

# A Pre-Experimental Study to Assess the Effectiveness of Nurse Led Education Programme on the Level of Knowledge Regarding Iron and Folic Acid (IFA) Tablets Distribution Under Anemia Mukh Bharat Program among the Adolescent Girls in Selected Senior Secondary School, Dehradun, Uttarakhand

Smriti Bagri<sup>1</sup>, Iris George<sup>2</sup>

<sup>1</sup>MSc Nursing Student, <sup>2</sup>Assistant Professor,

<sup>1,2</sup>Doon Institute of Medical Sciences, Dehradun, Uttarakhand, India

## ABSTRACT

**Background:** Anaemia remains a major public health concern in India, particularly among adolescents. The Anemia Mukh Bharat (AMB) programme aims to reduce anaemia through weekly Iron and Folic Acid (IFA) supplementation, but lack of awareness and poor compliance often limit its effectiveness. Nurse-led education has been shown to improve adolescent health behaviours. **Methods:** A pre-experimental one-group pre-test post-test design was adopted. Sixty adolescent girls from government senior secondary schools in Dehradun were selected using convenience sampling. A structured knowledge questionnaire (30 items) was administered before and after a nurse-led education programme. Descriptive and inferential statistics, including paired t test and chi-square, were used for analysis. **Results:** Pre-test scores revealed that 50% of participants had poor knowledge, 36.7% average, and only 13.3% good knowledge. After the intervention, 68.3% achieved average and 31.7% good knowledge, with none remaining in the poor category. A significant improvement was observed between pre-test and post-test scores ( $t = 3.240$ ,  $p < 0.05$ ). No significant association was found between demographic variables and knowledge levels. **Conclusion:** The nurse-led education programme significantly enhanced knowledge regarding IFA tablets among adolescent girls. Integrating structured nurse-led interventions within school health initiatives could strengthen AMB programme outcomes and reduce adolescent anaemia prevalence.

**KEYWORDS:** Anemia, Iron and Folic Acid, Anemia Mukh Bharat, Nurse-led education, Adolescents, Knowledge improvement.

## INTRODUCTION

Anemia continues to be one of the most persistent nutritional disorders worldwide and is a major public health challenge in both developed and developing countries. According to the World Health Organization (WHO), nearly 1.6 billion people are anemic, which accounts for about one-quarter of the global population. The condition disproportionately affects women of reproductive age, young children, and adolescents, especially in low- and middle-income countries. Iron deficiency anemia is the most common type and results primarily from inadequate

dietary intake, poor absorption, and blood loss. Its effects extend beyond physical health, as it compromises cognitive development, school performance, work productivity, and maternal and child health outcomes.

### Objectives:

1. To assess baseline knowledge of adolescent girls regarding IFA tablet distribution under AMB.
2. To evaluate the effectiveness of a nurse-led education programme on knowledge improvement.

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3. To examine the association between demographic variables and knowledge scores.

**Research Design:** This study adopted a **pre-experimental, one-group pre-test post-test design** to evaluate the effectiveness of a nurse-led education programme on knowledge regarding Iron and Folic Acid (IFA) supplementation among adolescent girls. This design was chosen because it allows for the measurement of changes in knowledge within the same group before and after the intervention, thereby highlighting the effectiveness of the educational programme. While the absence of a control group limits causal inference, the design is appropriate for small-scale school-based health education interventions.

**Study Setting:** The study was conducted in **government senior secondary schools in Dehradun, Uttarakhand, India**. These schools were selected as they represent a diverse group of adolescents from varied socioeconomic, cultural, and educational backgrounds. The schools also actively participate in government health initiatives, including the Anemia Mukh Bharat (AMB) programme, making them ideal settings for the intervention.

**Population and Sample:** The target population comprised adolescent girls aged **10–19 years** enrolled in government senior secondary schools in Dehradun.

- **Sample size:** A total of 60 participants were included in the study.
- **Sampling technique:** Non-probability **convenience sampling** was used to select participants who met the eligibility criteria and were available during the study period.
- **Sample size determination:** Although the sample size was limited by feasibility, it was deemed sufficient to detect meaningful differences between pre-test and post-test knowledge scores, based on similar school-based studies.

#### **Inclusion Criteria**

- Adolescent girls aged between 10–19 years.
- Enrolled in government senior secondary schools in Dehradun.
- Present during data collection and willing to participate.

#### **Exclusion Criteria**

- Students absent on the day of data collection.
- Students with known medical conditions affecting iron absorption (e.g., thalassemia, sickle cell anemia).
- Students who had previously participated in similar educational interventions.

#### **Data Collection Tools**

A **structured questionnaire** was developed to assess knowledge regarding IFA tablets distributed under the Anemia Mukh Bharat programme.

