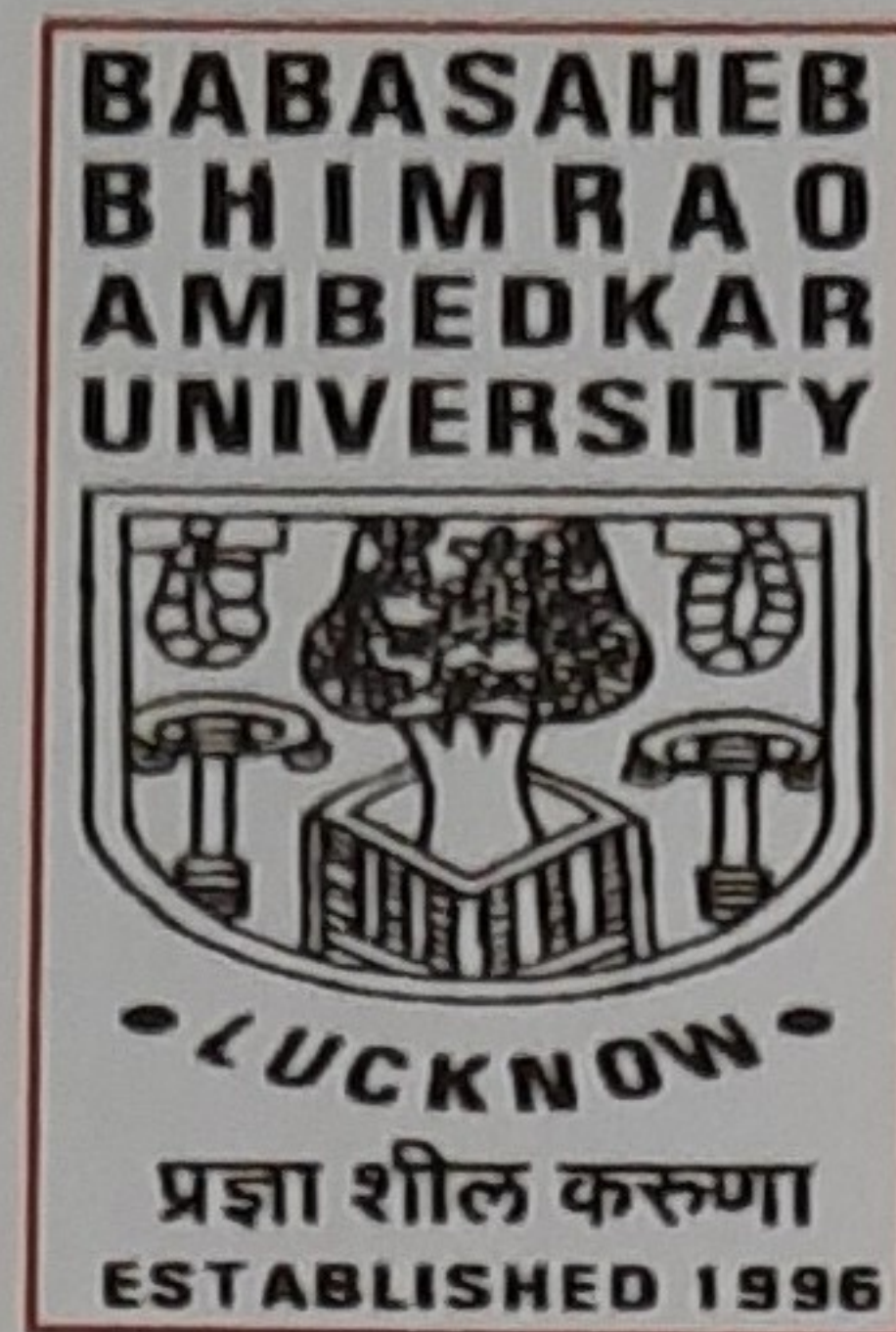


**“An Epidemiological Study of Iron Deficiency
Anemia and it’s Impact on the Health Status of the
Reproductive Age Women”**



THESIS SUBMITTED

TO

**DEPARTMENT OF HUMAN DEVELOPMENT AND FAMILY
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SUMMARY

Health and individuals well-being is a fundamental human right and central to the concept of quality of life. Women's health is vital to the survival of the society. They are the pivot of the family, they nurture the next generation and give care to the elderly. Reproductive health majorly affects the lives of women from adolescence to old age, through conception to giving birth and includes the attainment and maintenance of good health as well as the prevention and treatment of ill health.

