

Study of iron deficiency anemia in non-pregnant young females at a tertiary care center

Goldee Khurana^{1*}, Joginder Singh²

¹Senior Resident, Department of Medicine, Government Medical Collage, Kathua, Jammu & Kashmir, INDIA.

²Assistant Professor, Department of Medicine, Government Medical Collage, Rajouri, Jammu & Kashmir, INDIA.

Email: goldeekhurana72@gmail.com

Abstract

Background: Anemia remains a major challenge for the health and development of women and children in low and middle-income countries. Anemia is a serious public health problem affecting 293.1 million children and 468.4 million nonpregnant women in LMICs. Though many programmes are focussed on pregnant and lactating mothers, it is necessary to focus on nonpregnant, nonlactating females of reproductive age group. Present study is focussed on study of iron deficiency anemia in non-pregnant young females at a tertiary care center. **Material and Methods:** This was a cross-sectional, observational study conducted in female patients of reproductive age 19-42 years old with iron deficiency anaemia. **Results:** Total 513 patients satisfying inclusion and exclusion criteria were considered for present study. Patients from age group 19 to 26 years were 54 %, followed by 27 to 34 years age group (26 %) and 35-42 years age group (20 %). Literacy status was upto 12th standard in 65%, while 23 % were illiterate and only 12 % were graduation and above. Most patients were either housewife (56%) or labourer/farmer (21%). As per Socio-economic status class I, II, III, IV and V patients were 9%, 17%, 28% 21% and 25% respectively. 71 % patients had normal BMI, 17 % were underweight while 11% had BMI > 25. Most patients had age of marriage as 21-30 years (72%), followed by less than 20 years (24%) and more than 30 years (4%). In patients with anemia 82 % patients had their first pregnancy at 21-30 years age. Most patients had 0-2 number of pregnancies (78%) and 0-2 number of live children (74%). 55 % patients were not using any contraceptive while 16 % were using condoms and 14 % underwent tubectomy. **Conclusion:** Anemia as a public health issue in developing country like India can not be eradicated without interventions right from childhood-to-adolescence to reproductive ages rather than targeted programmes at the time of pregnancy and lactation.

Key Words: anemia, iron deficiency anemia, young female

*Address for Correspondence:

Dr Goldee Khurana, Senior Resident, Department of Medicine, Government Medical Collage, Kathua, Jammu & Kashmir, INDIA.

Email: goldeekhurana72@gmail.com

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INTRODUCTION

Anemia remains a major challenge for the health and development of women and children in low and middle-income countries (LMICs). Anemia is a serious public health problem affecting 293.1 million children and 468.4

million nonpregnant women in LMICs.^{1,2} In most LMICs, anemia is a major cause of child and maternal mortality and is associated with an increased risk of low birth weight, cognitive impairment, increased susceptibility to infection,¹ and delayed physical and mental development with diminished ability to work.^{1,3} Significantly, anemia serves as an indicator of socioeconomic disadvantage because it is inversely related to the socioeconomic status of households in developing settings^{1,4}; individuals with low socioeconomic status are at a higher risk of exposure to anemia and its sequelae.³ To address the high anaemia burden, the World Health Assembly set a target of achieving a 50% reduction of anaemia in women of reproductive age by 2025 relative to 2010 levels, but no South Asian country is on track to meet this target.⁵ The contribution of iron deficiency in the aetiology of anaemia is major in countries where the prevalence of anaemia is

