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A Study on the of Nutrition, Health and Hygiene Counselling impact on Iron Deficiency Anaemia

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Abstract - Iron deficiency anemia (IDA) is a prevalent nutritional disorder, especially among women and children in developing countries. This study investigates the impact of nutrition, health, and hygiene counseling on the prevalence and management of iron deficiency anemia. Through a combination of dietary modifications, health education, and hygiene practices, the study aims to evaluate improvements in hemoglobin levels and overall health outcomes. Participants included women of reproductive age and children from a rural community, who were provided with structured counseling sessions over six months. Baseline and post-intervention data on hemoglobin levels, dietary intake, and hygiene practices were collected and analyzed. The results demonstrate significant improvements in hemoglobin levels and a reduction in the incidence of IDA, highlighting the effectiveness of comprehensive counseling as a sustainable intervention strategy.

Keywords: Iron deficiency Anaemia, Nutrition, Health, Hygiene counselling, Impact

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INTRODUCTION

Anemia may be defined as the reduction in absolute number of red blood cells, indirectly measured by reduction in haemoglobin(Hb) concentration or RBC count. Other nutritional deficiencies contribute to anemia including vit A, riboflavin, folic acid and vit B12.

Globally, two billion people are anaemic, which includes 315 million (95% CI: 291– 340) in the South-East Asia Region (SEAR) (WHO, 2015). Iron deficiency, the primary contributor to anemia, is the most wide spread nutritional disorder while other micronutrient deficiencies including folate and vitamin B12 also contribute to anemia. Recent evidence indicates a greater role for anemia of inflammation caused by parasitic infections including malaria (Agarwal, et al., 2009).

The ideal ratio of nutrients to entire meals is what nutrition is all about, allowing the body to function at its best. It is the act of providing nourishment or receiving nourishment, particularly the process by which a living thing absorbs food and uses it for tissue regeneration and growth. Food consumption and nutrition have a direct impact on people's physical performance and productivity. One of the main environmental elements influencing the preservation of physical fitness and health is nutrition. The quality and quantity of food consumed has a significant impact on the nutritional status of any community or population. The body receives nutrients from food, which support the maintenance of our health and nutritional state. For instance, an apple can be considered food since it can be consumed, broken down, and then used by the body to absorb nutrients. These substances support the body in performing its daily tasks and preserving health. One must consume the necessary amount of nutrients through food on a daily basis in order to maintain good health and nutrition. This is because better nutrition enhances one's ability to perform physically by improving stamina and facilitating the body's efficient oxygen transport during physical labour. It goes without saying that deprivation of sufficient nourishment for extended periods of time causes fatigue and a decrease in physical stamina (Satyanarayane et al., 1979).

Iron insufficiency is a common dietary concern, which is odd considering that iron is one of the most plentiful elements in the universe. This is because the majority of the iron that people consume via food has poor solubility and is hence not easily available. Approximately 2.5–5 billion individuals, particularly in poor nations, are at risk for micronutrient deficiencies; this is particularly true for pregnant women and babies (Rush, 2000). Iron deficiency is a public health crisis on an epidemic scale, impacting more people than any other ailment. Anaemia affects 90% of the world's population, with a prevalence of

2% among pregnant women and 40% among preschool-aged children (WHO, 2005).

Anaemia is rather common, with estimates ranging from 33% to 100% based on research conducted in various parts of the nation (India). National and regional surveys in India have shown that IDA can affect as many as 74% of children under the age of 3, 85% of pregnant women, and 90% of teenage girls, according to certain demographics (NFHS-2, 1998–99 & ICMR, 2001). Deficiency in Iron In toddlers and babies, iron deficiency anaemia (IDA) is linked to delayed physical and mental maturation; in adults, it lowers productivity and work capacity, lowers resistance to illness generally, and increases mortality and morbidity. Adverse pregnancy outcomes have also been linked to IDA in women. An estimated 5% of India's GNP is lost every year due to iron deficiency-related mortality, resource depletion, and productivity losses (Sanghvi, 1996).