According, to CDC (centre for disease control and prevention) report, "IDA is a condition resulting from too little iron concentration in our body." Iron (as a part of hemoglobin) is one of the minerals required by our body to carry out essential function, which is to transport oxygen from lungs to cells within our body. Iron is essential for the production of hemoglobin by erythroblasts. If it is not in adequate, the hemoglobin production does not succeed and red blood cells decreases. This condition is prevalent as 'anemia'. According to WHO, the recommended hemoglobin level, for reproductive women (age 15 and over) is 120gm/l.

Anemia is defined that in clinical terms as an insufficient mass of RBCs circulating in the blood; in public health terms anemia is defined as a hemoglobin concentration below the thresholds given by *WHO, UNICEF & UNU (2001)*. Anemia is the decreased ability of the RBCs to provide adequate oxygen to body tissues. It may be due to a decreased number of RBCs, a decreased amount of substance in RBCs, which transports oxygen (hemoglobin), or a decreased volume of RBCs (*Balducci, et al., 2007; Bridges & Pearson, 2008*).

The prevalence of ID and IDA varies greatly from population to population according to a variety of host and environmental factors. The etiology of anemia is multifaceted and often several factors are at play in an anemic individual. Nutritional anemia as a result of iron deficiency is the most common cause of anemia worldwide, with approximately 50% of all cases attributed to a lack of iron in the diet. A number of host and environmental factors are associated with iron deficiency, and in more severe forms contribute to IDA as well.

This study helps to identify the important risk factors that have a direct effect on an individual's thought process to adapt any behavioral change. The information gained from this present study

will help to further implement policies to combat the health of women who are at the risk of developing IDA or are already suffering from. In fact, this study provides a broader perspective on how much knowledge they have and follow and in what way they relate it to their daily living. Thus, the study was undertaken with the following objectives:

1. To estimate the prevalence of iron deficiency anemia among reproductive age women of rural and urban areas.
2. To determine association of iron deficiency anemia with its pre-disposing factors in rural and urban areas.
3. To associate IDA with food consumption pattern and BMI.
4. To evaluate the knowledge about anemia and its consequences among respondents.
5. To create awareness among rural women through camp and exhibition.
6. To evaluate the effectiveness of intervention and associate with pre and post phase of the study.

Chapter I dealt with introduction part it includes the brief information of Theoretical background of Iron-Elemental Iron, Metabolism of Iron, Iron Bio-availability, Iron Absorption, Enhancement of iron absorption, Inhibition of iron absorption, Iron Storage and Losses, Iron overload. Definition of Anemia, Prevalence of Anemia, Classification and etiology of anemia, Contributors to IDA, Types of Anemia- Iron Deficiency Anemia, Iron Deficiency in Pregnancy, Folic Acid Deficiency Anemia, Pernicious Anemia, Hemolytic Anemia, Sickle Cell Anemia, Aplastic Anemia. Stages of development of Iron Deficiency Anemia, Causes of Iron Deficiency Anemia, Symptoms and consequence of iron deficiency, Common signs and symptoms, Magnitude of Anemia, Assessment of Anemia, Risk factors of Anemia, Epidemiology of Anemia, Global and Indian Scenario of Anemia, and Treatment of Iron Deficiency Anemia.

Chapter II dealt with Review of Literature of the study under the sub headings: Prevalence of Anemia, Iron Deficiency Anemia, Socio-demographic Profile, Reproductive Health, Dietary Habits, Anthropometric Measurement, Menstrual Health, Medical Status, and Knowledge regarding Anemia, Iron Rich Foods, Diagnosis of Anemia, and Effectiveness of Structured Teaching Programme in Prevention of Anemia.

Chapter III dealt with the Materials and Methods of the study. The cross sectional study was conducted followed by non-experimental pre-test/post-test design in which, evaluator surveyed the two groups of reproductive age women categorized under rural and urban areas. As the choice of the participants for this study included only reproductive age women (15-49 years), and their blood samples had to be collected for checking their hemoglobin level and iron status in the body, thus the availability of such participants played a very important role in deciding the sample size.

Total sample taken for the study is 400, which is slightly more than the minimum sample size requirement. Equal number of subjects from rural and urban has been taken in the study i.e. two hundred from urban population and two hundred from rural population. The target population for this study included reproductive age women. The subjects selected for this study belonged to the age group of 15-49 years irrespective of their menarche status.

