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Research Article

Community Based Attempts at Elimination of Anaemia in Rural Women of Reproductive Age with Nutrition Advocacy, Allopathic or Ayurvedic Medication

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Abstract

Background: Anaemia is biggest public health problem in developing countries, specially in reproductive age women. Despite several steps taken by governments, iron deficiency anaemia continues to be common.

Objective: Effectiveness of community based nutritional advice, medication to eliminate anaemia in rural women of reproductive age.

Materials and Methods: Community based study was conducted with nonpregnant women of 15 - 45 years with ≥7 gms/dl to < 11 gms/dl haemoglobin without any obvious illness which could have caused anaemia. Mother and child care was initiated in 28 villages. Anaemia was in high numbers during pregnancy. So it was decided to treat women of reproductive age before they become pregnant. There were 850 (67.08%) study subjects of 1267 tested. They were given medication with or without advocacy of nutrition. They were divided into four groups, A: Allopathic medication, An: A Allopathic medication with nutritional advocacy, B: Ayurvedic medication, Ayurvedic medication with nutritional advocacy.

Results: Total 639 (75.2%) women took medication for decided 180 days, 158 (24.7%) with moderate anaemia 481 (76.3%) mild anaemia. Compliance to free medication provided at door step was 75%. Ayurvedic medication alone was most effective (71%) Ayurvedic with nutrition (69.5%). Efficacy in A was 70.1% and An 56.4%. Nutrition advocacy with Allopathic medication reduced efficacy. No side effects were reported with Ayurvedic medication. In subjective analysis no one reported negative effect. Little more cost, little better efficacy Ayurvedic medication is good alternative.

Conclusion: Efficacy of Allopathic Ayurvedic medication was almost similar but nutrition with Allopathy reduced efficacy. Research about this aspect and noncompliance at door step is needed. To reduce anaemia possible ways of giving iron need to be found out till rural women have affordability of food with iron.

Keywords: *Anaemia; Reproductive Age; Rural Community; Ayurvedic Allopathic Medication; Nutrition Advocacy*

Background

In developing countries anaemia is the biggest public health problem with prevalence highest in South Asia and Central and West Africa [1]. One of the most common causes of anaemia is iron deficiency (ID) which is estimated to account for around 50% of all cases of anaemia [1,2]. However more recent estimates suggested that anaemia due to ID accounted for less than 50%, depending on the country-specific context [3]. Although many nutrients are involved in the production of red cells and haemoglobin, ID is by far the commonest cause of nutritional anaemia all over the world, specially in women of reproductive age, Despite several steps taken by governments, ID anaemia (IDA) still continues to be common due to various reasons. Women become anaemic more often due to their physiology, be it menstruation and pregnancy or abnormal uterine bleeding, pregnancy related bleeding in addition to deficiencies in food. They can have other disorders too which women as well as men can have, like bleeding piles, worm infestation, or chronic diseases such as tuberculosis, or cancer.

Objectives of the Study

Effectiveness of community based nutritional advice, Allopathic, Ayurvedic medication to eliminate anaemia in rural tribal women of reproductive age.

