Review: MEDICAL NUTRITION THERAPY IN ANAEMIC WOMEN

Normal amount of red blood cells

Anemic amount of red blood cells
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MEDICAL NUTRITION THERAPY
IN ANAEMIC WOMEN

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INTRODUCTION

Anaemia is a major public health problem worldwide. It is the most common nutritional deficiency disorder in the world. It occurs when the red blood cells do not carry enough oxygen to the tissues of the body.

WHO defines anaemia as a “condition in which the haemoglobin (Hb) content of the blood is lower than the normal as a result of deficiency of one or more essential nutrients, regardless of the cause of such deficiency”.

Anaemia is established if the haemoglobin and mean corpuscular hemoglobin concentration (MCHC) are below the cut-off points recommended by WHO Expert group (Table no. 1).¹

<table>
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<th>Population</th>
<th>Hb - gm/dl (venous blood)</th>
<th>MCHC (%)</th>
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<td>ADULT MALES</td>
<td>13</td>
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<td>ADULT FEMALES, NON-PREGNANT</td>
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<td>CHILDREN: 6 months to 6 years</td>
<td>11</td>
<td>34</td>
</tr>
<tr>
<td>CHILDREN: 6 to 14 years</td>
<td>11</td>
<td>34</td>
</tr>
<tr>
<td>MCHC = mean corpuscular hemoglobin concentration</td>
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At all ages, normal MCHC should be 34, values below that indicate that Red blood cells (RBCs) are hypochromic which occurs in iron deficiency anaemia. Hb levels of 10 to 11 gm% is defined as early anaemia, a level below 10 gm% as marked anaemia.

Anaemia is also defined as deficiency in size and number of RBC’s or amount of Hb that they contain or Hb concentration below 95th percentile for healthy referral population. Anaemia is not a disease but a symptom of conditions including nutritional deficiencies, gastrointestinal infestations, infections, blood loss, blood cell destruction and decreased blood formation.

CLASSIFICATION OF ANAEMIA²

According to Indian Council of Medical Research (ICMR), anaemia is classified as follows:

Mild anaemia: Hb level 8 to 10.9 gm%

Moderate anaemia: Hb level 5 to 7.9 gm%

¹ Reference: [Source]
² Reference: [Source]
Severe anaemia: Hb level less than 5 gm%

Different regions of the world are classified by the WHO into different categories depending on the prevalence of anaemia as below:

High Prevalence: > 40%
Medium Prevalence: 15 to 39%
Low Prevalence: 5 to 14.9%
Not a Problem: < 5%

Various factors such as deficient oxygen, Vitamin C, growth hormones and thyroxine stimulate erythropoiesis. The red cell mass is continually adjusted to the optimum quality for its function as an oxygen carrier by messages transmitted to the bone marrow from the oxygen sensors in the kidneys. These messages are mediated by a glycoprotein hormone 'erythropoietin' produced by the kidneys. Deficiency of dietary factors such as iron, folic acid, Vitamin B₁₂, Vitamin C, proteins and erythropoietin disturbs the normal erythropoiesis resulting in anaemia.

Anaemia may be classified according to their aetiology:

I. Anaemia due to dietary deficiency or malabsorption of factors essential for normal blood formation e.g. iron, folic acid, Vitamin C, Vitamin B₁₂, pyridoxine and protein.

II. Anaemia due to blood loss in conditions such as haemorrhoids, ulcers, hookworm infestation, etc.

III. Anaemia due to excessive blood cell destruction e.g. thalassemia, sickle cell anaemia and autoimmune haemolytic anaemia.

IV. Anaemia due to aplasia and hypoplasia of bone marrow, such as idiopathic aplastic anaemia, following certain drugs such as anti-cancer drugs, etc.

V. Anaemia due to deficiency of erythropoietin as in chronic renal diseases.

VI. Anaemia of uncertain origin e.g. due to chronic infections, rheumatoid arthritis, liver disease and cancer.

India has amongst the highest number of cases of anaemia in the world according to the National Family Health Survey (NFHS-3) undertaken in 2005-06 and the reasons given range from high cost of health care facilities, poor food quality and low status of women.
PREGNANCY AND INCREASED DEMANDS OF NUTRITION

During pregnancy there is increased demands of iron overall. In fact, iron deficiency starts in childhood, worsens in adolescence and gets aggravated in pregnancy. Overall incidence of anaemia during pregnancy in India is from 40 to 80%. Anaemia is responsible for 20% of maternal deaths in the third world countries.  