Before initiating the actual research, a pilot study was conducted on 30 study subjects from Community Health Center in rural area. The questions were personally asked to the respondents along with collecting their blood samples for checking their hemoglobin levels. The study was conducted into three phases; for each phase a different approach of sampling was used, Multi-stage Random Sampling was followed in the present study at the preliminary phase followed by non – probability sampling and purposive sampling.

The data was coded, tabulated and analyzed using appropriate statistical techniques i.e. Mean, SD, Frequency tabulation, Chi- square test, Logistic Regression, Paired t test, Wilcoxon signed rank test, Correlation was administered to analyze the data accordingly.

Chapter IV dealt with results and discussion of the study. The major findings of the study are mentioned below:

General Characteristics of the Respondents:

- The total numbers of respondents included in this study were four hundred (400) out of which majority of respondents 211 (52.75%) belonged to the age group of 20 to 29 years. The majorities of the respondents were Hindu 343 (85.75%) and were married 343 (85.75%).

- Most of the women were literate (42%) but unemployed (81%). 186 (46.50%) women revealed that they have more than eight thousand monthly family income and only 80 (20%) women said they have less than five thousand monthly family income.
- 211 (52.80%) women were living in joint family setup with medium family size 152 (38%) comprising five to eight members in a family.
- It was observed that most of the women (30.80%) belonged to the Class II, strata and only eight percent belonged to Class V strata.
- Of the 400 participants 246 (61.50%) attained their menarche at the age of 13-15 years. 124 (31%). More than half of the participants (65%) had a normal length of the menstrual cycle.
- Over two-third of the participants had three to five days of menses. A proportion of 16% and 11.80% participants had six or more days and two or less days of menses respectively.
- The majority of the women that is 274 (68.50%) denied the presence of clots and only 126 (31.50%) women complained about presence of clots. The majority of the women 292 (73%) said that they did not experience heavy or prolonged bleeding in their last few months.
- Obstetrical history of women shows that, majority of them 215 (53.70%) were pregnant. The gravida status of the women reveals that 55% of them had more than two pregnancies that is multigravida followed by primi-gravida and nulli-gravida that constitutes 100 (25%) and 80 (20%) in number respectively.
- Regarding parity status, most of the women 142 (35.50%) had not sustained any live births. The multi para women were 93 (23.20%) and women having two and a single live births were 86 (21.50%) and 79 (19.80%) respectively.
- Out of 400 women, more than half of them 208 (52%) had up to three children. The majority of the women 137 (61.70%) had kept spacing between children for more than a year. The majority of women 288 (72%) never terminated their pregnancy.

Past Morbidity Status of the Respondents:

- Majority of the women 202 (50.50%) mentioned that they had never undergone test for diagnosis of anemia. The number of women diagnosed with anemia was 95 (23.80%).

- Most of the respondents, 298 (74.50%) had never been diagnosed with malaria. The women ever suffered from malaria being 62 (15.50%).
- Most of the respondents, 298 (74.50%) had never been diagnosed with malaria. The women ever suffered from malaria being 62 (15.50%).
- Most of the women 226 (56.50%) revealed that they never suffered from any reproductive tract infection. The numbers of women suffered from any type of reproductive tract infections were 110 (27.50%). The majority of respondents 354 (88.50%) said that they never had blood transfusion and rest 46 (11.50%) respondents had gone through blood transfusion.
- The majority of the respondents 283 (70.75%) responded that they never had any surgery and rest 117 (29.25%) had undergone various types of surgery including C-section.

Dietary Practices:

- Most of the reproductive age women were vegetarian 212 (53%). It can be seen that most of the women 162 (40.50%) had their meals three times a day followed by two times a day 149 (37.25%). There were women 47 (11.75%) whose frequency of meals were not fixed.
- The majority of the respondents were found to consume tea/coffee 2-3 times a day were 162 (40.50%) followed by once in a day were 134 (33.50%). The majority of the respondents have appetizers in between meals were 272 (68%). The majority of women agreed to have fulfilling meals in last 15 days when they did not lack appetite were 232 (58%).
- About half the number of women that is 180 (45%) had no preferences of food they eat. On the other hand, 163 (40.75%) women relied upon fried and spicy food and rest 57 (14.25%) women were dependent on partially boiled food.
- As our respondents mostly relied on vegetarian diet the consumption frequency of red meat, chicken and fish on daily basis was very low that is 7 (1.75%), 6 (1.50%) and 8 (2%) respectively.
- The consumption of green leafy vegetables (55.50%) and whole grains (54.25%) on daily basis was high and equally dominant. The intake of legumes, citrus fruits/juices and soup on a regular basis was merely low being 20%, 18.50% and 2% respectively.

