Prevalence of Anaemia among Indian Children of Various Age Groups – A Systematic Review

Abstract

Background: Anaemia is the most common nutritional problem affecting various age group individuals all over the world. Iron deficiency anaemia is a major health problem since it impairs the cognitive development; causes delay growth, affect immune mechanism leading to various infections from infancy to adolescence.

Objective: The objective of the present review study is to assess the prevalence of anaemia among Indian children of various age groups.

Data source and eligibility criteria: A total of 10 published articles on the aspects of prevalence of anaemia, particularly, among the children of various age groups were reviewed systematically, which were collected through google search. Studies considered in the present review paper were published during 2009 to 2016 years and data were selected against predetermined inclusion and exclusion. The age groups of the children were from 0-12 and 13-16 years, which cover infant, pre-school children, school going children and adolescent girls

Study appraisal: Published articles on the aspects of anaemia of children and adolescent girls were peer reviewed with full one-line text available. Only the relevant studies were included to make suitable for synthesis and meaningful relationship in the present study.

Synthesis method: Data collected from various ten (10) published articles were combined together after carefully reviewed and presented them systematically taking consideration to the year of publications, age of the children, sample size, study design and finding of the studies in a summarized tabular form.

Limitation and key finding: Limitations regarding the estimation of haemoglobin were found varied and data of the same group of children were not found from the different retrieved published articles. The proportion of severe anaemia among school children and adolescents were not observed in the reviewed studies. However, the overall prevalence of anaemia could be observed in high percentages from the reported data during the year 2009-2016.

Conclusion: The key finding of this review study was that during the early age groups of children, boys were more affected than girls, however, at the adolescent stage with the commencement of menstrual cycle, girls were more suffered from anaemia as compared

with those of boys. Further, it was also observed that the highest prevalence of anaemia was in Faridkot district of Punjab among the boys (91.69%) and girls (93.94%) as reported by Nishi and Manjit (2016).

Keywords: anaemia, prevalence, Indian children.

Introduction

Nutritional anaemia was defined as "a condition in which the haemoglobin content of the blood is lower than the normal level as a result of deficiency of one or more essential nutrients, regardless of the cause of such deficiency" (WHO, 1968). The cells in the muscles and organs need oxygen to survive and decreased number of red blood cells in children and adolescent girls causes stress on the body since iron contained in the red blood cells carry oxygen to various parts of the body. Iron deficiency anaemia impairs cognitive development, delay growth, delay onset of menarche, decreased immune mechanism leading to infections from infancy to adolescent. Pregnancy in anaemic adolescent girls may cause foetal mortality and maternal death. The other causes of anaemia are bone marrow disorder, thalassemia, sickle cell anaemia etc.

Various Scientists have conducted research works on the aspect of anaemia among children and adolescents in various parts of India. Anaemia prevalence was with 44.8% among the rural adolescent girls in Tamil Nadu (Rajaratnam et al., 2000). Vyas and Choudri (2005) also reported 93.7% prevalence of anaemia among the school children of Rajasthan. Among the adolescent girls of sports academy, Manipur, 50 % of girls suffered from anaemia (Sorojini, 2017). The prevalence of anaemia among children and adolescent girls are not plenty and it is not possible to implement programmes without sufficient data to rely on. Therefore, the present study has been taken up to assess the prevalence of anaemia among the Indian children.

Objective

The objective of the present review study is to examine the prevalence of anaemia among the children of different age groups in different parts of the India including North east states.

Materials and Methods

A total of 10 published articles were systematically reviewed which were collected through google search. Studies considered in the present review paper were published during 2009 to 2016 years and data were selected against predetermined

inclusion and exclusion. The age groups of the children were from 0-12 and 13-16 years, which cover infant, pre-school children, school going children and adolescent girls. Information on objective, design, setting, methodology, sample size, were examined minutely. The present review study followed PRISMA guidelines (Moher et. al. 2009). Due to the heterogeneity of age groups of children, and methods employed, meta-analysis was not conducted. A narrative approach was used. Data on anaemia prevalence of each published article considered in the present study has been recorded. Variations in the techniques for estimation of haemoglobin were found different. Cyanmethemoglobin method and Sahli's method were common used techniques among the various reviewed articles.