In pregnancy, overall there is haemodilution. Plasma volume increases by 40 to 50% but RBC volume increases only by 15 to 20%; this results in erythrocyte dilution by 5 to 15% and decrease in haemoglobin concentration by approximately 2 gm/dl, resulting in physiological anaemia. But the peripheral blood smear remains as normocytic and normochromic.  

Total iron demand during pregnancy is around 900 mg (range 700 to 1400 mg) of which about 500-600 mg is accounted by the uterus and its contents, around 150-200 mg is lost during delivery and roughly around same is utilised during lactation. Due to pregnancy amenorrhea, around 225 mg of iron is saved, thus a deficiency of 600 to 700 mg iron results. In terms of daily needs this is approximates to 4-6 mg/day in second trimester and 6 to 8 mg/day in third trimester. Absorption of orally administered iron depends upon state of iron bodystores.  

In the formation of RBC’s an active bone marrow requires not only iron and traces of copper and zinc for haemoglobin formation, but also folic acid, Vitamin B12, Vitamin C and protein.  

In the non-pregnant state, iron flow is mainly towards the cells in the bone marrow, but during pregnancy the trophoblastic cells of the placenta become the major target and iron is delivered to foetus against concentration gradient. Same thing happens with folate, therefore fetal requirement gets priority over mother and it maintains its own Hb at the expense of iron and folate deficiency in the mother. Hence, it is said that foetus has a typical behaviour like parasite.  

To meet with the increased demand of iron during pregnancy, we have to give supplementary iron therapy to the mother. The National Nutritional Anaemia Control Programme of India recommends 100 mg of elemental iron + 500 mcg of folic acid for prophylactic supplementation for a minimum of 100 days in second trimester. And for actual treatment of anaemia it recommends 200 mg of elemental iron with 1000 mcg of folic acid. This is to be continued during the lactation for 3 to 6 months. Along with iron and folic acid, there is a need to supply Vitamin B12, Vitamin C, protein, zinc,
magnesium and calcium. In non-pregnant state, requirement of protein is 1 gm/kg body weight, but during pregnancy requirement increases to 1.5 gm/kg/day. It plays a very important role in growth and development of foetus as well.1

**CLINICAL FEATURES OF ANAEMIA**

**Symptoms:**

As anaemia becomes more severe patient starts suffering from easy fatigability, weakness, dizziness, drowsiness and loss of normal colour of skin, tongue, lips and nails, dyspnea on exertion, palpitations and worsening of pre-existing angina (depending upon severity of anaemia). Lack of concentration and poor performances in schools and colleges can thus affect her cognitive function. With further fall in haemoglobin she develops swelling (edema) first usually in limbs, later on it becomes generalised.

**Signs:**

On examination, patient may be averagely or poorly built. Pallor can be appeared at different sites e.g. conjunctiva, nails, tongue and soft palate. Edema can be seen on lower limbs or it may be generalised. Nails show typical features of chronic anaemia i.e. platynychia, koilonychia, spoon shaped or brittle nails. Cardiovascular examination may reveal haemic murmur (ejection systolic murmur) in pulmonary area with splitting of second heart sound. Per abdomen examination may reveal hepatosplenomegaly and/or ascites.

**DIAGNOSIS/LAB INVESTIGATIONS**

The basic workup for anaemia includes estimation of haemoglobin and hematocrit to quantify the severity of disease, calculations of red blood cell indices to classify the anaemia, haemoglobin electrophoresis to exclude thalassemia and sickle cell anaemia and detailed evaluation of peripheral blood smear.

- Peripheral blood smear (PBS) is the single most
important tool in the diagnosis of anaemia. Micro or macrocytosis, hypo or normochromic RBCs, anisopoikilocytosis, presence of target cells, schistocytes serves as important clues to aetiology. PB5 also provides information about the white blood cells, differential count and morphology, platelet count, presence of parasites like malaria, kala azar and toxic granules of chronic infections.

- Reticulocyte count- In a women with normal erythropoietin response, development of anaemia causes a compensatory reticulocytosis. If this does not occur, probably it is an indicator of poorly functioning bone marrow. It could be because of nutritional deficiencies such as iron and folate deficiency or due to erythropoietin deficiency as seen in chronic renal failure.

- Various RBC indices help in finding out probable aetiology of anaemia e.g. mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC).