more than 40 per cent, such as India and especially in rural populations.⁶ Iron deficiency usually develops in a sequential manner over a period of negative iron balance, such as periods of blood loss and/or prolonged iron-deficient diet, accelerated growth in children and adolescents as well as during pregnancy and lactation.⁷ In addition, although iron deficiency anaemia accounts for most of the anaemia that occurs in underprivileged environments, several other possible causes should be noted. These include haemolysis occurring with malaria; glucose-6-phosphate dehydrogenase deficiency; congenital hereditary defects in haemoglobin synthesis; and deficits in other nutrients, e.g. vitamins A, B12, and C, and folic acid. Blood loss such as that associated with schistosomiasis, hookworm infestation, haemorrhage in childbirth, and trauma, can also result in both iron deficiency and anaemia. Lastly, as with vitamin A deficiency, inhibition of the normal metabolism of iron can result in anaemia.⁸ Though many programmes are focussed on pregnant and lactating mothers, it is necessary to focus on nonpregnant, nonlactating females of reproductive age group. Present study is focussed on study of iron deficiency anemia in non-pregnant young females at a tertiary care center.

MATERIAL AND METHODS

This was a cross-sectional, observational study conducted in Department of Medicine, Government Medical Collage, Kathua. Study duration was 3 months (September to November 2019). Institutional ethical committee approval was taken for present study.

Inclusion criteria –

females of reproductive age 19-42 years old with iron deficiency anaemia.

RESULTS

In present study, patients came to OPD for other complaints were included. Total 513 patients satisfying inclusion and exclusion criteria were considered for present study. Patients from age group 19 to 26 years were 54 %, followed by 27 to 34 years age group (26 %) and 35-42 years age group (20 %).

Table 1: Age distribution in anemia in patients:

| Age in years | Mild | Moderate | Severe | Total |
|--------------|-----------|----------|---------|------------|
| 19-26 | 162 (32%) | 88 (17%) | 26 (5%) | 276 (54%) |
| 27-34 | 81 (16%) | 41 (8%) | 11 (2%) | 133 (26%) |
| 35-42 | 71 (14%) | 28 (5%) | 5 (1%) | 104 (20%) |
| Total | | | | 513 |

Literacy status was upto 12th standard in 65%, while 23 % were illiterate and only 12 % were graduation and above. Most patients were either housewife (56%) or labourer/farmer (21%). As per Socio-economic status class I, II, III, IV and V patients were 9%, 17%, 28% 21% and 25% respectively. 71 % patients had normal BMI, 17 % were underweight while 11% had BMI > 25.

Table 2: Characteristics in anemia patients

| | | | |
|-----------------|----------------------|-----|-----|
| Literacy status | Illiterate | 118 | 23% |
| | Upto 12th std | 335 | 65% |
| | Graduation and above | 60 | 12% |
| Occupation | Housewife | 288 | 56% |

Exclusion criteria –

- Pregnant females
- Female underwent abortion in last 6 weeks, Female with postpartum period less than 6 months, lactating mothers, females who had stopped breastfeeding less than 6 months before
- Female receiving iron tablets, received blood transfusion in last 6 months
- Females having any chronic cardiovascular, gastrointestinal morbidity, diabetes, underwent any major surgery (in last 6 months), presently admitted for any reason
- Not willing to participate in study

A written informed consent was taken for participation in present study. Reproductive age group women who were eligible and agree to participate have included in the study. From all the participants, hemoglobin concentration was measured using portable Sahli's Haemoglobinometer method and a peripheral blood smear was prepared. Patients with PBS suggestive of iron deficiency anaemia were included in present study.

A study proforma was prepared for present study.

Demographic data such as age, residence, obstetric history, menstrual disturbances, dietary history, past history, family history and socioeconomic history was taken as per proforma.

From all the participants, hemoglobin concentration was measured using portable Sahli's Haemoglobinometer method. Anaemia was defined as <12 gm/dl. Severe, moderate, and mild anaemia was defined as Hgb below 7 gm/dl, 7-9 gm/dl and 9-11.9 gm/dl respectively. Data were entered in Microsoft excel and compiled. Statistical analysis was done using descriptive statistics.

| | | | |
|------------------------|-----------------|-----|-----|
| | Government job | 16 | 3% |
| | Private job | 61 | 12% |
| | Self-employment | 38 | 7% |
| | Labourer/farmer | 110 | 21% |
| Socio-economic status* | I | 48 | 9% |
| | II | 86 | 17% |
| | III | 143 | 28% |
| | IV | 106 | 21% |
| | V | 130 | 25% |
| Body mass index | < 18 | 89 | 17% |
| | 18-25 | 366 | 71% |
| | >25 | 58 | 11% |