According to the World Health Organisation (2015), over half of all cases of anaemia are caused by iron-deficiency anaemia (IDA), the most prevalent form of nutritional anaemia that develops from a chronically low iron balance. Iron deficiency anaemia is characterised by dangerously low haemoglobin levels (Hb 12.0 mg/dL or haematocrit below 36%).

METHODOLOGY

Study design

Five villages were selected for this study, which is a longitudinal interventional study, after careful consideration of program officers for women, the child development office of the district, and the block medical officer. The villages were not endemic to malaria and lacked basic health care facilities. For the purpose of sampling iron deficiency anemic women of reproductive age, a cluster randomised controlled trial was selected at Sahid Matangini Block, District – Purba Medinipur, West Bengal.

Study on non pregnant women

Women with hemoglobinopathies and those who disclosed having any illnesses that were thought to be of an inflammatory nature were not allowed to participate in the research. Purposively chosen at random, 584 IDA women from 305 households were included in the experimental group at baseline, whereas 584 women from 310 households were included in the control group.

Data collection

To gather qualitative information, three sets of open-ended questionnaires were used. Three main concerns were covered by the division of the questions. The WRA group's age, gender, marital status, and level of education were all included in the first section's demographic profile.

Nutritional, health and hygiene interventional strategies

The primary goal of the current research was to advise the experimental group of women on how to include foods high in iron into their diets and essential supplements to improve their body's ability to absorb iron. To determine whether the interview questions would be viable in the local cultural context, the tool was pre-tested on 100 women from 50 homes throughout the five villages. Evaluations were made of the interview's duration, acceptability, validity of the responses, and question and answer substance and flow. After then, in order to make understanding easier, the questions' structure and substance were changed.

Clinical examination of sign of anemia:- Assessment of pallor:

An inspection of the tongue, palmer, nail bed pallor, and conjunctiva are among the physical indicators used to detect anaemia. Under bright natural light, the four anatomical areas were inspected, and any pallor was noticed or not. The modified O.P. Aggarwal technique was used to collect socioeconomic data, and the population was categorised into four income groups: poverty, lower middle class, middle class, and high income group.

Blood sample collection

Blood samples were obtained to measure serum ferritin and TIBC concentrations and to estimate haemoglobin levels. Each sample was made up of five millilitres of blood drawn from the arm's antecubital vein after isopropyl alcohol cleansing of the area. This yielded 4 mL of serum, and 1 mL was subjected to EDTA treatment in order to estimate haemoglobin levels. Within four hours after extraction, serum samples were collected by centrifugation of blood samples.

Assessment of intervention

To investigate the effects of nutrition, health, and hygiene counselling as a controlling measure of anaemia, the procedure was repeated once more at twelve months, and finally at the end of the operational research, at eighteen months. At this point, all haematological parameters, pallor, diet survey, and health and hygiene predictors of both the experimental and control group were statistically analysed.

Study on pregnant women

Women who were neither pregnant nor nursing, as well as those who were both nursing, were not included since nursing mothers have a higher need for iron and might potentially impede our study's goals. Haemoglobin levels were checked in 250 pregnant women in their first trimester; 200, or 80% of the total, were found to be anaemic. 68 IDA pregnant women were purposively selected at

random to be in the experimental group at baseline, whereas 68 women were placed in the control group.

Data collection of pregnant women

Open-ended questionnaires were used to interview and gather information on demographics, ANC registration and service utilisation, IFA compliance, iron absorption inhibitor and facilitator intake, and health personnel' understanding of anaemia and counselling. Data on food intake were collected over the course of seven days using a 24-hour dietary recall approach in a dietary survey. Hygiene questionnaires were used to interview participants about their practices of practicing good hygiene predictors.

Statistical analyses

A chi-square test was used to analyse categorical data. The study used Binominal Logistic Regression to evaluate the influence of hygiene factors on anaemia status. Every statistical test had a 2-tailed confidence interval of 95 CI, and differences were deemed significant when the probability value was less than 0.05. Version 22 of the Statistical Package for the Social Sciences (SPSS) was used to do the statistical analysis.