- **Part I: Demographic data** – Age, religion, class, father's education, occupation of family, type of family, food habits, number of siblings, source of health information, and history of anemia in the family.
- **Part II: Knowledge assessment** – 30 multiple-choice questions covering the purpose, dosage, benefits, and side effects of IFA supplementation. Each correct answer was scored as "1" and incorrect as "0."

#### **Scoring and interpretation:**

- Good knowledge: 76–100% (23–30 correct answers)
- Average knowledge: 51–75% (16–22 correct answers)
- Poor knowledge: 0–50% (0–15 correct answers)

**Validity:** Content validity was established through expert review by five nursing faculty members with experience in community health and adolescent health programmes.

**Reliability:** Reliability was tested using the test-retest method, yielding a correlation coefficient of  $r = 0.88$ , confirming that the tool was highly reliable.

**Pilot Study:** A pilot study was conducted on six adolescent girls from a different school to assess the feasibility of the tool and procedures. No major modifications were required, and the tool was found to be appropriate for the main study.

#### **Intervention: Nurse-Led Education Programme**

The analysis and interpretation of data collected from 60 adolescent girls in senior secondary schools of Dehradun, Uttarakhand. The results are organized under four subsections:

**Demographic Characteristics of Participants****Table 1. Demographic characteristics of participants (N=60)**

Variable	Categories	Frequency (f)	Percentage (%)
Age	10–12 years	14	23.0
	13–15 years	29	48.0
	16–19 years	17	28.0
Religion	Hindu	14	23.0
	Muslim	15	25.0
	Sikh	15	25.0
	Christian	16	27.0
Class	6th	7	12.0
	7th–8th	15	25.0
	9th–10th	24	40.0
	11th–12th	14	23.0
Father's Education	No formal education	7	12.0
	Primary	24	40.0
	Secondary	15	25.0
	Graduate	14	23.0
Family Occupation	Business	14	23.0
	Self-employed	15	25.0
	Private job	17	28.0
	Government job	14	23.0
Family Type	Nuclear	23	38.0
	Joint	22	37.0
	Extended	8	13.0
	Separated	7	12.0
Food Habits	Vegetarian	35	58.0
	Non-vegetarian	25	42.0
Siblings	None	14	23.0
	One	24	40.0
	Two	15	25.0
	Three	7	12.0
Source of Information	Health personnel	7	12.0
	Teachers	24	40.0
	Media (TV/Newspaper)	15	25.0
	Family members	14	23.0
Family History of Anemia	Yes	15	25.0
	No	45	75.0

**Narrative summary:** Most participants (48%) were aged 13–15 years, while 28% were in the 16–19 years age group. The religious distribution was relatively even, with Christians forming the largest group (27%). Nearly 40% of participants were in 9th–10th grades, and 40% of fathers had only primary education. Regarding occupation, private jobs (28%) were slightly more common than self-employment (25%). Nuclear families (38%) and vegetarian diets (58%) predominated. Teachers were the most common source of health information (40%), and 25% of participants reported a family history of anemia.

**Pre-Test and Post-Test Levels of Knowledge****Table 2. Knowledge levels before and after intervention (N=60)**

Knowledge Level	Pre-test (f, %)	Post-test (f, %)
Poor (0–50%)	30 (50.0)	0 (0.0)
Average (51–75%)	22 (36.7)	41 (68.3)
Good (76–100%)	8 (13.3)	19 (31.7)

**Narrative summary:** Before the intervention, half of the participants (50%) had poor knowledge, 36.7% had average knowledge, and only 13.3% demonstrated good knowledge. Following the nurse-led education

programme, none of the participants remained in the poor knowledge category. The proportion with average knowledge rose to 68.3%, while 31.7% achieved good knowledge. This indicates a clear improvement in awareness and understanding.

**Comparison of Pre-Test and Post-Test Knowledge Scores:** To evaluate the effectiveness of the intervention, paired *t*-test was applied to compare pre- and post-test scores.

**Table 3. Comparison of pre-test and post-test knowledge scores (N=60)**

Test	Mean $\pm$ SD	Mean Difference	<i>t</i> -value	<i>p</i> -value
Pre-test	15.77 $\pm$ 14.0			
Post-test	20.63 $\pm$ 12.98	4.86	3.240	0.00098*

\*Significant at  $p < 0.05$

**Narratives ummary:** The mean pre-test score was 15.77 (SD = 14.0), while the mean post-test score increased to 20.63 (SD = 12.98). The mean difference of 4.86 was statistically significant ( $t = 3.240$ ,  $p < 0.05$ ). This demonstrates that the nurse-led education programme had a meaningful and positive effect on participants' knowledge levels.

**Association between Demographic Variables and Knowledge Levels:** Chi-square test was used to assess the relationship between participants' demographic variables and their pre-test knowledge levels.

