is significant in mean value and

Table 4: Association between demographic variables and Hb level before and after among group I and group II

Sl. No	Demographic Data	Group I		Group II		X2
		Frequency	%	Frequency	%	
1.	Age (in yrs)					
	a)13-14	23	92	20	80	1.495
	b)15-16	2	8	5	20	N.S.
2.	Educational status					
	a) VII std	4	16	2	8	1.633
	b) VIII std	8	32	12	48	N.S.
	c) IX std	13	52	11	44	
3.	Family Income					
	a) <5000	2	8	1	4	
	b)5001-7000	2	8	2	8	
	c)7001-9000	2	8	10	40	9.952
	d)9001-11000	17	68	11	44	N.S.
	e)11001-13000	2	8	0	0	
	f)>13000	0	0	4	4	
4.	Dietary pattern					
	a) Vegetarian	6	24	3	12	1.220
	b) Non-vegetarian	19	76	22	88	N.S.
5.	Type of family					
	a) Nuclear	16	64	17	68	
	b) Joint	9	36	8	32	0.089
	c) Extended	0	0	0	0	N.S.
6.	No of children in the family					
	a) One	2	8	3	12	
	b) Two	17	68	15	60	0.416
	c) Three	5	20	6	24	N.S.
	d) More than three	1	4	1	4	
7.	Source of knowledge regarding anaemia obtained from					
	a) Mass media	11	44	10	40	
	b) Health professionals	0	0	1	4	1.197
	c) Family member	6	24	5	20	N.S.
	d) Health programmers	8	32	9	36	
8.	Religion					
	a) Hindu	24	96	20	80	
	b) Christian	1	4	5	20	3.030
	c) Muslim	0	0	0	0	N.S.

standard deviation of posttest Hb value at $p<0.05$ level.

Table 4reveals that there is no significant association between Hb level before and after in adolescent girls and their demographic variables like age, educational status, family income, dietary pattern, type of family, number of children in the family, the source of knowledge regarding anaemia, religion based on chi-square value at p-value <0.05.Table 5reveals that there is no significant association between HB level before and after and their clinical variables like weight, height, BMI, HB level, age at menarche in yrs, menstrual cycle, frequency of a menstrual cycle in days, number of pad wet per day , history of recent worm infestation <1years based on chi-square value at p-value < 0.05. There is a significant association between Hb level before and after intervention and their clinical variable in a number of days' menstrual flow. Table 6 presents the rating scale on the level of satisfaction of the administration of fresh amla juice and elemental iron in group I and group.

DISCUSSION

Anaemia is a silent killer and serious health problem throughout the world. The decrease in the red blood cell count or decrease in the haemoglobin levels in the blood is called anaemia (Kumari S., Singh S, 2003). It mainly decreases the oxygen-carrying capacity of the blood and effects all the tissues of the body leading to the condition called hypoxia (Mathur JSS, 2007). The most common cause of anaemia in India is a deficiency of iron. Other deficiencies include deficiency of folic acid, vitamin

Table 5: Association between clinical variable and level of Hb before and after of group I and group II

Sl. No	Clinical variable	Group I		Group II		X2
		No.	%	No.	%	
1	Weight in kg					
	a)26-35	2	8	2	8	
	b)36-45	13	52	13	52	1.197
	c)46-55	7	28	7	28	N.S.
	d)56-65	3	12	3	12	
2	Height in cm					
	a) 130-139	1	4	0	0	
	b) 140-149	7	28	6	24	1.188
	c) 150-159	17	68	19	76	N.S.
	d) 160-169	0	0	0	0	
3	BMI					
	a) Normal	13	52	14	56	
	b) Underweight	11	44	10	40	2.085
	c) Overweight	0	0	1	4	N.S.
	d) Obesity	1	4	0	0	
4	Hb level in gm/dl					
	a) <8	0	0	0	0	
	b) 8 - 9.9	8	32	17	68	0.89
	c) 10 - 11.9	17	68	8	32	N.S.
5	Age at menarche in yrs.					
	a) 11	0	0	3	12	
	b) 12	13	52	12	48	4.469
	c) 13	12	48	9	36	N.S.
	d) 14	0	0	1	4	
6	Menstrual cycle					
	a) Regular	12	48	14	56	1.14
	b) Irregular	13	52	11	44	N.S.
7	The frequency of your menstruation cycle in days					
	a) <21	2	8	0	0	
	b) 21-23	1	4	0	0	
	c) 24-26	8	32	8	32	8.154
	d) 26-29	14	56	12	48	N.S.
	e) >30	0	0	5	20	
8	Number of days menstrual flow					
	a) <3days	6	24	0	0	
	b) 3-5days	16	64	23	92	7.456
	c) >5days	3	12	2	8	(significant)
9	Number of pads wet per day					
	a) 1	5	20	0	0	
	b) 2	14	56	14	56	0.321
	c) 3	6	24	10	40	N.S.
	d) 4	0	0	1	4	
10	History of recent worm infection<1year					
	a) Yes	16	64	16	64	0.000
	b) No	9	36	9	36	N.S.