- Other investigations required are stool examination for parasites, cysts, ova, occult blood, urine analysis for albumin, sugar, microscopy, culture and sensitivity

- Serum proteins, liver function tests, renal function tests

- Specific investigations like Serum iron, Serum Total iron binding capacity (TIBC), Serum transferrin, Serum folate, Serum B₁₂, may be required

- In rare cases, for diagnosis of pulmonary TB, chest X-ray with abdominal shield may be taken if pregnant.

- Other nutritional anaemias like copper deficiency anaemia, sideroblastic (pyridoxine responsive) anaemia, Vitamin E responsive anaemia should be kept in mind, though rare. Non nutritional anaemias like sickle cell or thalassemia though rare, may be seen in practice. Relevant investigations may be done if symptoms or history is suggestive of these diseases.

**MANAGEMENT OF ANAEMIA**

**Diet**

As mentioned earlier, nutritional deficiency anaemia starts in childhood, worsens in adolescence and gets aggravated during pregnancy. Therefore neglecting her in family, food wise, education wise, opportunity wise should come to an end. Sex discrimination should be abolished completely. Boys and girls should be brought up in the same way, treating them equally. As girl grows, parents and family must empower her in all respects. Woman should be more independent financially. This will go long way in preventing nutritional anaemia. After investigating her, treating the cause of anaemia is needed.
• Since hookworm infestation is very common in our country we need to treat her with Tablet Mebendazole 100 mg twice a day for 3 days or Tablet Albendazole 400 mg single dose. Poor hygiene overall may lead to chronic amoebic colitis; in this condition, Tablet Metronidazole 400 mg thrice a day for seven days is adequate. If girl/woman happens to come from malaria endemic area, then a course of antimalarial drugs like Tablet Chloroquine 200 mg, four tablets initially, two tablets after 6 hours and one tab BD for next 2 days should be given. Other gastrointestinal tract (GIT) infection, urinary tract infection or other chronic infections should be treated aggressively.

• Though it may seem to be only one type of nutritional deficient anaemia, in practice we come across patients with multiple deficiency anaemia. It may be two or more nutritional deficiency anaemia e.g. deficiencies of iron, folic acid, B₁₂, B₉, etc. Protein deficiency goes hand in hand with all these deficiencies. Unless a particular nutritional deficiency is found, we have to correct all above mentioned nutritional deficiencies with adequate dosages of nutrients for adequate time. Diet rich in all these nutrients is advised.

• A good counselling regarding diet is a must. We must give a quality time while counselling and make sure that girl/woman has understood importance of food in general and nutrients in particular.

• Details of iron rich food and factors which inhibit or promote its absorption should be discussed. Food sources rich in iron are liver, meat, poultry and fish. Foods containing non heme iron are those of vegetables origin e.g. cereals, green leafy vegetables, legumes, nuts, oilseeds, jaggery and dried fruits. Bioavailability of non heme iron is poor owing to the presence of phytales, phosphates, oxalates, carbonates and dietary fibres which interfere with iron absorption. Cooking in iron vessels delivers significant amount of iron. Must avoid tea and coffee.

• Folic acid is sourced from liver, meat, dairy products, eggs, milk, fruits and cereals. Green leafy vegetables are also rich in folate.

• Good sources of Vitamin B₁₂ are liver, kidney, meat, fish, eggs, milk and cheese. Vitamin B₁₂ is not found in foods of vegetable origin. It is synthesized by bacteria in colon.

• Vitamin C is required for reducing ferric iron to ferrous iron, which helps in the absorption of iron from vegetable foods. Main dietary sources of Vitamin C are fresh fruits and green leafy vegetables. Guava and Amla (Indian gooseberry) are very rich source of vitamin C.

• Other B-group vitamins, Vitamin A, D, E, and K can also be available in various dietary constituents.
• Fortification of food with these essential micronutrients is another option of making food rich in these ingredients.

• 10 mg of iron daily is adequate for prevention of anaemia. Most authorities agree that most expensive iron preparations or quick or slow release preparations have no advantages over ferrous sulfate. Ferrous sulfate is inexpensive and prevents anaemia.

• Rich sources of proteins are as follows:

   A) Animal source: e.g. Meat, egg, cheese, fish, milk. These proteins contain all essential amino acids in adequate amounts

   B) Vegetable source: Vegetable proteins are found in pulses (legumes), cereals, beans, nuts, oilseeds etc. Soya bean is the richest and cheapest source of proteins (about 40%) and must be consumed frequently. But, it hampers the absorption of iron.

**Medical therapy**

While managing nutritional deficiency anaemia, we must provide deficient nutrients in the dosage form of drugs. Along with proper nutritious and healthy diet, therapeutic supplementation through drugs is essential.