Materials and Methods

Community based cross sectional study was conducted in 28 villages after approval of ethics committee of the institute. These villages were around 65 ± 10 km distance from the institute where study was planned. In these villages mother and child care activities were started and anaemia was seen in many pregnant women. So it was decided to try ensure women were not anaemic before they become pregnant. Sample size needed for screening was around 1200 in 28 villages, where some villages were small and others big. Haemoglobin of 1267 non pregnant women of 15 - 45 years of age with no obvious cause for anaemia (inclusion criteria) was checked after consent. Total 858 were anaemic and 8 severely anaemic were excluded. Those with haemoglobin ≥ 7 gms/dl to < 11 gms/dl, 850 (66.08%) were enrolled as study subjects. Those with less than 7 gm/dl were asked to get investigations and were not part of the study. All the anaemic < 11 gm/dl were also asked to get investigations. But investigations were not part of the study. Pregnant women, those with obvious illnesses and not willing to be part of the study were also excluded. Side effects were recorded. Those who wanted to withdraw were also allowed. For final inclusion of women, criteria was decided at the beginning. Those who complied to minimum 85% of medication, minimum 165 days out of 180 days decided were final study subjects. For medication, women were divided into four groups, Group A were given Allopathic medication, Group An Allopathic medication with nutritional advice, Group B Ayurvedic medication and Group Bn were given Ayurvedic medication with nutritional advice. Nutritional advice was given with the help of a booklet specially prepared for the study. Booklet had detailed information about anaemia, symptoms, causes, effects and prevention with food rich in iron. In each village women used to meet at source of water and temples. Huts were within some meters or even some feet distance from each other. So randomization of villages was done and not study subjects in any village for Ayurvedic and Allopathic medication. Women were explained in details about the need of prevention of anaemia and necessity of therapy if anaemic. Medication was given on day one by research assistant as per criteria. On 30th day timely medicine was again distributed to anaemic women by nurse midwives. Compliance was checked. Some of them did not continue the medicine in Allopathic group as they had rashes, vomiting, diarrhea or constipation. Ayurvedic medication was discontinued because of taste, size and twice a day schedule. On 60th day visit again medication were distributed by NM. They went door to door to cut down on compliance problems. On 90th day, NMs and as well as research assistant visited and checked haemoglobin. Each woman was counselled again and medicines were dispensed. Side effects of the medication, any reaction and improvement in the Hb were recorded. Likewise, on 120th day, NMs visited women, even in the fields where they worked. On 150th day, again NMs visited the communities for compliance and distributing the medication, and any side effects. Improvement effects after 6-months was recorded. In addition to haemoglobin, a scale was used as per their symptomatic responses, deteriorated, no change, little change, good, and very good. On 180th day research assistant checked the final Hb for final compliance and results.

Nutritional chart was given to the An and Bn groups with advice to follow the chart along with the medication to 850 anaemic women. Out of 850 overall 201 were enrolled under group A, 200 under group An medication with nutritional advice, 224 were under group B Ayurvedic medication and 225 were enrolled under group Bn Ayurvedic medications nutritional advocacy. In group A 50 women had Hb% between 7 to 8.9 gm/dl and 151 between 9 to 10.9 gm/dl. In group An 51 had Hb% between 7 to 8.9 gm/dl and 149 between 9 to 10.9 gm/dl. In group Bn 52 and 173 women had Hb between 7 to 8.9 gm/dl and 9 to 10.9 gm/dl respectively. So all the groups were comparable. No other investigations were done (Table 1).

Group	Total anaemic	Moderate	Mild
		≥ 7 to 8.9 gm/dl	≥ 9 to 10.9 gm/dl
A	201	50	151
An	200	51	149
B	224	53	171
Bn	225	52	173
	850	206	644

Table 1: *On 0th day group wise enrolment with Hb%.*

Results

In group A, 201 women were enrolled, on day one. Of which 50 (24.87%) had Hb% between 7 to 7.9 gm/dl, 76 (37.8%) between 8 to 9.9% gm/dl and 75 (37.3%) between 10 to 10.9 gm/dl. On 90th day, of 50 women with Hb% between 7 to 7.9% gm/dl, 12 became drop outs and 38 (76%) women continued and showed rise in Hb%, 32 (84.2%) between 8 to 9.9 and gm/dl, and 6 (16%) between 10 - 10.9 gm/dl, but no one became non anaemic. On 90th day, of 76 women with Hb% between 8 to 9.9 gm/dl, 14 were drop outs. Of left 62 women 3 (5%) had same Hb% and 57 (92%) had Hb between 10 - 10.9 gm/dl and 2 (3.2%) became non anaemic. On 180th day, one more woman was drop out and 61 (98.4%) finally continued and 43 (70.5%) became non anaemic.

In the same group on day one 75 women had Hb% between 10 to 10.9 gm/dl. On 90th day, 11 became drop outs and 64 (85.4%) followed up and 12 (18.8%) had no change in Hb% and 52 (81.25%) became non-anaemic. On 180th day 64 had final check. One had same Hb% and 55 became non anaemic and 8 more were drop outs. Thus under group A, finally out of 201 anaemic women, 38 (19%) were drop outs, 163 (81%) completed planned therapy and 114 (70%) of 163 women became non anaemic. Overall of 50 (24.9%) moderately anaemic study subjects, 16 (42.1%) became non anaemic and 22 (57.9%) became mildly anaemic. From 125 mildly anaemic 98 (78.4%) became non anaemic and 27 (21.6%) remained mildly anaemic.

