Adolescent anaemia and cognitive status among females in a rural block Sampla, Haryana

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Abstract

Introduction: Cognitive status gets affected by adolescent anaemia among females. Anaemia super added with Cognitive deficiency, in recent years, is taking the shape of a major public health problem in India. Thus the present study was undertaken to assess the effects of adolescent anaemia on cognitive domain and intervention to cognitive changes.

Materials and Methods: A cross sectional observational community based study was carried in a rural block, Sampla in Haryana. Non-probability sampling was used to select 1951 adolescent girls of age group 10-20 years. Hemoglobin estimation was done by using photoelectric colorimeter (Digital) and cognitive assessment was done by Montreal Cognitive Assessment (MoCA) Test Scoring and Accuracy. Pre-test and post-test was used to find the association between Hb level and their cognitive behavior amongst the females group. The data collected were analyzed using excel and SPSS-21. Study duration was 12 months i.e. August 2017- July 2018. Relevant statistical test was applied where ever required and considering significant at 5% level of significance.

Results: Most of the girls (52.9%) were found to have moderate anaemia. After intervention the hemoglobin level increased with proportionate improvement in the cognitive score status.

Conclusion: Measures taken to prevent anaemia with IFA, nutritional modification and deworming settles anaemia and improves the cognitive status of adolescent girls.

Keywords: Adolescent health, Anaemia in adolescents, Cognitive status in adolescent girls.

Introduction

Quality adolescent health is an unparalleled asset for increased economic productivity, each at individual and national level. Nutrition is considered as an essential determinant of good well-being & the incidence of under nutrition and malnutrition within the community influences certain indicators such as MMR & IMR adversely.[1,2]

Anaemia is the most common problem of the women of all age groups in India. The three main classes of anaemia embrace excessive blood loss (acutely like haemorrhage or chronically through low-volume loss), excessive red blood cell destruction (haemolysis) or deficient red blood cell production (ineffective haematopoiesis). Iron deficiency anaemia is the most common type of anaemia found in women of all age groups and is typically hypochromic and microcytic.

Iron deficiency is the end result of a long period of negative iron balance which usually develops in three phases: depletion of iron stores (ferritin and haemosiderin), deficiency of erythropoiesis, and anaemia.[3-5]

The WHO Global Database on Anaemia for 1993–2005, and different conciding studies, estimated the prevalence of anaemia as 25 percent worldwide.[5-7] The prevalence of anaemia ranges from 9 percent to 43 percent in countries with high development to countries with low development.[8] Globally anaemia affects 1.62 billion individuals with about 293 million children of preschool age group, approximately 56 million pregnant women and 468 million non-pregnant women respectively.[6,7] Women of reproductive age group as well as children are mostly at risk, as prevalence of anaemia in children estimates 47 percent. Analysis of data on global prevalence shows that anaemia is disproportionately targeted in low socioeconomic groups.[8,9]

Impact of Anaemia on Health Outcomes:

Anaemia is considered as the world's second leading cause of disability and is also responsible for approximately 1 million deaths in a year, of which three-quarter deaths occur mainly in South-east Asia and African region.[10] The consequences of anaemia in women are enormous as the condition adversely affects both, their reproductive as well as productive capabilities.[11] The magnitude of iron deficiency anaemia is higher among women as compare to men due to menstrual iron losses and the extreme iron demands of a growing fetus during pregnancies, which is approximately two times more as compare to the demands in the non-pregnant state. Globally it is estimated that about 20 percent of maternal deaths are caused directly by anaemia.[1] Firstly, anaemia reduces the women's energy and capacity for work and then threaten the household food security and income. Secondly, severe anaemia in pregnancy impairs oxygen delivery to the fetus and interferes with normal intrauterine growth, resulting in stillbirth, LBW, intrauterine growth retardation and neonatal deaths. Therefore, anaemia is a major contributor to poor pregnancy and birth outcomes in developing countries as it predisposes to increased perinatal mortality, premature delivery and increased risk of death during delivery and the postpartum period.[12-14] It is believed that anaemia also adversely affects the cognitive domain of the adolescent girls and women in particular.