Most patients had age of marriage as 21-30 years (72%), followed by less than 20 years (24%) and more than 30 years (4%). In patients with anemia 82 % patients had their first pregnancy at 21-30 years age. Most patients had 0-2 number of pregnancies (78%) and 0-2 number of live children (74%). 55 % patients were not using any contraceptive while 16 % were using condoms and 14 % underwent tubectomy.

Table 3

| Characteristics | | No. of patients | Percentage |
|--------------------------------|--------------------------|-----------------|------------|
| Age of marriage (years) | ≤20 | 125 | 24% |
| | 21-30 | 367 | 72% |
| | >30 | 21 | 4% |
| Age of first pregnancy (years) | ≤20 | 61 | 12% |
| | 21-30 | 421 | 82% |
| | >30 | 31 | 6% |
| Number of pregnancies | 0-2 | 400 | 78% |
| | 3-4 | 81 | 16% |
| | >4 | 32 | 6% |
| Number of live children | 0-2 | 380 | 74% |
| | >2 | 133 | 26% |
| Current contraception status | None | 281 | 55% |
| | Condom | 81 | 16% |
| | Oral Contraceptive Pills | 32 | 6% |
| | Intra Uterine Devices | 48 | 9% |
| | Tubectomy | 71 | 14% |

DISCUSSION

The economic and social consequences of anaemia, as yet un-quantified, are thought to be enormous including a significant drain on health care, education resources and labour productivity, and reduced physical and mental capacity of large segments of the population. Iron deficiency is the leading cause of anemia, with women of reproductive age being particularly vulnerable to acquiring iron deficiency anemia (IDA) because of the increase in blood volume and muscle mass that occurs around puberty followed by regular menstruation, which increases the body's demand for iron.⁹ Infectious diseases such as malaria, tuberculosis, fevers, diarrhoea, parasitic infestations and other infections common in developing countries also contribute to anaemia⁹. The inflammation caused due to infections leads to poor nutrient absorption and increased nutrient losses.¹⁰ According to data from the second and third rounds of India's National Family Health Survey (NFHS) in 1997 and 2006,^{11,12} anaemia prevalence increased from 74% to 79% in children aged 6 to 36

months and from 52% to 56% in women aged 15 to 49 years. The lack of anaemia reduction is surprising given India's rapid economic growth⁹ during the same period, as anaemia rates are expected to decline approximately a quarter as fast as income increases.¹³ According to the National Family Health Survey (NFHS)-4, 53 per cent of non-pregnant women, 50.3 per cent of pregnant women (in the age group of 15-49 yr) and 58.5 per cent of children in the age group of 6-59 months had anaemia.¹⁴

In NFHS 4¹⁴ major findings were

- The prevalence of anaemia decreases with schooling, from 56 percent among women with no schooling to 49 percent among women with 12 or more years of schooling. Across the same schooling groups, the prevalence of anaemia among men decreases from 29 percent to 18 percent.
- The proportion of anaemic women and men declines steadily as the wealth of the household increases (from 59% in the lowest wealth quintile

to 48% in the highest wealth quintile among women and from 32% in the lowest wealth quintile to 17% in the highest wealth quintile among men).

- Women in urban areas are slightly less likely to be anaemic (51%) than those in rural areas (54%). The difference is larger for the prevalence of anaemia in men (25% in rural areas versus 19% in urban areas).