Under group An 200 women were enrolled. On day one, 52 (26%) had Hb between 7 to 7.9 gm/dl, 80 (40%) between 8 to 9.9 gm/dl and 68 (34%) between 10 to 10.9 gm/dl. On 90th day of 52 women with Hb between 7 to 7.9 gm/dl, 15 were drop outs and 37 (71.2%) did follow up. Of which 2 (5.4%) showed no change in Hb, 32 (87%) showed rise in Hb (8to 9.9 gm/dl). Three (9%) showed rise to 10 to 10.9 gm/dl, but no one became non anaemic. On 180th day, one more woman became dropout, 36 had Hb check up, 7 (19.4%) of 36 were non anaemic.

Eighty women had Hb% between 8 to 9.9 gm/dl on day one, of which 24 were drop outs and 56 (70%) followed. On 90th day, 6 (11%) had same Hb% and 47 (84%) showed rise in Hb to 10 to 10.9 gm/dl and 3 (5.4%) became non anaemic. On 180th day, all 56 could be detected and 35 (62.5%) became non anaemic. Sixty eight women had Hb% between 10 to 10.9 gm/dl on day one, of which 11 became drop outs, and 57 (83.9%) had follow up. By 90th day, 23 (40%) had no change in Hb% and 34(60%) became non anaemic. On 180th day only 55 (96%) could be checked and two left the medication in between, 14 (25%) had Hb% between 10 to 10.9 gm/dl and 41 (75%) became non anaemic.

Overall of 200 women of group An, 52 (26%) moderately anaemic and 148 (74%) mildly anaemic, 147 (73.5%) followed and 56.5% became non anaemic. On 180th day of 147 followed, 45 (86.53%) moderately anaemic and 102 (68.91%) with mild anaemia. Of moderately anaemic, 25% became non anaemic and 75% became mildly anaemic and of mildly anaemic, 75% became non anaemic and 25% remained mildly anaemic.

Under group B, 224 women were enrolled on day one. Of which 53 (23.66%) had Hb% between 7 to 7.9 gm/dl, 94 (41.96%) between 8 to 9.9 gm/dl and 77 (34.37%) between 10 to 10.9 gm/dl. On 90th day of 53 women with Hb% between 7 to 7.9 gm/dl, 10 became dropouts and, 43 (81.5%) followed. One showed no change in Hb%, 39 (74%) showed rise to 8 to 9.9 gm/dl, one (2.3%) to 10 to 10.9 gm/dl and 2(5%) became non anaemic. On 180th day all the 43 women had check up and 11 (25.6%) were non anaemic.

Ninety four women had Hb% between 8 to 9.9 gm/dl day, 27 were drop outs and 67 (71.3%) had follow up on 90th day. Two (3%) had same Hb% and 62 (92.6%) showed rise in Hb% between 10 to 10.9 gm/dl and 3(4.5%) became non anaemic. On 180th day, all 67 finally had Hb checked and 56 (84%) had become nonanaemic.

Seventy seven women had Hb% between 10 to 10.9 gm/dl on day one. Of which 24 were drop outs, 53 (69%) could be followed. By 90th day 10 (19%) had no change in Hb% and 43 (81.13%) became non-anaemic. On 180th day all 53 had Hb checked, 4 had same Hb% and 49 (92.5%) became non anaemic. Finally, under group B, of total 224, women 53 (23.6%) became moderately anaemic and 171 (76.3%) mildly anaemic. By 180th day 163 could be followed, 43 (26.4%) were moderately anaemic and 120 (73.6%) mildly anaemic. From 43 moderately anaemic women 11 (25.6%) became non anaemic and 32 (74.4%) became mildly anaemic and from 120 mildly anaemic, 105 (87.5%) became non anaemic and 15 (12.5%) remained mildly anaemic.