B12 and vitamin A (Antia FP, Abraham, 1997). Malnutrition, early childbearing & reproductive health problems were reported as very common causes of anaemia in young girls in India (Asha KP, 2010). Further, there was no awareness about the nutritious status in the girls (Ezzati M *et al.,* 2004). Majority of the adolescent girls were reported not having minimum knowledge about the nutrition values to be consumed as per the growth (Zijp IM *et al.,* 2000). As there is an increase in the demands of nutrition along with increased growth and also there will be a loss of blood due to the menstrual cycle (World Health Organization). Earlier studies reported that there is a strong need to add the iron supplements in the diet of these adolescent girls (National Nutrition Monitoring Bureau (NNMB),

2002). Further, there is a strong need to conduct the sessions for training and increasing awareness in this population. The present study was undertaken to assess the effectiveness of fresh amla juice with elemental iron versus elemental iron supplementation on anaemia among adolescent girls in selected school at Chennai. The present study assessed the effectiveness of fresh amla juice with elemental iron and found that the adolescent girls in group I had increased the mean Hb level more than group II. The study concluded that the fresh amla juice helps in iron absorption thereby increasing the Hb level in group I. It was reported that supplements with rich of iron are beneficial in the management of the anaemia (Saroja Prabhakaran, 2006). Amla was reported to be very useful in the management of anaemia as it consists of large amounts of iron; it favours the synthesis of haemoglobin (Singh, 2003). Our study results are in accordance with earlier studies as we have observed similar results in our study.

Table 6: Rating scale on the level of satisfaction of administration of fresh amla juice and elemental iron in group I and group II

Sl. No	Level of satisfaction	Group I		Group II	
		No.	%	No.	%
1.	Highly satisfied	25	100	15	60
2.	Satisfied	0	0	9	36
3.	Dissatisfied	0	0	1	4

CONCLUSION

The present study provides further evidence for the beneficial effects of amla juice in the management of anaemia. We recommend further detailed studies in this area to recommend amla juice as a nutritive supplement for the management of anaemia.

Conflicts of interest: None declared.

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REFERENCES

Acheson S. K, Richardson R, Swartzwelder H. S (1999). Developmental changes in seizure susceptibility during ethanol withdrawal. Alcohol. 18:23–26.

Ahlstrom S. K, Osterberg E. L (2004). International perspectives on adolescent and young adult drinking. Alcohol Research and Health. 28(4):258.

Andersen S. L, Dumont N. L, Teicher M. H (1997). Developmental differences in dopamine synthesis inhibition by 7-OH-DPAT. Naunyn-Schmiedeberg's archives of pharmacology. 356(2):173–181.

Antia FP, Abraham (1997). Clinical dietetics and nutrition. 4th ed. Oxford, Oxford university press. 328.

Asha KP, Indu D, Ali A (2010). Prevalence of Anaemia among Adolescent girls (10-19 years) in Urban Slums of Thiruvananthapuram Corporation. Kerala Medical Journal. 3(4):143-7.

Dr ShrinandanBansal. (2008). Food and nutrition. (2 Eds). Delhi: A.I.T.B.J Publishers.

Ezzati M, Lopez AD, Rodgers AA, Murray CJL (2004). Comparative quantification of health risks: the global and regional burden of disease attributable to selected major risk factors. Geneva, Switzerland: World Health Organization.

Kumari S., Singh S (2003). Ind. J. Nutr. Dietet, 40;147-152.

Mathur JSS (2007). Preventive and Social Medicine, A comprehensive textbook. 1st ed. New Delhi: CBS Publishers and Distributors; 382-89.

National Nutrition Monitoring Bureau (NNMB) (2002). NNMB Micronutrient Survey. National Institute of Nutrition, Hyderabad.

Saroja Prabhakaran. (2006). Fighting anaemia with iron-rich foods. *Health Action*, 19(2), 6-8.

Sharon manti. K. Lewis. Margaret. (2007). Medical-Surgical Nursing. Assessment and Management of Clinical Problems. (7 Eds) Newyork: Mosby Publications. Missouri.

Sheila John. (2007). *Essential of nutrition and Dietetics for nursing.* Chennai. B.I. Publication.

Singh (2003). Techno-Economic study on the processing of amla products, 30(1), 68-69.

World Health Organization. Strategic directions for improving adolescent health in the South-East Asia Region.

Zijp IM, Korver O, Tijburg LB (2000). Crit Rev Food SciNutr. 40(5);371-98.