- Out of the 257 women (ever became pregnant), 156 (60.75%) were on usual diet as they were taking before conception. The women who partly modified their diet were 52 (20.25%) and women who were on special diet comprised 49 (19%) only.

Knowledge about Anemia:

- Most of the women 208 (52%) were aware about the term anemia but mostly 229 (57.3%) not aware about what happens in anemia.
- In the context of knowledge scored, it was observed as Low- 64%, moderate- 14.5% and high- 21.5% among rural respondents having a Mean 2.65 ± 2.96 SD, which subsequently different among urban respondents as Low- 37%, Moderate- 27% and High- 36% with a Mean 4.22 ± 2.99 SD.
- The knowledge level of total 400 respondents was Low- 50.5%, Moderate- 20.8% and High- 28.7% with Mean \pm SD 3.44 ± 3.08 .

Factors associated with IDA:

- A non-significant observation with socio-demographic status was observed with age and religion. Also, no significant association was observed between family setup and IDA.
- A highly significant association was observed with literacy status, family income and socio-economic strata at $\chi^2 = 30.077$, $\chi^2 = 21.051$ and , $\chi^2 = 25.161$, $p=0.000$ respectively
- The chi-square test was carried out to determine the association between menstrual status and anemia categories, where a non-significant relationship was observed between anemic and non-anemic women as p value is greater than 0.05.
- Gravida and parity had a highly significant association with IDA status at $\chi^2 = 14.272$, $p=.001$ and $\chi^2 = 14.037$, $p=.003$ respectively.
- A non-significant relationship of prevalence of IDA and BMI categories having $\chi^2 = 7.815$, $df = 4$. association of anemia with BMI categories where the a non-significant relation is obtained between anemic and non-anemic as p value is greater than .05, more percentage of anemic women are there in underweight (6%), normal (31.8%), overweight (10.5%) and obese grade I (13%) categories of BMI when compared non-anemic ones.

- Pearson coefficient correlation between menstrual status and hemoglobin levels showed a significant positive correlation with menses age ($r = 0.222$, $p < .01$) along with a significant negative correlation with length of cycle ($r = -0.135$, $p < .01$) and very weak and positive correlation with duration of menses ($r = 0.020$, $p < .01$).
- A significant positive correlation was found between menses age and hemoglobin ($r = 0.222$, $p < .01$) along with a significant negative correlation between length of cycle and hemoglobin ($r = -0.135$, $p < .01$) and very weak and positive correlation between duration of menses and hemoglobin ($r = 0.020$, $p < .01$).
- Pearson coefficient correlation between anthropometric indices and hemoglobin levels showed a statistically significant positive correlation was observed between hemoglobin level with weight ($r=0.252$, $p < .01$) followed by height ($r= 0.174$, $p < .01$) and marginally significant correlation with BMI ($r= 0.189$, $p < .01$).
- Females who were not diagnosed with anemia more likely to become anemic when compared to non-anemic ones (95% CI 6.504-40.057) and females who don't know about their anemia status were 2.32 time (95% CI 1.380-3.930) more likely to become anemic when compared to non-anemic ones, in both the cases odds were highly significant ($p < 0.001$).
- Relative risk for headache all the time (RR= 2.229, CI-0.973, 5.255), dizziness all the time (RR= 1.466, CI-0.606, 3.683), nausea all the time (RR= 1.035, CI-0.350, 3.281), insomnia all the time (RR= 4.326, CI-0.514, 20.393). Heavy bleeding all the time (RR= 1.490, CI-0.707, 3.277) and fatigue all the time (RR= 6.777, CI-3.105,15.005) where fatigue was the most significant risk factor as anaemic females high risk of feeling fatigue all the time.
- A strong significant association of BMI and consumption of red meat ($p=0.00$), chicken ($p=0.00$) fish ($p=0.05$), followed by green leafy vegetables ($p=0.04$) and whole grains ($p=0.01$) where as a non-significant association was observed between legumes ($p=0.08$), citrus fruits ($p=0.11$) and soups ($p=0.15$).
- Association between BMI and no. of meals consumed per day where $p=0.06$ which reveals a non-significant relation as no. of meals taken have no effect on BMI.