RESULT AND DISCUSSION

Analysis of socio-demographic profile of non pregnant women

Table 1 and Figure 1 show that of the 574 women in the experimental group, 70(12.1%), 319(55.5%), 170(29.6%), and 15(2.6%) were in the poor, lower middle, middle, and high income group, respectively. Of the 574 women in the control group, 87(15.1%), 311(54.1%), 161(28.0%), and 15(2.6%) were in the poor, lower middle, middle, and high income group, respectively.

Table 1: Shows the distribution of women in experimental and control group as per their economic status

Economic status	Experimental n=574	Control group n =574
Poor	70 (12.1%)	87(15.1%),
Lower-Middle	319 (55.5%)	311(54.1%)
Middle	170 (29.6%)	161(28.0%)
High	15 (2.6%)	15(2.6%)

n=No. of women

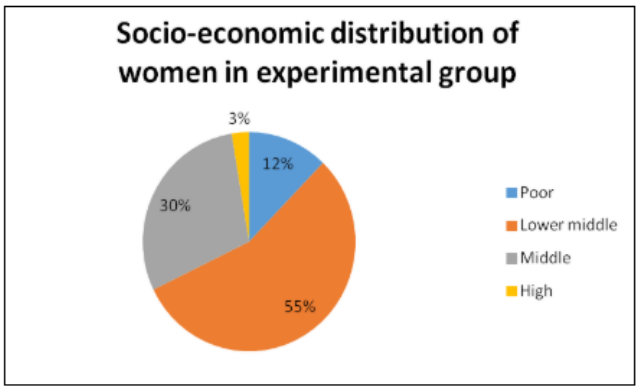

Figure 1: Socio-economic distribution of women in experimental group

Clinical Examination of sign of anemia – examination of pallor:

Pallor was assessed based on the paleness of the tongue, palm, nail bed, and lower conjunctiva. Data for the experimental and control groups were obtained at six, twelve, and eighteen months into the operational study period.

Pallor was discovered in 392 (68.2%), 264 (45.9%), and 174 (30.3%) of the WRA in the experimental group in the sixth, twelve, and eighteen months, respectively.Pallor was discovered in the control group among the WRA in 450 cases (78.3%), 423 cases (73.6%), and 396 cases (68.9%) in the sixth, twelfth, and eighteenth months, respectively.

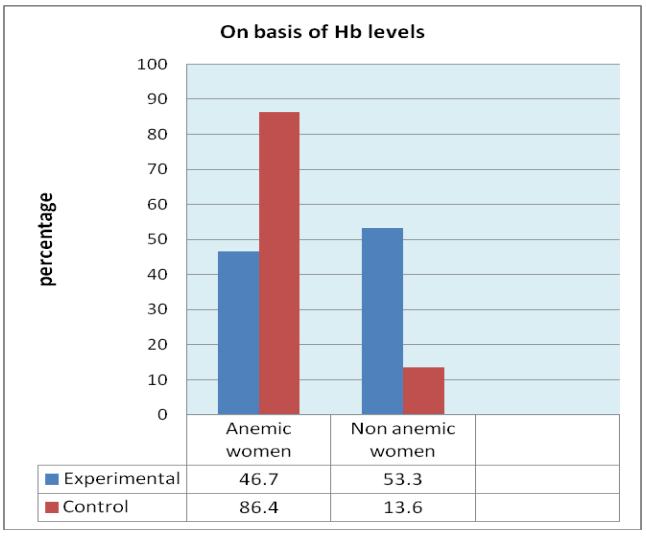

Figure 2: Post interventional prevalence of anemia betweenexperimental and control group on basis of hemoglobin level

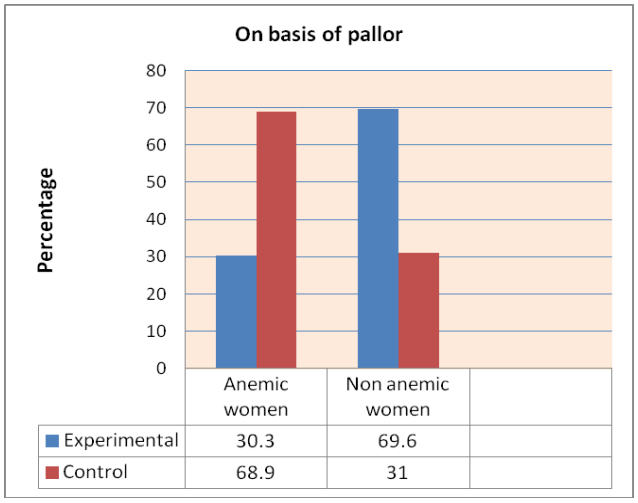

Figure 3: P ost interventional prevalence of anemia between experimental and control group on basis of pallor