**Iron Therapy:**

Oral iron is the best form. Iron in the ferrous form is absorbed most. Though iron on empty stomach is absorbed maximum but its GIT side effects prevent it from doing so. Therefore iron after meal is the best strategy. Presence of vitamin C in diet facilitates iron absorption.

WHO recommends 100 mg of elemental iron with at least 400 mcg of folic acid for 3 months in every woman, irrespective of pregnancy. In first trimester avoid giving these preparation for the sake of preventing oral iron side effects. Morning sickness or hyperemesis gravidarum of first trimester might get worsened with oral iron, so avoid it in first trimester.

After 3 weeks of oral iron therapy, Hb starts rising about 1gm (0.8 to 1.2 gm %) per week. This happens when girl/woman takes iron everyday, without any gastric intolerance and in absence of any surgical problem (e.g. gastrectomy) or medical diseases (e.g. malabsorption syndrome, worm infestation, etc.). Treating GIT disorders is important before starting oral iron therapy. Improvement in symptoms due to anaemia like weakness, lethargy, inability to concentrate starts improving within 7 to 10 days. Feeling of well-being is also observed.

Though, in iron deficiency anaemia treatment as much as 200 mg of oral iron is recommended, it may give rise to GIT side effects. Start with lower doses like 60 mg single dose and slowly increase it; during severe anaemia, faster is the iron absorption. About 5 to
Along with iron we need to give patient supplementation with folic acid (1.5-5 mg once day), Vitamin B₁₂ (5 to 10 mcg), Vitamin C (500 mg a day) and other micronutrients like copper, zinc, manganese, etc.

10% of ingested iron is absorbed from GIT. Usually it happens to be multiple deficiency nutritional anaemia; therefore along with iron we need to give patient supplementation with folic acid (1.5-5 mg once day), Vitamin B₁₂ (5 to 10 mcg), Vitamin C (500 mg a day) and other micronutrients like copper, zinc, manganese, etc.

Role of injectable iron (iron sucrose):

Role of injectable iron is only in those cases who have oral iron intolerance or have medical or surgical or GIT diseases or in non-complaint cases.

In modern days, intramuscular (IM) iron therapy is given rarely. We prefer giving IV iron to such indicated cases. Iron sucrose 100 mg given by intravenous (IV) route is preferred therapy. Newer drugs like ferric carboxymaltose 1000 mg can be given IV over a period of 15 min. Both these drugs are approved for use during pregnancy in 2nd and 3rd trimester. All the emergency measures should be available to treat allergic (anaphylactic) reactions of IV iron.

Formula to calculate IV injectable is = \(0.3 \times \text{weight in pounds} \times \text{haemoglobin deficit in percentage}\) + \(50\% \times \text{iron to replenish iron storage}\).

Role of blood transfusion:

Indicated only in very few cases who are very close to term pregnancy (36 weeks +) or having severe anaemia (Hb <7 g%) or not responding to oral or parental iron therapy. In all non pregnant anaemic women Hb should be built through diet and oral iron with other micronutrients.

Protein supplementation

Protein supplementation is a must. It plays very important role in tissue building, synthesis of haemoglobin (globin part of it), repairing other tissue damage which has occurred due to chronic anaemia. A dose of 1 gm/kg/day for non pregnant women and 1.5 gm/kg/day for pregnant and lactating women should be advised. Apart from the protein rich food mentioned above, simple preparation like a laadoo made of groundnut and jaggery can provide nutrients like fat and iron along with proteins.

There is a doubt about a protein rich tonic or powder available commercially. Natural nutritious food in adequate amount calculated for her need, yields better tissue building and satisfactorily outcome.

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FOOD FORTIFICATION

WHO has defined food fortification as the process whereby, nutrients are added to foods (in relative, small quantities) to maintain or improve the quality of the diet, of a group, a community or population. Example iodination of salt for combating the problem of endemic goitre and adding vitamin A and D to milk. Technology has also been developed for twin fortification with salts of iodine and iron.

The amount of iron available from food depends upon its iron content as well as bioavailability which differs with different foods. Iron from animal foods is better absorbed than that from vegetable foods. Haeme iron by far is the most available (20-40%) and its absorption is independent of the food composition. However non heme fraction represents by far the largest amount in a vegetarian diet.