WHO study noted that, the prevalence rates for reproductive age group pregnant women and non-pregnant women are 29% and 38%, respectively; however, among different age group people, reproductive age group women were commonly affected which is nearly 468 million.¹⁵ In present study patients from age group 19 to 26 years were 54 %, followed by 27 to 34 years age group (26 %) and 35-42 years age group (20 %). However, a recent subnational surveys have shown that between 50% and 90% of adolescents are anaemic during this critical period when lifelong habits are being formed.¹⁶ Literacy status was upto 12th standard in 65%, while 23 % were illiterate and only 12 % were graduation and above. In present study 77 % patients were literate, which was similar to the studies conducted in Tamil Nadu (72%) and Haryana (75%).^{17,18} Whereas the study conducted in Orissa¹⁹ reported low literacy rate (31.3%). This shows that literacy rate is high in the study area compared to that of census. The mean age of the participants was 28.4±7.8 years which was similar to the study conducted in Haryana and Orissa.²⁰ Most Indian girls reach menarche (thus start to experience significant iron losses) between age 12 and 14 years²¹ and have their first child by age 19 years,¹⁴ it is important to intervene early. As per Socio-economic status class I, II, III, IV and V patients were 9%, 17%, 28% 21% and 25% respectively. Similar finding was reported by Bharati P *et al.*,¹⁷ and Panigrahi A *et al.*¹⁹. This could be due to the fact that those from lower economic status lack the ability to purchase the quality and/or quantity of foods compared with those from higher economic status. In the current study, significant association was also found between socio-demographic variables and anaemic status of the reproductive age group women in terms of religion, literacy status, occupation and socio-economic status. Similar findings were reported in other studies also.^{17,18,19,22} 55 % patients were not using any contraceptive while 16 % were using condoms and 14 % underwent tubectomy. Regarding contraception usage among reproductive age group women, Sadeghian M *et al.*²³ also notes that the highest prevalence was found among those who did not use any method of contraception. This shows besides socio-economic factors, there are other factors like increased parity, reduced birth spacing and low usage of contraceptive methods may also indirectly

influence the prevalence of anemia. In present study, 71 % patients had normal BMI, 17 % were underweight while 11% had BMI > 25. Both low BMI (undernourished) and high BMI (overweight and obesity) are considered as risk factors for iron deficiency,⁴⁶ one known cause of anaemia.²⁴ Although the population prevalence of low BMI in non-pregnant women decreased considerably, there was not a substantial decrease in anaemia. This suggests that women gained weight but did not necessarily experience improvements in micronutrient status or other factors underlying anaemia. The recommended iron intake in non-pregnant women is 12-18 mg/day however over 90% women in India have a dietary intake below this recommendation at an average of only 9 mg/day.²⁵ The recommended iron intake is further increased in pregnancy to around 35 mg/day.²⁶ Therefore, dietary iron alone is not sufficient for iron requirements in non-pregnant women with iron deficiency or in pregnant women, to maintain hemoglobin levels.²⁶ A major reason for poor compliance for IFA tablets is adverse effects such as gastric irritation, nausea, epigastric discomfort, and constipation. The adverse effects increase with the administration of higher doses of iron.²⁷ Knowing the importance of consequences of anaemia, in 2012 World Health Assembly made a resolution and endorsed a “Comprehensive implementation plan on maternal, infant and young child nutrition”. This plan has six global nutrition targets to be achieved in 2025 and second target specifically emphasising on 50% reduction of anaemia in reproductive age group women.²⁸ IFA supplementation alongside behaviour change communication to improve pill-taking compliance, deworming, education on appropriate dietary choices and child feeding practices, promotion of delayed cord clamping, mandatory provision of fortified foods in public health programmes, and screening and treatment of non-nutritional causes of anaemia with a focus on malaria are simultaneously required to reduce anemia.

CONCLUSION

Despite progress in the last decade for anaemia reduction in children and pregnant women, anaemia continues to be a major public health concern in India. Anemia as a public health issue in developing country like India can not be eradicated without interventions right from childhood-to-adolescence to reproductive ages rather than targeted programmes at the time of pregnancy and lactation. Further research is recommended to identify the specific risk factors for anaemia. It may be helpful to implement measures to improve nutritional knowledge and awareness among mothers and health workers.

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