Analysis of impact of nutritional counseling

Table 2: Base line average mean and median values of different nutritionindicators among pregnant women in interventional and Non-Interventional group

Nutrition group	Interventional group n=59			Non-Interventional group n=59		
	Mean	Median	SD±	Mean	Median	SD±
FFA(µg/day)	39.2	38.1	6.8	40.4	40.5	5.4
Iron(mg/day)	8.2	8.9	2.7	8.39	9.0	2.7
Protein(g/day)	34.5	34.1	4.6	32.1	32.8	3.5
TFA(µg/day)	113.0	111.7	19.8	107.8	103.2	21.5
Vit B_{12}(µg/day)	0.56	0.50	0.27	0.67	0.50	0.27
VitA(RAEµg/day)	502.9	500	41.4	496.1	510.0	68.3
Vitamin C(mg/day)	56.6	60.8	10.9	56.6	60.8	10.9

n = No of pregnant women

Table 3: B ase line mean and median values of different food groupsamong pregnant women of Interventional and Non-Interventional group

	Interventional group n=59			Non-Interventional group n=59		
Food Groups	Mean	Median	SD±	Mean	Median	SD±
cereals(g/day)	375.7	374.2	31.1	375.7	374.2	31.1
fishes(g/day)	10.3	0.00	16.91	7.6	0.00	14.8
fruits(g/day)	60.4	20.6	60.0	60.4	60.0	20.6
Green leafy vegetables(g/day)	17.6	17.1	6.7	17.6	17.1	6.7
meat(g/day)	3.1	0.00	7.0	0.82	0.00	3.3
Other vegetables(g/day)	47.4	42.8	24.5	38.6	42.8	11.2
pulses(g/day)	17.4	12.8	15.1	17.4	12.8	15.1
Roots and tubers(g/day)	99.6	80.0	32.4	99.3	80.0	30.8

n = No of pregnant women

Table 4:- Mann-Whitney test comparing the nutritional output of experimental and control groups of pregnant women after eight months of pregnancy

Nutrition group	Interventional group n=59			Control group n=59			Mann-Whitney	Z value	P value
	Median	SD±	Mean rank	Median	SD±	Mean rank			
FFA(µg/day)	48.0	10.8	66.46	45.0	8.6	52.5	1330.0	-2.21	0.02
Iron(mg/day)	26.0	3.9	88.6	10.8	4.3	30.6	21.0	-9.27	0.001
Protein(g/day)	49.1	5.9	75.36	34.0	11.5	43.64	804.5	-5.05	0.001
TFA(µg/day)	290	62.1	71.4	170.0	96.1	47.5	1034	-3.81	0.001
Vit A RAE(µg/day)	650.0	147.9	71.56	540.0	113.29	47.44	1029.0	-3.84	0.001
Vit B_{12}(µg/day)	1.20	0.73	70.61	0.60	0.36	48.39	1085.0	-3.57	0.001
Vitamin C(mg/day)	211.0	49.6	63.8	161.9	46.1	55.14	1483.5	-1.41	0.15

n= no of pregnant women

Table 5: Mann-Whitney test output of food groups after 8th months among pregnant women between experimental and control groups