In this manner, the present study was undertaken with the following objectives-

1. To assess the prevalence of anaemia among females (10-20 years) in Sampla, a rural block of Haryana.
2. To assess the effects or association of adolescent anaemia on cognitive domain and an intervention for cognitive changes.

Materials and Methods

The present study was conducted as a community based cross-sectional study, with pre and post evaluation of haemoglobin and cognitive status of adolescent girls in the Sampla, the rural block of Haryana, for a period of 12 months i.e. August 2017- July 2018. All the school going adolescent girls of 10-20 years of age group who were residing in the Sampla block were included in the study after their informed consent. A pre-designed, pre-tested proforma was used to collect the information about all the study participants followed by a brief clinical examination.

Sampla Block is located in the southeastern part of the district Rohtak with a total adolescent school population (i.e. both males and females) of 3791, out of which 1951 were adolescent girls and were selected to participate in the study. Before the commencement of the study, all the adolescent girls were counselled in two consecutive sessions about the anaemia, deworming and the cognitive status and were also educated about the menstrual hygiene and consumption of green leafy vegetables and solidified molasses (gur). After that, hemoglobin estimation of every adolescent girl was done by using photoelectric colorimeter (Digital) and cognitive assessment was done by Montreal Cognitive Assessment (MoCA) Test Scoring and Accuracy.[15] MoCA 2005 was redrawn in local dialect and adequate score was given. A score between 18-20, 21-23 and 24-26 were considered as moderate, mild and normal cognitive scores respectively.

IFA tablets along with tablet Albendazole were distributed to the all adolescent girls on the day of first contact and the list of those girls were given to ASHA workers so that they could visit thrice in a week and monitor the compliance of IFA tablets consumption. ASHA worker record was verified by the investigators with the concurrence of the respondents so that the non compliance was avoided.

Data analysis was done using the SPSS 21.0 software and chi-square test was used wherever required.

Observations

In our study the magnitude of anaemia was found to be 49.4%. Out of 1951 adolescent girls, 29.6% were having mild anaemia, 52.9% were having moderate anaemia and 13.5% were having severe anaemia and only 4.0% adolescent girls were having no anaemia. The range of haemoglobin level among the study participants varied from less than 8 gms/dl to more than 12 gms/dl. [Table 1] Shows that higher the haemoglobin level highest is their IQ level ($x^2 = 161.57$; $p \leq .00001$).

Table 1: Relationship of haemoglobin level and the cognitive status

Groups	Number of girls	Heamoglobin	Perecentage of girls	Cognitive status
No Anaemia	79	≥12	4.0%	Normal
Mild Anaemia	585	10-12	29.6%	
Moderate Anaemia	1020	8-10	52.9%	Mild
Severe Anaemia	267	<8	13.5%	Moderate
Total	1951		100%	
Chi-square value= 161.57; p≤.00001, highly significant				

All adolescent girls were given IFA tablets and dewormed twice with a gap of three months. The level of hemoglobin was rectified as shown in [Table 2]. The nutritional advice was also given to all adolescent girls for the consumption of green leafy vegetables and gur. [Table 2] Shows that the consumption of IFA tablets increase the proportion of adolescent girls from severe anemia to moderate anemia and so on and there was significant statistical association between them (Chi-sq. =201.15 p≤.00001). The cognitive score was also analyzed again. A score between 18-20, 21-23 and 24-26 were considered as moderate, mild and normal cognitive scores respectively.

Table 2: Effect of IFA tablet and deworming on anaemia

Groups	Number of girls	Heamoglobin	Perecentage of girls	Cognitive status
No Anaemia	99	≥12	5.1%	Normal
Mild Anaemia	624	10-12	31.9%	
Moderate Anaemia	1060	8-10	54.3%	Mild
Severe Anaemia	168	<8	8.7%	Moderate
Total	1951		100%	
Chi-square value =201.15; p≤.00001				

Discussion

In the developing world, anaemia is taken into account as a serious public health concern in females of different age groups. Many studies have examined the risk caused by anaemia, however still there's a paucity of data on anaemia among adolescents especially those living in the developing

countries due to the complex ecologic context of malnutrition and poverty.[16] If a satisfactory iron status can be ensured within the adolescent age group then only the control of anaemia in pregnant women can be achieved.[17]

