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Effectiveness of Dietary Intervention on Iron Deficiency Anemia among Nursing Students in Selected Nursing Colleges, Mangaluru

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ABSTRACT

Introduction: Anemia is a medical condition characterized by low red blood cell counts, which lead to hypoxia, or insufficient oxygenation of body tissue. Anemia is caused by an inadequate Iron supply in the body. Raising hemoglobin levels is essential in preventing anemia. Anemia is the major nutritional problem in India. The prevalence of anemia is higher among developing nations, because of low socioeconomic status and lack of access to the healthcare services. A study was aimed to evaluate the effectiveness of dietary interventions on Iron deficiency anemia among selected 1st year B.Sc. Nursing and GNM students in Mangaluru. **Methods:** An evaluative approach with one- group pre test – post test design was used for the study. Permission was obtained from the concerned authority for conducting the study. The purposive sampling technique was used to draw 30 female nursing students. On day 1, Students were assessed for signs and symptoms of Iron deficiency anemia using signs and symptoms checklist and classified as mild, moderate, and severe anemia. Level of anemia was assessed by checking the hemoglobin percentage using hemoglobinometer. The samples who were having Hb percentage below 12gm/dl were administered dietary intervention which included rice flake balls (125 gms) and a gooseberry (10 gms) for 30 days and on day 31st, samples were checked for Hb percentage and signs and symptoms of Iron deficiency anemia. **Result:** In the pre test mean Hb percentage was 10.620 ± 0.875 and in the post test mean Hb percentage was 12.003 ± 1.046 Hb values were increased in the post test. In the pretest majority 70% of them had mild anemia and 30% had moderate anemia. Whereas in the post test all had mild anemia. The pre test mean signs and symptoms score was 4.1 ± 0.9 and the post test mean signs and symptoms score was 1.86 ± 0.68. This shows the post test mean signs and symptoms score was reduced from the pre test. **Interpretation:** The finding of the study proved that the dietary intervention was an effective measure to improve the hemoglobin level of nursing students. **Conclusion:** It was concluded that dietary intervention of rice flakes balls and gooseberry administered may be effective in improving iron status of nursing students to prevent Iron deficiency anemia.

Keywords: Dietary intervention; Iron deficiency anemia; Rice flake ball; Gooseberry

INTRODUCTION

According to WHO the period of youth is from 15 to 24 years. Nursing students belongs to teenager/ youth group. Teenage years are a time when people dream of becoming successful and beautiful and living up to the expectations that their role model set. The period between childhood and adulthood is a transition period. Females are essential in contributing and training responsible citizen for the country. In addition to being crucial during her reproductive years, a woman's health is also important in general. Physical, psychological, and social needs of women are prioritized in terms of their health. [1]

Iron deficiency anemia is a common type of anemia in which blood lacks enough healthy red blood cells, the body's oxygen is delivered via red blood cells.[2] Due to their increased iron requirements from their rapid growth; adolescents are particularly susceptible to an iron deficiency. Due to a greater increase in a blood volume, muscle mass, and myoglobin during peak pubertal growth, teenagers have higher iron demands.[3] Menstrual blood loss in girls which amounts to 20 mg of iron each month but occasionally reach 58 mg, females need for iron continue to be high after menarche.[4] Numerous studies have shown that eating gooseberries and dates with honey can raise hemoglobin level. The short-term remedy for an iron deficiency is

typically to take iron supplements. But when examining an iron deficiency, it's also important to consider how the other minerals relate to one another.[5]

This study hypothesized that there is significant difference in the Hb percentage, signs and symptoms score of Iron deficiency anemia before and after the dietary intervention and there is a significant association of post test signs and symptoms score and selected demographic variables. This study aimed to find the effectiveness of dietary intervention on Iron deficiency anemia among nursing students in selected nursing colleges, Mangaluru.

MATERIALS AND METHODS

Research approach:

A quantitative evaluative approach was used to evaluate the effectiveness of dietary intervention on Iron deficiency anemia among the nursing students of selected nursing colleges of Mangaluru.

Research design:

In this study one group pre test post test research design was used (Figure 1).

Sample:

In this study 30 female nursing students with Hemoglobin <12gm/dl were selected for the intervention.

Sample size estimation:

The sample size is calculated using the sample estimation formula

$$n = \frac{(Z\alpha)^2 \times (S.D)^2}{d^2}$$

Substituting the values of previous similar study:

d =1.97, S.D =3.1, Zα =1.96 at 95 % confidence level, sample size is n=10.