**Table 4. Association between demographic variables and knowledge levels (N=60)**

Variable	$\chi^2$ -value	df	<i>p</i> -value	Significance
Age	5.847	4	0.211	NS
Religion	5.111	6	0.529	NS
Class	6.758	6	0.344	NS
Father's Education	7.259	6	0.298	NS
Family Occupation	5.769	6	0.449	NS
Family Type	6.294	6	0.391	NS
Food Habits	1.577	2	0.454	NS
No. of Siblings	6.635	6	0.356	NS
Source of Information	5.743	6	0.452	NS
Family History of Anemia	0.945	2	0.623	NS

(NS = Not Significant at  $p < 0.05$ )

**Narrative summary:** No statistically significant associations were found between demographic variables (age, religion, class, father's education, family occupation, family type, food habits, number of siblings, source of information, or family history of anemia) and pre-test knowledge levels. This suggests that lack of knowledge regarding IFA supplementation was widespread and not influenced by demographic factors in this group.

## Discussion:

### Improvement in Knowledge Following Intervention

The study revealed that 50% of participants initially had poor knowledge regarding IFA supplementation, while only 13.3% demonstrated good knowledge. After the nurse-led education programme, none of the participants remained in the poor category, 68.3% achieved average knowledge, and 31.7% attained good knowledge. The mean difference in pre-test and post-test scores was statistically significant ( $t = 3.240$ ,  $p < 0.05$ ).

### Lack of Association Between Demographic Variables and Knowledge

The study found no significant association between demographic variables such as age, religion, class, father's education, occupation, family type, food habits, number of siblings, source of information, and

family history of anemia with participants' baseline knowledge levels. This indicates that poor knowledge about IFA supplementation was widespread and not confined to specific subgroups.

### Role of Nurses in Adolescent Health Promotion

The findings of this study reinforce the pivotal role nurses play in health education. As approachable and trusted health professionals, nurses are uniquely positioned to deliver health education in schools and communities. The effectiveness of the nurse-led programme observed here aligns with **WHO's recommendations** that school health services should be nurse-driven to ensure sustainability and relevance.

### Implications for the Anemia Mukht Bharat Programme

Despite the implementation of AMB, anemia prevalence remains high among adolescents. One of



the critical barriers has been poor awareness and low compliance with IFA supplementation. The findings of this study indicate that nurse-led education can be a valuable adjunct to the AMB programme, improving knowledge and potentially enhancing compliance.

### Theoretical Perspective

The results of this study can be interpreted through **Pender's Health Promotion Model**, which posits that individual behaviour is influenced by perceived benefits, perceived barriers, self-efficacy, and cues to action. Before the intervention, poor knowledge likely reflected low perceived susceptibility and benefits, as participants did not fully recognize the importance of IFA tablets. The nurse-led education programme served as both a **cue to action** and a means to enhance **self-efficacy**, by addressing misconceptions, emphasizing benefits, and providing practical solutions to barriers. The significant improvement in knowledge scores supports the model's assertion that targeted education can positively influence health-promoting behaviours.

### Strengths of the Study

1. The study directly addresses a pressing public health issue among a vulnerable population.
2. It demonstrates the effectiveness of nurse-led education, offering evidence for policy and programme strengthening.
3. The structured pre-test post-test design allowed for clear measurement of changes attributable to the intervention.
4. The use of a validated and reliable tool enhanced the credibility of findings.

### Limitations of the Study

1. The study was limited to **one geographic region (Dehradun)**, restricting generalizability.
2. The **sample size of 60** was relatively small and selected using convenience sampling, which may limit representativeness.
3. The design lacked a **control group**, so improvements cannot be solely attributed to the

intervention without accounting for external factors.

4. The study measured **knowledge only**, without assessing behavioural outcomes such as actual IFA consumption.
5. The **short follow-up period (two weeks)** limited assessment of long-term retention of knowledge.

**Nursing Implications:** The study findings carry significant implications for nursing practice, education, and administration:

- **Nursing Practice:** Nurses should actively engage in adolescent health promotion through structured educational sessions in schools.
- **Nursing Education:** Nursing curricula should emphasize health education skills and community outreach, preparing nurses for roles in school health services.
- **Nursing Administration:** Administrators should integrate nurse-led education into routine health programmes and allocate resources for training and supervision.
- **Nursing Research:** Further research is required to explore innovative nurse-led strategies for reducing anemia and improving adolescent nutrition.

### Conclusion of Discussion

The present study provides strong evidence that nurse-led educational programmes can significantly enhance adolescents' knowledge about IFA supplementation. The findings are in line with national and international studies, highlighting that education is a cornerstone of behaviour change. While demographic factors were not significantly associated with knowledge levels, the universal improvement post-intervention suggests that such programmes are beneficial across diverse subgroups. Integrating nurse-led education within the Anemia Mukt Bharat framework may enhance programme effectiveness, improve compliance, and contribute to reducing anemia prevalence among adolescents in India.