- Association between food habits after becoming pregnant and BMI reveals that eating habit after becoming pregnant have no relation with BMI categories as the relation was non-significant (p=0.61).
- A significant (p=0.01) association between BMI and daily average consumption of tea and coffee where tea and coffee consumed more than one time shown effects on BMI.
- The association of BMI categories with menstrual status, a non-significant relationship was observed among all categories of BMI except for age at menarche (p= 0.035) and flow during menses (p= 0.048).
- The association between age group and food consumption pattern, a non-significant relationship was observed among the consumption pattern of green leafy vegetables, citrus fruits, whole grains and soup having the p values <.05 respectively (green leafy vegetables p=0.294; citrus fruits p=0.127; whole grains p=0.07 and soup p=0.121).
- On evaluating the association between residence area and food consumption pattern, a very high significant relationship was observed with the consumption pattern of red meat, chicken, fish, legumes, green leafy vegetables, citrus fruits, whole grains and soup having the p values =0.000 respectively whereas Family type showed non-significant association with consumption pattern of fish p=0.09 and red meat p=0.121, rest all the other food groups were having a highly significant values.
- On evaluating the association between socio-economic status and food consumption pattern, a significant relationship was observed among the different class groups with chicken and legume consumption pattern having the chi-square values as $\chi^2=81.759$, df=16 and $\chi^2=80.530$, df=16 significant at p<.01 level respectively.
- Logistic regression analysis showed that females who relied upon fried/spicy food have more risk of becoming anemic (RR= 1.261, CI-0.963, 1.651) and significant risk of becoming anemic among those who rely upon whatever being cooked (RR= 1.345, CI-1.044, 1.733; p<0.05) when compared to the one taking partially boiled food.

Post Intervention:

- The comparison of mean scores was done using Paired t test, analysis revealed a statistically significant relationship among all variables of knowledge except knowledge about symptoms of anemia and about iron rich foods.
- It is revealed that the level of awareness change from pre to post- intervention in the context of knowledge was observed as Low- 66.3%, average- 6.3%, High- 27.5% during pre-intervention having a total Mean 2.65 ± 3.13 SD, which subsequently changed to Low- 17.5%, average-21.3%, High- 61.3% with a total Mean \pm SD 5.87 ± 2.59 .
- It was observed that only 37.50% women were aware about anemia before intervention, post intervention it was 85%. Women had no idea (71.30%) about what happens to blood in anemia before intervention, post intervention many of them (87.50%) retained knowledge.
- Responses recorded from women in terms of nutrients deficient in anemia, causes and symptoms of anemia, effects of anemia, preventive measures and iron rich foods revealed that most of the women were not aware about anemia before intervention while after intervention an appreciable improvement in the knowledge was observed as compared to pretested baseline scores.

HYPOTHESIS OF THE STUDY

1. H_0 : There exists a significant relationship between Socio-demographic Status and Prevalence of IDA.
2. H_0 : There exists no significant relationship between Socio-economic Status and Prevalence of IDA.
3. H_0 : There exists a significant relationship between Menstrual Status and Prevalence of IDA.
4. H_0 : There exists no significant relationship between Gravida, Parity and Prevalence of IDA.
5. H_0 : There exist a significant association between BMI and Prevalence of IDA.
6. H_0 : There exists no significant correlation among Menstrual Status and Hemoglobin Levels.
7. H_0 : There exists no significant correlation among Anthropometric Indices and Hemoglobin Levels.

8. H₀: There exists no significant relationship between BMI and Food Consumption Pattern.
9. H₀: There exists no significant relationship between BMI with Menstrual Status.
10. H₀: There exists a significant relationship between Age and Religion with Food Consumption Pattern.
11. H₀: There exists a non-significant relationship between Residence Area and Type of Family with Food Consumption Pattern.
12. H₀: There exists no significant relationship between Literacy Status and Food Consumption Pattern.
13. H₀: There exists no significant relationship between Family Income and Food Consumption Pattern.
14. H₀: There exists no significant relationship between Socio-economic Strata and Food Consumption Pattern.
15. H₀: There is no significant association between Pre and Post Intervention evaluation of knowledge regarding anemia.