Results

The findings of the various studies have been summarised in the table 1. The study of Pravakar and Gangadhar (2009) among the Jenukurumba tribal children (6-10 years) of Mysore, the anaemia were 70.89% (boys) and 83.34% (girls) in which moderate grade was the highest in both sexes. The moderate form of anaemia for boys and girls were 31.65% and 40.63 % respectively. Sudhagandhi et al. (2011) worked among the Kattankulathur tribal children aged 8-18 years and found 38.0% anaemic boys and 67.77% anaemic girls. Both cases of moderate and mild anaemia were the highest among the adolescent girls as compared with boys counterpart of the same age groups. In another work of Sujata et al. (2014), the prevalence of anaemia was 78.7% for both boys and girls of slum children of Bhubaneswar, aged < 12 years. Suchitra and Shashikumar in 2014 conducted research work on the haemoglobin status of adolescent girls (12-19 years) of Nidoni of Karnataka state and estimated 80% anaemia prevalence for both boys and girls and among the various forms, mild anaemia was reported as the common type (48.75%). There was report of anaemia in the Karnal district of Haryana among the adolescent girls aged 13-15, which was conducted by Kaur and Kaur (2015). The overall percentage of anaemia having with 88% was observed among these girls in whom moderate (51.2%) anaemia was the highest. Neha et al., (2015), among the adolescent girls of Haldwani, Uttarkhand, reported 40. 41% anaemia and in another study of rural children of Udaipur, Rajasthan which was conducted by Sajay and Subhash in (2015), anaemia rates were 50.54% for boys and 91.69% for girls. In Faridkot district of Punjab also Nishi and Manjit (2016) assessed the anaemia pattern among the children (5-16

years) and found that maximum number of the boys (91.69 %) and girls (93.94%) suffered from anaemia. In this study also moderate form of anaemia was common in both sexes with 73.96% and 79.29% respectively.

In North East Indian states of Sikkim, Tripura and Assam, Sanku et al. (2013) assessed the amaemia pervasiveness among the children aged 0-6 years and reported 74.2% in Tripura, 69.9% in Sikkim and 61.8% in Assam, having the most affected children in Tripura within the age group of 0-6 years. Further, Rupabati and Chourjit (2016) attempted to estimate the prevalence of anaemia among the children aged 0-12 years of Manipur who attended the tertiary hospital as outpatients and reported that 40.2% (boys) and 31.0% (girls) were anaemic in various grades. In their study also, mild form of anaemia was the grade where the highest number of children occurred with 54.7% (boys) and 52.0% (girls).

Table 1

Prevalence of anaemia in different age groups of children

Sl. No.	Authors	Population	Hb. Estimation Method	Age groups	Boys	Girls	Anaemia prevalence	
							Boys	Girls
1.	Prabhakar and Gangadhar (2009).	Jenukurumba tribal children, Mysore,	Cyanmethemoglobin method	6-10 years	79	96	70.89%	83.34%
2.	Sudhagandhi et al., (2011).	School children in Kattakulathur, T.N.	do	8-16 years	450	450	38.0 %	67.77%
3.	Sujata et al., (2014).	Slum school children of Bhubaneswar	Sahli's method	<12 years	385		79.00%	
4.	Suchitra & Shashikumar (2014).	Adolescent girls of schools in Nidoni, Karnataka	Not mentioned	13-16 years	-	300	-	80.00%
5.	Kaur & Kaur (2015).	Adolescent girls in Karnal dist, Hariyana	Cyanmethemoglobin method	13-15 years	-	250	-	88.00%
6.	Neha et al., (2015)	Adolescent girls in Haldwani, Uttarakhand	Haemoglobin Colour Scale (HCS)	10-14 years 15-19 years	-	212 159	- -	49.41% 46.62%