Under group Bn, 225 women were enrolled on day one. Of which 52 (23.2%) women had Hb% between 7 to 7.9 gm/dl, 87 (39%) between 8 to 9.9 gm/dl and 86 (38.3%) between 10 to 10.9 gm/dl. On 90th day of 52 women with Hb% between 7 to 7.9 gm/dl, 9 were drop outs and 43 (83%) followed. One showed: no change, 33 (77%) women showed rise to 8 to 9.9 gm/dl, 9 (21%) showed rise to 10 to 10.9 gm/dl. No one became non anaemic. On 180th day, 2 women could not be followed, 41 had Hb checked and 20 (49%) of them became non anaemic. Eighty seven women had Hb% between 8 to 9.9 gm/dl, of which 23 were drop outs and 64 (74%) followed by 90th day, 6 (9.4%) had same Hb% and 52 (81.3%) showed rise in Hb% to 10 to 10.9 gm/dl and 6(9.4%) women became non anaemic. On 180th day 2 more women were drop outs, 62 checked, and 38 (61.3%) became non anaemic.

Total 86 women had Hb% between 10 to 10.9 gm/dl on day one. Twenty were dropouts and 66 (76%) followed up by 90th day. Eleven (17%) had no change in Hb% and 54 (83%) became non-anaemic. On 180th day 64 had check up, 6 remained with same Hb% and 58 (91%) became non anaemic. Out of 224 women finally 163 (72.76%) completed medication and 61 (27.2%) were drop outs.

In Bn, 225 anaemic women enrolled, 52 (23.11%) were moderately anaemic and 173 (76.9%) mildly anaemic. On 180th day, 166 completed follow up, 41 (24.7%) with moderate anaemia and 125 (75.3%) with mild anaemia. From 41 moderately anaemic women, 20(48.8%) became non anaemic and 21 (51.21%) became mildly anaemic. and from 125 mildly anaemic, 96 (76.8%) became non anaemic and 29(23.2%) remained mildly anaemic. Finally of 225 women, 74.2% completed follow up and 25.8% were drop outs.

Overall 639 (75.2%) of 850 women had compliance as per criteria, 158 (24.7%) with moderate anaemia and 481 (76.3%) mildly anaemic. Efficacy in group A was 70.1% An 56.4%, B71.12% and 69.5% in Bn group. Ayurvedic drug alone was most effective (71.2%) and more effective than Ayurvedic drug with nutritional advice 69.5% but difference was little. Similarly Allopathic medication alone was more effective (70%) than Allopathic medication with nutrition (56.5%), with a lot of difference. Thus efficacy of Ayurvedic and allopathic drugs were almost similar, Ayurvedic little better. However when Allopathic medication and food advocacy was done results significantly changed and needs more research. This problem was much less with Ayurvedic medication (Table 2).

0-day Hb%	Total anaemic Pt. on 0-day	90 day follow up		Rise in Hb				180 day follow up		Rise in Hb			
		Drop Out up to 90th day	Total anaemic follow up	7 to 7.9 gm/dl	8 to 9.9 gm/dl	10 to 10.9 g/dl	12.5 to > 14.1 gm/dl	Drop Out up to 180th day	Total anaemic follow up	7 to 7.9 gm/dl	8 to 9.9 gm/dl	10 to 10.9 g/dl	12.5 to > 14.1 g/dl
Group - A													
7 to 7.9 gm/dl	50 (24.87%) 76 (37.81%)	12	38	-	32	6	-	-	38	-	-	22	16
8 to 9.9 gm/dl		14	62	-	3	57	2	1	61	-	-	18	43
10 to 10.9 g/dl	75 (37.32%)	11	64	-	-	12	52	-	64	-	-	9	55
Total	201	37	164	-	35	75	54	1	163	-	-	49 (30.06%)	114 (70.1%)
Group - An													
7 to 7.9 gm/dl	52 (26%)	15	37	2	32	3	-	1	36	-	2	27	7
8 to 9.9 gm/dl	80 (40%)	24	56	-	6	47	3	-	56	-	1	20	35
10 to 10.9 g/dl	68 (34%)	11	57	-	-	23	34	2	55	-	-	14	41
Total	200	50	150	2	38	73	37	3	147	-	3 (2.04%)	61 (41.5%)	83 (56.46%)
Group - B													
7 to 7.9 gm/dl	53 (23.66%)	10	43	1	39	1	2	-	43	-	4	28	11
8 to 9.9 gm/dl	94 (41.96%)	27	67	-	2	62	3	-	67	-	-	11	56
10 to 10.9 g/dl	77 (34.37%)	24	53	-	-	10	43	-	53	-	-	4	49
Total	224	61	163	1	41	73	48	-	163	-	4 (2.45%)	43 (26.4%)	116 (71.2%)
Group - Bn													
7 to 7.9 gm/dl	52 (23.11%)	9	43	1	33	9	-	2	41	-	3	18	20
8 to 9.9 gm/dl	87 (38.66%)	23	64	-	6	52	6	2	62	-	2	22	38
10 to 10.9 gm/dl	86 (38.23%)	21	65	-	-	11	54	2	63	-	-	5	58
Total	225	53	172	1	39	72	60	6	166	-	5 (3.9%)	45 (27.5%)	116 (69.5%)