Iron from animal foods is better absorbed than that from vegetable foods

Role of protein anaemia

Protein is responsible for the increase of iron absorption.9

The mean absorption of iron from vegetable foods ranges from 1% for rice, 5% for wheat, and 6% for soybeans while for animal foods it ranges from 11% for fish, 12% for haemoglobin to 13% for liver. Milk and its products are poor sources of iron.1 Green vegetables, peas and beans, bananas, spinach, some cereals, egg yolk, meat and liver are rich in iron.

Iron absorption is enhanced approximately twice when it is administered with meat protein in meal. Protein degradation products are probably responsible for the enhancement of the heme iron from both haemoglobin and myoglobin.8

Absorption of veal muscle iron is slightly reduced when it is administered with vegetable foods (corn, black beans) in a meal. On the contrary veal muscle approximately doubles the absorption of vegetable iron.13 Dietary factors including ascorbic acid and elusive factors in animal protein foods enhances iron absorption while phytic acid, soya proteins, calcium and polyphenols inhibit iron absorption. In cross sectional studies only meat intake has consistently been associated with higher serum ferritin concentrations.31 Meat protein facilitates iron absorption by stimulating production of gastric acid. This increased iron availability several folds.12

Role of peptonized iron anaemia

Peptonized iron is a protein-iron complex. Peptonised iron is a compound of iron and
peptone which is an intermediate polypeptide. Peptonised iron is an iron salt where iron ammonium citrate is added to peptone to obtain a complex of iron with peptone. With Peptonised iron, iron availability is improved, as amino acids in proteins (from peptone) are known to enhance iron absorption by providing acidic environment in the first part of small intestine.\textsuperscript{13}

As per the study conducted by S.K. Bichile peptonized iron is an iron salt which offers better iron availability. With Hepatoglobine liquid (containing Peptonised iron) leads significant rise in haemoglobin levels was seen within 4–6 weeks and continued up to 12 weeks and not a single person was refractory to iron therapy. Peptonised iron appears to be suitable oral iron formulation; it also appears to restore ferritin levels with excellent tolerability. Thus, peptonised iron may be considered for iron therapy in children, adolescents and adults.\textsuperscript{15}

### MEDICAL NUTRITIONAL THERAPY (MNT)\textsuperscript{16}

Medical nutritional therapy (MNT) is a therapeutic approach to treat medical conditions and their associated symptoms via the use of specially tailored diet advised and monitored by medical doctor, registered dietician or professional nutritionist.

Diet is based upon patient’s medical record, physical examination, functional examination as well as to ameliorate the effects of any existing condition such as anaemia.

Role of MNT when administered by above mentioned personnel, is for reducing the risk of developing complication in pre-existing complication such as anaemia.

Many medical conditions either develop or made worst by an improper or unhealthy diet.

**Clinical nutrition**

Clinical Nutrition is nutrition of patient in health care set up. Clinical, in this refers to management of patients in outdoor as well as indoor set ups. It incorporates primarily
scientific fields of nutrition and diet. It aims to keep a healthy energy balance in patients and providing sufficient amounts of other nutrients.

Methods of administration of medical nutritional therapy

**Oral medical nutritional therapy is the best route**

Oral medical nutritional therapy is the best route but in few sick or serious cases one may have to go for enteral medical nutritional therapy (nasogastric tube) or intravenous medical nutritional therapy.

Clinical Malnutrition

There are various definitions of clinical malnutrition as follows:

1. Patients are defined severely under-nourished when meeting at least one of the following criterions:
   A. Body mass index (BMI) is < 20
   B. > 5% unintentional weight loss in last one month
   C. > 10% unintentional weight loss in last six months
2. Patients are defined moderately under-nourished when:
   A. BMI is 20-22
   B. 5-10% unintentional weight loss in last six months

Nutrition:

Poor diet during pregnancy may have an injurious impact on health causing deficiency diseases like anaemia, scurvy, preterm birth and still birth.

Education:

Nutrition is taught in schools in many countries. Nutritional research councils of various countries conclude that this education is inadequate. Though the percentage of this is improving in various countries.

Nutritional literacy:

NAAL (National Assessment of Adult Literacy) USA 2003 defines it as degrees to which individuals have the capacity to obtain, process and to understand basic health information and services needed to make appropriate health decisions on objective healthy people (2010) and of which nutrition literacy might be considered an important subset. Health literacy increases with education. People living below the level of poverty have lower health literacy. Education and income are significantly inter related. In India, malnutrition is more likely to be caused by poor access to nutritious food or inadequate knowledge. It is
In India, malnutrition is more likely to be caused by poor access to nutritious food or inadequate knowledge.

also seen that interventions to improve health literacy produces successful results in primary health settings.