7.	Sajay an Subhash (2015)	Rural school children of Udaipur, Rajasthan	Cynmethemoglobin method	5-15 years	906	556	50.54%	33.11%
8.	Nishi and Manjit (2016).	School children in Faridkot dist, Punjab.	Sahli's method	5 -15 years	265	198	91.69%	93.94%
9.	Sanku et al., (2013).	Children, Tripura,	Cyanmethemoglobin method	0-6 years	10,137		74.20%	
		Children, Sikkim		-do-			69.90%	
		Children, Assam		-do-			61.80%	
10.	Rupabati and Chourjit (2016)	Children, N.E.I	Sahli's method	0-12 years	272	228	40.20%	31.0%

Discussion

From the foregoing observations, it has found that age groups and cut off grades of anaemia for children were different in the reviewed retrieved studies. However, cut off grades given in the reviewed data for adolescent girls were found uniform and same as those of WHO (2011). In the present paper, accurate statistical comparison could not be conducted due to above mentioned differences in the methods used, age group variations and cut off differences. In the present review study, anaemia ranges from 38.0% to 91.69% in case of boys and 31.0 % to 93.94% in case of girls. Remarkably, the highest prevalence of anaemia for boys (91.69%) and for girls (93.94%) were represented by the children of Faridkot district of Punjab, India whereas the lowest prevalence of anaemia proportions were from amongst the boys (38.0%) of Kattakulthur district of Tamil Nadu and girls (31.0%) of North East states of India. Further, it has also been observed that the lowest prevalence of anaemia (49.41%) was among the adolescent girls of Haldwani district of Uttarkhand and the highest (88.0%) had been reported from amongst the adolescent girls of Karnal district of Haryana, India. Worldwide prevalence of anaemia during (1993-2005), survey conducted by WHO in 2008 indicated that the highest proportion of anaemia was among the preschool age children (47.4%). It was followed by pregnant women (41.8%) and non- pregnant women (30.2%). Anaemia prevalence for school age children, men and elderly were comparatively low. Again, global anaemia prevalence in between 1995-2011 from 190 countries revealed that anaemia prevalence was 42.6% (pre-school age children), pregnant (38.2%), non-

pregnant (29.0%) and all women (29.4%). This indicates that prevalence of anaemia in different age groups decreases according to the data of WHO (2015). The present paper has revealed that the prevalence of anaemia was continuing till 2016 in high proportions among the children. Anaemia should be treated as a major health problem since it damages immune mechanisms, cognitive development, and increased morbidity rates in children (WHO, 2001).

Various causes of anaemia such as poor diets (Rupabati and Chourjit, 2016; and Suchitra and Sashikumar, 2013), poverty and illiteracy (Prabhakar and Gangadhar, 2009) increased fertility rate (Sanku et al., 2013) family income and lack of education (Sujata et al., 2014) and malnutrition and menstrual periods in adolescent girls (Halterman, et al., 2001) have been mentioned. Therefore, causes of anaemia is multifactorial, and there are many contributing factors like parasitic infections, genetic traits like sickle cell and thalassaemia, HIV infection deficiencies of micronutrients such as vitamin B12 (colabamin) and Vitamin C. B12 is needed for red cell formation of DNA synthesis and Vitamin C helps in the absorption of iron in the body.

Conclusion

The present review paper envisages to provide a complete exhaustive summary of the prevalence of anaemia among the children of various age groups in different parts of India from the available literatures and has clearly shown that anaemia was still continuing till 2016. To intervene the problem of anaemia, recommendations of WHO/FAO of the International Conference (Rome 1992) should be fully implemented and the programmes be reached, particularly, for children, child bearing mothers and all women with an integrated approach to eradicate anaemia.

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