Since the calculated sample size was small, the researcher increased the sample size to 30. Hence 30 students were selected. The investigators increased the sample size for improved accuracy, as larger sample size reduces the margin of errors and increases the precision.

Sampling technique:

In this study purposive sampling technique was used to select the sample of nursing students from selected colleges of Mangaluru.

Description of the tool:

- **Demographic proforma:** This consists of demographic characteristics of the sample such as age, marital status, birth order, total family members, family income per month, religion, type of food consumption, health information, residence, present living status, exercise, and type of physical activity.
- **Hemoglobinometer:** Standardized Hemoglobinometer.
- **Checklist on signs and symptoms of Iron deficiency anemia:** The checklist has 8 items on signs of Iron deficiency anemia and 8 items on symptoms of Iron deficiency anemia, either of the signs or symptoms present then it will be scored 1. The total score would be 16. Based on the arbitrary classification it is categorized as scores less than 5 mild anemia, 5-9 moderate anemia and 10-16 severe anemia.

Content validity of the tool:

It is concerned with the scope of coverage of the content area to be measured. More often it is applied in tests of knowledge measurement. It is mostly used in measuring complex psychologic tests of a person. It is a case of expert judgement about the content area included in the research instrument to measure a particular phenomenon.

In this study the prepared demographic proforma and the signs and symptoms checklist along with objectives and criteria checklist was submitted to four experts for content validation. Experts were requested to give their opinion and suggestions regarding each item in the tool. The items were modified according to the recommendations and suggestions of the experts. All the items in the tool were agreed by all the experts.

Reliability of tool:

The reliability was established by using intra rater reliability. Karl Pearson coefficient correlation formula was used. Obtained r value for signs and symptoms checklist was 0.89. Hence the tool was reliable.

Classification of Anemia:

Grading of anemia	Hb % (gm/dl)
Severe	<8
Moderate	8-10
Mild	10-12
Normal	> 12

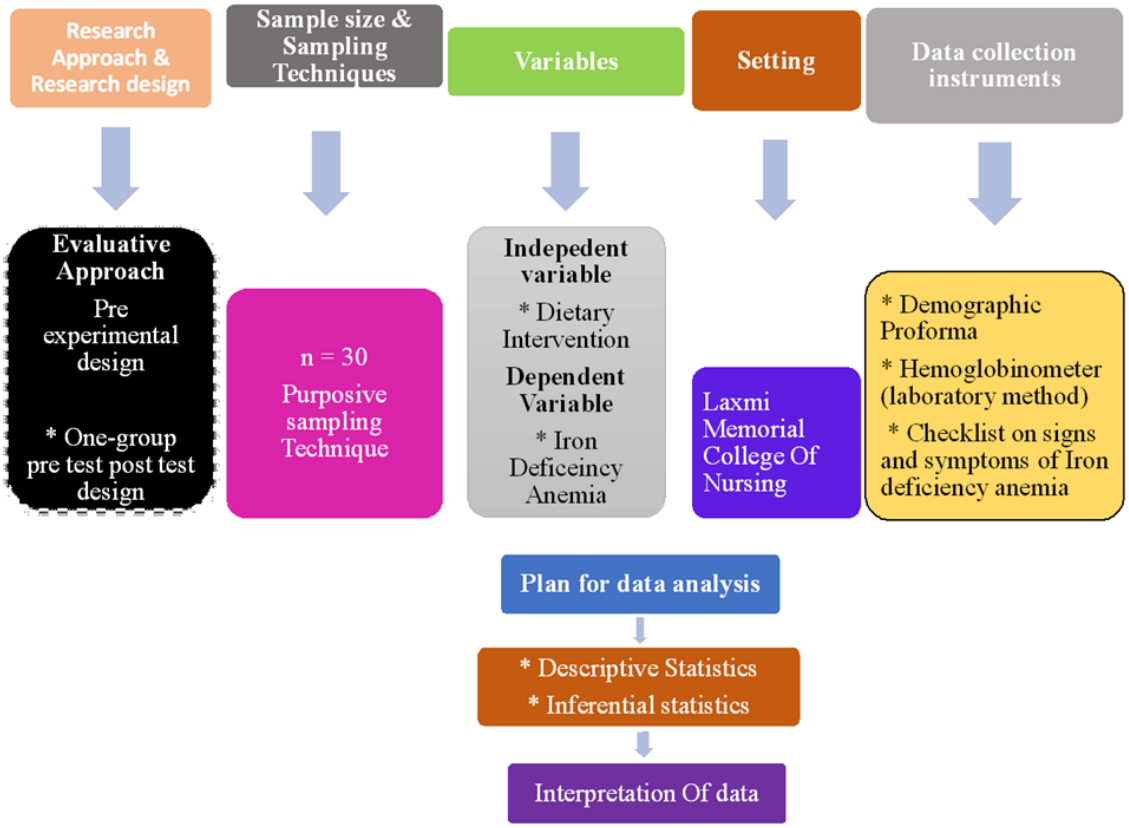

Fig. 1: Schematic representation of Research Design

Data collection method:

- Permission was obtained from the ethical committee prior to the study.
- Permission was obtained from the nursing college authority to select the nursing students.
- Consent was taken from the 1st year B.Sc nursing and GNM students to screen the hemoglobin level.
- All the female students were screened for hemoglobin level and then 30 students who were having hemoglobin level below 12gm/dl were selected as samples by using nonprobability purposive sampling technique.
- The signs and symptoms of Iron deficiency anemia was assessed by using Iron deficiency anemia signs and symptoms checklist.
- A dietician was appointed for the preparation of the dietary intervention in order to maintain the standard value.
- Dietary Intervention included 125 grams of rice flake ball and approximately 10 gm of gooseberry.
- A 125 gram rice flake ball included rice flakes, jaggery, roasted bengal gram and dry coconut.
- The dietary intervention was administered to the sample daily in the morning 10 am under the supervision of the researcher for a period of 30 days.
- Prior to the pretest, de-worming was done by administering tablet Albendazole 400mg.
- On 31st day again Hb percentage was checked, and Signs and Symptoms of Iron deficiency anemia was assessed using checklist.

Ethical consideration:

Ethical approval was obtained from the Institutional Ethics Committee.

Data analysis:

It was decided to analyse the data by both descriptive and inferential statistics. To compute the data. A master data sheet was prepared. Demographic proforma containing sample characteristics was analysed by using frequency and percentage. Hemoglobin level would be presented in the form of Hb percentage. t test would be used to find out the significant difference between the mean pre and post test Hb percentage. Signs and symptoms of anemia was presented in

terms of frequency and percentage. λ^2 test used to find out the association of demographic variables and hemoglobin level. The findings are presented in the form of tables.

RESULTS

Description of demographic variables:

The baseline proforma of the samples showed that the highest percentage of the samples. (56.6%) are in the age group 19 years. Whereas least of them (10%) are in the age group of 18 years. None of them in group are married. Highest percentages are in the 1st and 2nd birth order (46.6% and 40%) respectively. Majority (66.6%) are having more than 4 members in the family. Most of the samples (96.6%) belongs to nuclear family and none of them are from extended family. The highest percentage of (40%) sample family monthly income is between 20,000 – 35,000. Whereas least (13.3%) of them have income above 35,000/- per month. Majority of the samples are Christians (60%). All the samples are non-vegetarian (100%). Highest percentage of samples obtained health education from friends and relatives and similar percentage (13.3%) obtained health information from newspapers, magazines, and health professionals. The majority of the samples (66.6%) are from rural area. Majority of them (80%) have not taken deworming once in six months. Majorities of the samples (66.6%) are hostelites whereas the least percentage are day scholars. Most of the samples (90%) are not doing exercise regularly. The majority of the samples (86.6%) are involved in walking and none of the sample is involved in cycling and yoga.

Pre and Post test mean hemoglobin level:

The pre test mean hemoglobin percentage is 10.62gm/dl $\pm$ 0.87 and the post test mean hemoglobin level is 12gm/dl $\pm$ 1.04. This shows that the post test mean hemoglobin level is reduced from the pre test mean hemoglobin level.

Mean Iron deficiency anemia Signs and Symptoms score of samples:

The data in the Table 3 shows that the pre test mean signs and symptoms score is 4.1 $\pm$ 0.9 and the post test mean signs and symptoms score is 1.86 $\pm$ 0.68. This shows that the post test mean signs and symptoms score is reduced from the pre test.

Level of anemia before and after dietary intervention:

In the pre test, majority (70%) of them had mild anemia and none of them were severely anemic. But 30% are moderately anemic, whereas in the post test all have mild anemia. None of them are severely or moderately anemic.