Table 2: *Haemoglobins charge. Group - A, An, B, Bn.*

A- Allopathic Medication; An- Allopathic Medication with Nutrition Advocacy; B- Ayurvedic Medication; Bn- Ayurvedic Nutrition Advocacy

Over all 32 women 20 in A and 12 in An developed adverse reactions at various stages of follow up (Table 3). Twenty women left medication due to distaste (16 of group B and 4 of Bn), 7 women left the medication due to big size of pill (4 from group B and 3 from group Bn). No side effects were reported with Ayurvedic medication. Little more efficacy with little more cost than Allopathic drug, Ayurvedic medication seemed a good alternative which could be offered.

Group - A	15-19 Yrs			20-34 Yrs			35-49 Yrs		
	Economic Status								
Economic Status	Lower	Middle	Upper	Lower	Middle	Upper	Lower	Middle	Upper
Rashes	1	-	-	1	-	-	-	-	-
Constipation	-	-	-	1	1	-	-	-	-
Diarrhoea	-	-	-	-	1	-	1	-	-
Vomiting	-	-	-	2	-	-	-	1	-
Pain abdomen	-	-	-	4	-	-	6	1	-
Group – An									
Rashes	1	-	-	1	1	-	-	1	-
Constipation	-	-	-	-	-	-	-	-	-
Diarrhoea	-	-	-	-	-	-	-	-	-
Vomiting	-	-	-	-	2	-	-	1	-
Pain abdomen	-	-	-	-	4	-	1	-	-

Table 3: *Correlation of adverse reaction with age and economic status.*

Before treatment out of 850 anaemic women 207 (24.4%) were moderately anaemic and 643 (75.64%) mildly anaemic. After treatment of 639(75.2%) women who took medication for the duration decided. 158 (24.7%) were, moderately anaemic and 481 (76.3%) mildly anaemic. Finally, from 158 moderately anaemic women, 54 (34.2%) became non anaemic and 104 (65.9) became mildly anaemic. From 481 mildly anaemic women, 375 (78%) became non anaemic and 106 (22%) remained mildly anaemic.

In subjective analysis in group A 26.99% felt very good, 42.94% felt good, 23.31% had little change and 6.74% had no change. In group An 20.56% felt very good, 65.24% felt good, 10.63% had little change, and 3.54% had no change. In group B 30.7% felt very good, 40.5% felt good, 23.9% had little change, and 4.9% had no change. No one reported negative effect in any category.

Discussion

Nutritional anaemia may be defined as 'haemoglobin concentration below that which is normal for the individual, due to an inadequate supply of right nutrients'. IDA is a global public health crisis. As per the World Health Organization's report half of the cases of anaemia are due to ID. Alternative forms of medicine like Ayurvedic preparations are usually used by patients because they are believed to be harmless. Ayurveda offers several formulations for the management of IDA. Despite all the efforts the demographic health survey in India revealed that 27% of women of age 15 - 49 years were chronically malnourished and about the same proportion suffered from anaemia with significant regional variations [4]. Thhacker [5] reported that NFHS III [6] revealed that 55.3% of women between 15 - 49 years were anaemic in India and the survey estimated prevalence of anaemia around 55% among women of reproductive age. In the present community based study it was found that women of reproductive age were anaemic. Nutritional advice in their own language should help a lot in consuming the right diet and thus need to make difference. However rural women cannot afford to have right food. So system for iron supplement to nonpregnant women is needed. Also it was revealed that Allopathic medication alone without nutritional advice had better efficacy. Ayurvedic medication had best efficacy. Anaemia was reduced at community level in group, A 70% and An 56.4% Allopathic medication with iron containing food with iron might affect iron absorption of drug and this aspect needs further studies. Over all 32 women, 20 in A and 12 in An developed adverse reactions at various stages of follow up. Twenty women left medicine due to distaste (16 of group B and 4 of Bn), 7 women left the medicine due to big size of pill (4 from group B and 3 from group Bn).