Food Groups	Interventional group n=59			Control group n=59			Mann-Whitney U value	Z value	P value
	Median	SD±	Mean rank	Median	SD±	Mean rank			
cereals(g/day)	400.0	55.1	54.2	400.0	24.6	64.8	2053.0	1.71	0.08
fishes(g/day)	4.28	4.28	79.1	0.00	3.4	39.8	582.0	-6.7	0.001
fruits(g/day)	44.2	15.8	45.6	60.0	20.6	73.2	2559.0	4.45	0.001
Green leafy vegetables(g/day)	69.0	19.1	88.4	24	4.8	30.3	33.0	-9.26	0.00
meat(g/day)	8.5	4.3	72.3	0.00	2.3	46.6	984.5	-4.9	0.001
Other vegetables(g/day)	93.0	19.4	87.7	50	7.0	31.3	76.5	-9.06	0.001
pulses(g/day)	58.0	19.3	86.3	21	7.8	32.6	157.5	-8.5	0.001
Roots and tubers(g/day)	80.0	18.4	62.9	80	15.1	56.0	1537.5	-1.1	0.25

n= no of pregnant women

Table shows that there was a statistically significant increase in the experimental group's protein median score (49.1g/day) compared to the control group's (34.0g/day) (U = 804.5 Z = -5.05 p< 0.05).

The experimental group's median iron score was statistically substantially higher than the control group's at 26.0 mg/day and 10.8 mg/day, with a difference of U = 21.00 Z = -9.2 p< 0.05.
The experimental group's median FFA score was 48.0µg/day, whereas the control group's was 45.00µg/day. There was a statistically significant increase in the experimental group compared to the control group (U= 1330.0 Z = -2.21 p< 0.05).

There was a statistically significant difference in the median TFA score between the experimental and control groups, with the former at 290.0µg/day and the latter at 170.0µg/day (U=1034.0, Z = -3.81, p<0.05).

The Vit C median score for the experimental group was 211.0 mg/day, while the control group's was 161.9 mg/day. There was no statistically significant difference between the two groups' median scores (U = 1483.5 Z = -1.41 p>0.05).

Vit B12 median scores were statistically substantially higher in the experimental group (U = 1085.0 Z = -3.57 p<0.05) than in the control group (0.6 µg/day). The experimental group's median score was 1.20 µg/day.

The experimental group's median Vit A (RAE) score was 650.0 µg/day, whereas the control group's was 540.0 µg/day. There was a statistically significant increase in the experimental group compared to the control group (U = 1029.0 Z = -3.84 p< 0.05).

Table shows that there was a statistically significant increase in the experimental group's median score for other vegetables (93.0 g/day) compared to the control group's 50.0 g/day (U = 76.5 Z = -9.06 p<0.05).

The experimental group had a considerably higher median score for green leafy vegetables (69.0g/day) than the control group (24.0g/day). This difference was statistically significant (U=33.0 Z = -9.26 p<0.05).

The experimental group saw a statistically significant increase in median pulse score (58.0g/day) compared to the control group (21.0g/day): U = 157.5 Z = -8.58 p< 0.05.

The mean rank of the fish was statistically substantially higher in the experimental group (79.1) compared to the control group (39.8): U = 582.0 Z = -6.7 p< 0.05. Meat mean rank was statistically substantially higher in the experimental group (72.3) compared to the control group (46.6) (U = 984.5 Z = -4.9 p<0.05).

Statistical analysis of post interventional results

Table 6: At various points throughout the trial, the frequency and percentage of changes in the anaemia status of pregnant women in the experimental and control groups, as well as the outcomes of the chi-square test after eight months

	Base line (1st Trimester)		Eight Months (3rd Trimester)		P VALUE	χ^2 VALUE
Category of anemia	Experimental n=59	Control n=59	Experimental n=59	Control n=59		
Mild count	22	26	37	24	0.017	5.735
Percentage	37.3	44.1	62.7	40.7		
Moderatecount	37	33	22	35		
Percentage	62.7	55.9	37.3	59.3		

n= no of pregnant women

Based on Table 4.38, it can be concluded that at the conclusion of the trial, the anaemia status of pregnant women in the experimental and control groups had changed statistically significantly (χ2 (1) = 5.73 p<0.05).

CONCLUSION

The study underscores the critical role of targeted nutrition, health, and hygiene counseling in combating iron deficiency anemia. By empowering individuals with knowledge and practical skills to improve their dietary habits and hygiene practices, significant health benefits were observed. The intervention led to marked improvements in hemoglobin levels, showcasing the potential for scalable public health strategies to address IDA. Continued efforts and investments in educational programs are essential to sustain these gains and further reduce the burden of iron deficiency anemia, particularly in vulnerable populations.

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