The following are the reasons for the high magnitude of nutritional Anaemia among the adolescent girls as well as in women:

1. Poor dietary intake.
2. Consumption of inadequate amount of iron-rich foods and "iron enhancers" within the diet (foods rich in vitamin C like citrus fruits), and low bioavailability of dietary iron (like food containing only non-haem iron).
3. Excessive intake of "iron inhibitors" in diet, particularly throughout the meal times (e.g. tea, coffee, calcium-rich foods).
4. Iron loss during menstruation.
5. Poor iron stores from infancy or childhood deficiencies.
6. Iron loss due to post-partum haemorrhage.
7. Increase iron requirement during pregnancy.
8. Pregnancy during teenage.
9. Repeated pregnancies within two years' interval.
10. Iron loss due to increase parasite load (e.g. malaria, intestinal worms).
11. Unsafe drinking water and poor environmental sanitation.[18]

In a study done by the International Centre for Research on Women (ICRW) on the nutritional status of adolescent girls, anaemia was observed to be the most common nutritional problem and its prevalence ranged from 32-55% respectively.[19]

Various studies conducted in India and other developing countries also demonstrated a high magnitude of iron deficiency anaemia in women of reproductive age group i.e. between 35 to 88%.[20-23] A study in the urban area of Nagpur shows the prevalence of anemia in adolescent females as 35.1%.[24]

Toteja GS et al found the prevalence of anemia as 90.1% among adolescent girls from sixteen districts of India with 7.1% having severe anemia.[25]

In the present study the effects of iron deficiency anaemia along with the cognitive assessment of adolescent girls have been studied. The iron deficiency anaemia affects the cognitive functions. Similar findings were also seen in the study done by Sarika More et al[26] in Maharashtra, India and also by Suzan O Mousa[27] and her co workers in Egypt. Thus, the results of various other studies also demonstrated that the magnitude of anaemia was high in the major parts of the country and the world. This indicated the significance of including the adolescent age group in the high risk group, so as to improve their iron content and also there is a need for a planning intervention program, as it would help to increase the haemoglobin levels among the adolescent girls through dietary modification, prophylaxis iron supplementation and helminth control.

Conclusion and Recommendations

The present study showed that anaemia is a major health concern among the females of adolescent age group. In our study, there was a high magnitude of moderate anaemia (52.3%) as compared to mild (29.9%) and severe anaemia (13.7%).

Prevention of iron deficiency anaemia needs approaches that address all the potential responsible factors. Interventions to prevent and correct iron deficiency should embrace dietary diversification, food fortification with iron, measures to extend iron intake through food-based approaches, iron supplementation and improved health services and sanitation.

Dietary diversification is encouraging the consumption of micronutrient rich foods which mainly includes red palm oil, dark green leafy vegetables, vitamin C rich fruits, mangoes and lentils.

Food fortification is defined as the addition of micronutrients to the processed foods. This strategy will result in relatively rapid enhancement in the micronutrient status of a population at a awfully reasonable cost, particularly if advantage may be taken of existing technology and local distribution networks.

Food supplements are highly concentrated vitamins and minerals made by pharmaceutical makers in the form of tablets, capsules or injections and administered as a part of health care or specific nutrition campaigns.

Even though food-based approaches to extend iron intake through dietary diversification and food fortification are deemed as a vital and sustainable strategy for preventing iron deficiency and IDA within the general population, as it is not easy to change the dietary habits or ensure access to iron rich foods, as diet in India is primarily cereal based and bioavailability of iron from such diets is limited. On the other hand, iron from dietary animal sources (haem iron) is healthier in terms of bioavailability; however consumption is rather low or nil due to social reasons and financial conditions.

ASHA should be suitably incentivized for this activity

In nutshell Community mobilization programmes should be oriented towards proper dietary habits, appropriate cooking practices and awareness & motivation of females to curb the menace of Anaemia as it is an urgent need of the hour. Existing health interventions through National Iron Plus Initiative need to be properly implemented, monitored & supervised to attain the desired impact.

Conflict of Interest: Nil.

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