Between 1993 and 2013, the global prevalence of anaemia improved by only 0.2% to 0.3% points [7,8]. This slow progress, coupled with the overall burden of anaemia, lead to anaemia's inclusion in the global nutrition targets to improve maternal, infant and child nutrition agreed by the World Health Assembly in 2012 the second of the six global goals aimed for a 50% reduction of anaemia in women of reproductive age by 2015 [9,10]. But goal is not achieved is obvious. In addition, anaemia is indirectly included in the sustainable Development Goals (SDGs), according to the second goal on ending hunger, target 2.2 aims to end all forms of malnutrition by 2030, (UN 2015) [11], how continues, to be a big question.

Analysis of adherence and side effects of iron supplements revealed adverse effects in allopathic group (A and An), the major cause of drop outs. None of the women in the Ayurvedic group reported adverse effects. The cause of the drop outs in this group was distaste and bigger size of pill. Little more cost and with better efficacy than allopathic drug, Ayurvedic medication was a good alternative which could be offered. Overall 70% women of group A, 56.5% of An 71.2% B and 69.5% of Bn became non anaemic on 180th day. Finally from 158 moderately anaemic women, 54 (34.2%) became non anaemic and 104 (65.9) became mild anaemic. From 481 mildly anaemic women, 375 (78%) became non anaemic and 106 (22%) remained mild anaemic. Subjective analysis: revealed that in group A 26.99% felt very good, 42.94% felt good, 23.31% had little change, and 6.74% had no change. In group An 20.56% felt very good, 65.24%felt good, 10.63% had little change, and 3.54% had no change. In group B 30.7% felt very good, 40.5% felt good, 23.9% had little change, and 4.9% had no change. In group Bn 25.9% felt very good, 43.69% felt good, 24.1% had little change, and 6.02% had no change. No one reported a negative effect. So what women need is more of iron in food, which they are unable because of the cost of food. Presently the most cost- effective method for the prevention of anaemia among women is community-based attempts at supply of iron containing food, iron fortification of food, a iron supplementation, to nonpregnant women of reproductive age. Fortification still could be the most effective community based intervention, for reducing maternal anaemia. There is a need to develop policies to improve the health promotion activities and involvement of women. A study by Tubaki [12] effectively showed that Ayurveda Kasisa bhasma is better than Dhatri avaleha. Improvements by both interventions were sustained even during the sustainability period, Samal [13] reported that no the response of most of the Ayurvedic formulations was better than Allopathic formulations and there was no untoward effect as observed with iron salts. Significant results were obtained in favour of the Ayurvedic formulations in subjective and haematological parameters. As most of these Ayurvedic formulations are found effective against IDA, their usage should be fostered at all level in addition to modern allopathic medicines. People have faith with Ayurveda as it is based on the use of natural products and is considered to be devoid of adverse events. Iron deficiency is a common nutritional deficiency worldwide and jointly responsible for the high and persistent prevalence of anaemia. However various other micronutrients may be lacking in inadequate and imbalanced diets and contributed to micronutrients deficiencies and emergence of anaemia. Nutrition-specific interventions that address the immediate determinants of anaemia, such as diseases or infections, aim to prevent and control nutritional anaemia.

Conclusion

More of iron by some means can change the scenario of anaemia in women of reproductive age in rural communities till the time affordability changes, fortification of food, iron supplementation need to be tried. Also research is needed about synergy of Ayurvedic medication and food and negative effects of Allopathic medication and food.

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