Nutritionism:

Nutritionism is an alleged paradigm that assumes that it is the scientifically identified nutrients in foods that determine the value of individual food stuffs in the diet. In other words, it is the idea that the nutritional value of a food is the sum of all its individual nutrients, vitamins, and other components.

SOCIAL- CULTURAL FACTORS: CURSE FOR WOMEN

In every stage of life of a woman, she has to suffer utmost in her family and social life. This discrimination starts right from birth, female foeticide and infanticide are the worst examples of discrimination. Female children usually don’t receive proper care and nourishment right from birth, starting with inadequate breast feeding, inappropriate weaning resulting in protein caloric malnutrition. Nutrition deficiency such as iron, protein, folic acid, Vitamin B₁₂, Vitamin C, etc. continues throughout her life which results in chronic anaemia. Male offspring usually get priority over females in the form of best of nutrition (quality and quantity wise), education, basic necessities, health care etc. Inadequate growth and development, poor immunological response makes females more prone for communicable diseases, thus compromising their quality of life and health during childhood. When such females enter their adolescence in this poor health state, they become more prone for having dysfunctional uterine bleeding or puberty menorrhagia, which further worsens their anaemia. Later on early marriage, early child bearing, repeated pregnancies, home deliveries, poor spacing, unregistered pregnancies and non-availability of routine antenatal and postnatal care complicates their health status. There is increased incidence of maternal morbidity and mortality with anaemia being the most common cause. Prolonged lactation with inadequate and poor quality diet without any supportive medications deteriorates her health further. Lack of education, lack of decision making, lack of self-esteem, being financially dependent with poor knowledge and misconception about contraceptives, non-availability of medical services, no health seeking behaviour, forced and repeated abortions based on sex determination,
puts a grave impact on her mental and physical health.

During childbearing, woman may suffer from repeated abortions, vesicular mole, ectopic pregnancy, antepartum and postpartum haemorrhage for which many times woman does not receive adequate treatment. Perimenopausal and postmenopausal periods are complicated with conditions like abnormal uterine bleeding, fibroids, genital malignancies which make them more anaemic and cachexic. Thus, throughout life woman suffers from chronic ill health making her immunocompromised and exposing her to life threatening conditions. These series of events are usually seen in low socioeconomic group having poor education and low income groups. Severity of impaired health conditions reduces with education and availability and accessibility to medical services especially in low and middle income groups.

Male offspring usually get priority over females in the form of best of nutrition (quality and quantity wise), education, basic necessities, health care etc.

Throughout life woman suffers from chronic ill health making her immunocompromised and exposing her to life threatening conditions

MALNUTRITION AND ANAEMIA PREVENTION AND SOCIAL MEASURES

For managing malnutrition in general and chronic anaemia in particular, actions are to be taken at various levels e.g. family, community, national, international which requires a very coordinated approach.

Action at family level:

Not to neglect female health at family level. No sex bias, equal opportunities to both males and females. Ensure about school education and nutrition literacy in family. Harmful food and dietary prejudice must be identified and corrected. Having small families, limited number of children empowers women at family level.

Action at community level:

Direct interventional measures like supplementary feeding programmes, mid-day meal, vitamin A prophylaxis, etc. To improve food availability in quality as well as quantity. Population below poverty line are to be given priority. There has been a need of long term continuous health and nutrition education to both mothers and children, adequate food, adequate water supply, sanitation facilities and health education.

For managing malnutrition in general and chronic anaemia in particular, actions are to be taken at various levels e.g. family, community, national, international
Action at National Level:
Rural development, raising standards of living and improving purchasing power of people, effective food distribution, control mosquito breeding and other infections, population stabilisation, nutrition intervention programmes are utmost important.

Medical nutrition therapy in anaemia should not be limited only to treatment of anaemia or dietary part of it

A need of long term continuous health and nutrition education to both mothers and children, adequate food, adequate water supply, sanitation facilities and health education

Thus, medical nutrition therapy in anaemia should not be limited only to treatment of anaemia or dietary part of it. It has lots of implications at each level. It has to be tackled at each part of its origin and cause. Overall goal should be to improve health and status of a woman in family and society. Self-esteem of woman should be maintained and improved. Girl/woman must have education and financial independence. If we educate a woman, she educates her whole family. In India, overall there is a male dominating society, slow shift to female dominance will improve health of family and society.

Slow shift to female dominance will improve health of family and society
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