Item wise frequency and percentage distribution of samples based on signs and symptoms of anemia:

Data in the Table 5, findings show that, majority of the samples (76.6%) had pallor in conjunctiva in pretest and in the post test 10% of them had pallor in conjunctiva. Only 6 students had pallor in nails in the pretest and none of them has pallor in nails in post test. Only one sample had tachycardia in pre test and none of them had tachycardia in the pos test. Two sample in the pretest had puffiness of face and after intervention only on sample had it. Least percentage (10%) of the samples had irritability in the pre test and it reduced (3.3%) in the post test. Highest percentage (56.6%) of the samples had brittle hair in the pretest and it reduced to 40 percentage in the post test. Most of the samples (96.6%) were having fatigue in the pre test, and after post test only 60% of the samples are fatigue. Highest percentage of the sample in the pre test had symptoms like loss of appetite and head ache (60% and 63.3% respectively) and least percentage had loss of appetite and head ache after post test (13.3%) and least percentage (10%) had breathlessness in the pre test and none of them had breathlessness in the post test. Only 5 samples had giddiness in pre test and it reduced to 2 in the post test, two samples had bone pain the pre test, and in the post test only one sample had it.

Comparison of significant difference between pre test and post test hemoglobin percentage among nursing students:

Post test mean (12.00) hemoglobin percentage is increased than the pretest (10.62). The mean difference before and after the intervention is significant ($p < 0.05$) at 5% level of significance. Hence null hypothesis is rejected, and research hypothesis is accepted, thus it shows the dietary intervention is effective increasing the hemoglobin level

Comparison of significant difference between mean pre test and post test score of signs and symptoms score of anemia among nursing students:

The mean difference before and after the dietary intervention is significant ($p < 0.05$) at 5% level of significance. Hence null hypothesis is rejected and research hypothesis is accepted. Thus, it shows that dietary intervention is effective in reducing the signs and symptoms of Iron deficiency anemia.

Association of selected demographic variables with post test Iron deficiency anemia signs and symptoms scores of Iron deficiency anemia:

There is no significant association of selected demographic variables with post test signs and symptoms scores of iron deficiency anaemia among nursing students as the calculated λ^2 value is less than the table calculation at 0.05 level of significance ($p < 0.05$). Hence the null hypothesis is accepted.

Table 1: Frequency and percentage distribution of samples based on demographic variables

Demographic Variables	Frequency (f)	Percentage (%)	Demographic Variables	Frequency (f)	Percentage (%)
Age (in years)			**Marital status**		
18	3	10	Unmarried	30	100
19	17	56.6	Married	0	0
20	6	20	**Total family members**		
21	4	13.3	<4	20	66.6
Birth order			5	7	23.3
1st	14	46.6	>6	3	10
2nd	12	40			
3rd	4	13.3	**Family income per month (In rupees)**		
4th and above	0	0	<10000	6	20
Type of family			10000-20000	8	26.6
Nuclear	29	96.6	20001-35000	12	40
Joint	1	3.3	>35000	4	13.3
Extended	0	0	**Type of food consumption**		
Religion			Vegetarian	0	0
Hindu	11	36.6	Non – vegetarian	30	100
Muslim	1	3.3	Residence		
Christian	18	60	Urban	10	33.3
Health information			Rural	20	66.6
Newspaper/Magazines	4	13.3	**Present living status**		
Radio/Television	8	26.6	Hostel	20	66.6
Friends/Relationships	13	43.3	Day scholar	4	13.3
Health professionals	4	13.3	Paying guest	6	20
Others	1	3.3	**Type of physical activity performed by you**		
Are you taking deworming once in 6 months			Nil	3	10
Yes	6	20	Walking	26	86.6
No	24	80	Cycling	0	0
Will you do exercise regularly			Yoga	0	0
Yes	3	10	Exercise	1	3.3
No	27	90			

Table 2: Pre and Post test mean hemoglobin level

SL. No.	Pre test			Post test		
	Obtained range of score	Mean	S.D	Obtained range of score	Mean	S.D
1.	8.5-11.8	10.62	0.87	9.3-14.3	12.00	1.04

Table 3: Mean Iron deficiency anemia Signs and Symptoms scores of samples

SI.NO.	Pre test			Post test		
	Obtained Range score	Mean	S.D	Obtained Range score	Mean	S.D
1.	3-7	4.1	0.9	1-3	1.86	0.61

Table 4: Frequency and percentage distribution of samples based on level of anemia

Level of Anemia	Pretest		Post test	
	f	%	F	%
Mild	21	70%	30	100%
Moderate	9	30%	0	0
Severe	0	0	0	0

Table 5: Item wise frequency and percentage distribution of samples based on signs and symptoms of anemia

Sl No	Content	Pre Test		Post Test	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
I.	**Signs**				
1.	Pallor				
	• Conjunctiva	23	76.6	3	10
	• Tongue	-	-	-	-
	• Nail	6	20	-	-
2.	Glossitis	-	-	-	-
3.	Stomatitis	-	-	-	-
4.	Oedema				
	• Face	-	-	-	-
	• Leg	-	-	-	-
5.	Tachycardia	1	3.3	-	-
6.	Puffiness of face	2	6.6	1	3.3
7.	Irritability	3	10	1	3.3
8.	Brittle hair	17	56.6	12	40
II.	**Symptoms**				
9.	Fatigue	29	96.6	18	60
10.	Loss of appetite	18	60	4	13.3
11.	Headache	19	63.3	4	13.3
12.	Breathlessness	3	10	-	-
13.	Giddiness	5	16.6	2	6.6
14.	Palpitation	-	-	-	-
15.	Bone pain	2	6.6	1	3.3
16.	Numbness	-	-	-	-

Table 6: Comparison of significant difference between pre test and post test hemoglobin percentage among nursing students

SI.NO.	Variable	Range (g/d L)	Mean	SD	Mean difference	t value	Table value	t	dF	Inference
1.	Pre test	8.5-11.8	10.62	0.875	1.38	11.07	2.05		29	Significant
2.	Post test	9.3-14.3	12.003	1.046						

P < 0.05

Table 7: Significant difference between mean pre test and post test score of signs and symptoms of anemia among nursing students

Test	Mean	SD	Mean Difference	t value	Table value	t	Df	Inference
Pretest	4.1	0.9	2.24	12.59	2.05		29	Significant
Post test	1.86	0.618						

P < 0.05

Table 8: Association of selected demographic variables with post test signs and symptoms scores of Iron deficiency anemia

Variables	λ^2	Table value	Df	Remark
• Birth order	1.67	3.84	1	N.S
• Total family members	1.21	3.84	1	N.S
• Family income per month	0.368	3.84	1	N.S
• Health information	0.170	3.84	1	N.S
• Residence	0.341	3.84	1	N.S
• Deworming	0.170	3.84	1	N.S
• Present living status	2.727	3.84	1	N.S

(N S = Not Significant); ($p< 0.05$)

and the research hypothesis is rejected.

DISCUSSION

4.1 Discussion on Effectiveness of dietary intervention on hemoglobin percentage and Iron deficiency anemia signs and symptoms score

In the present study the findings shows that there was significant difference between the mean pre test and post test haemoglobin percentage at 0.05 level of significance ($p < 0.05$). Similar findings were also observed in the study conducted at rural areas in Dharapuram[6], Dindigul[7], Hubballi[8],Pondicherry[9] and at Thiruvallur[10] showed similar result that the mean pre test and post test hemoglobin percentage difference was significant at 0.05 level of significance.

In the present study, findings shows that there was significant difference between pre test and post test Iron deficiency anemia signs and symptoms score at 0.05 level of significance ($p<0.05$), similarly findings of the study conducted at Dindigul[7] and at Thiruvallur[10] similar result was observed, That the mean pre test and post test signs and symptoms score difference was significant.

4.2 Description of association of post test score of Iron deficiency anemia signs and symptoms score with selected demographic variables

In the current study chi square test was used to find the association of selected demographic variables with post test signs and symptoms scores of Iron deficiency anemia among nursing students and found that there is no significant association of birth order, total family members, family income, health information, residence, de-worming, present living status with signs and symptoms score of samples with Iron deficiency anemia as the calculated chi square value is less than the table value at 0.05 level of significance ($p< 0.05$). Hence the null hypothesis is accepted, and the research hypothesis is rejected similarly study conducted on adolescents girls at Nanchiyampalayam showed no association with signs and symptoms score of Iron deficiency anemia after nutritional intervention among adolescent girls[11]. Hence it is concluded that demographic variables have no association with signs and symptoms of Iron deficiency anemia.

CONCLUSION

The study was conducted with the objectives to evaluate the effectiveness of dietary intervention on Iron deficiency anemia among nursing students in selected nursing colleges, Mangaluru. It was concluded that dietary intervention of rice flakes balls and gooseberry administered may be effective in improving iron status of nursing students to prevent Iron deficiency anemia.

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