Prevalence of Anaemia among 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. A systematic review has undertaken to assess out the prevalence of anaemia among children of various age groups in different parts of India.

Objective: The objective of the present review study is to identify the prevalence of anaemia and to find out the trend of anaemia.

Data source and eligibility criteria: A total of 12 studies were reviewed systematically, which were collected through google search. Studies were conducted during 2009 to 2017 years. Studies were assessed against predetermined inclusion and exclusion. The age groups ranges from 0-12 and 13-16 years, which cover infant, pre-school, school going and adolescent children.

Study appraisal: Included studies were peer review with full one-line text available, reported data on anaemia of children. Only the relevant studies were included to make suitable for synthesis and meaningful relationships.

Synthesis method: Combine reviewed data of the sources which are included in the study and making them into group. Arrange them systematically according to year of publication and age of the children. Assess the prevalence of anaemia of children of different states in India.

Results limitations and key finding: Data of the reviewed studies were from infants, pre-school, school going and adolescent children. Inconsistencies in the estimation of haemoglobin have been found. The proportion of severe anaemia among school children and adolescents are not observed in these studies. However, the overall anaemia prevalence still remained high during the year 2009-2017.

Conclusion: The key finding of this reviewed study is that during the early age groups of children, boys are more affected than girls, however, at the adolescent stage with the commencement of menstrual cycle; girls are more suffered from anaemia as compared with those of boys.

Keywords: anaemia, prevalence, 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). Iron deficiency anaemia remains one of the most severe and important nutritional deficiencies in the world today in which every age group is vulnerable. The normal synthesis of haemoglobin requires an adequate supply of iron. Iron deficiency impairs the cognitive development of children from infancy through to adolescence. It damages immune mechanisms, and is associated with increased morbidity rates (WHO, 2001). Accelerated development, hormonal changes, malnutrition and menstrual periods in girls are main causes of anemia (Halterman, et al, 2001). However, bone marrow disorder, thalassemia, sickle cell anaemia and other diseases are all responsible for the prevalence of anaemia.

School child stage is very crucial stage, since these are the formative stages of life of an individual in which major physical, psychological and behavioural changes takes place during this period. In girls, adolescence is a distinctive period of transition from girlhood to womanhood. The nutritional and the health needs of every child is important because of the growth spurt and the increased in physical activity in them. Inadequate nutrition during growth period can have serious consequences to health. The prevalence of anaemia is caused due to inadequate diet, worm infections, and poor access to the health services (Pupabhati and Chourjit, 2014 and Kaur et al., 2006), socio-economic (Kaur and Kaur, 2015), family income and lack of education Sujata et al., 2014), poor diets (Sudhagandhi et al., 2011). Various Scientists have conducted research works on the aspect of anaemia among the school going and adolescent children in various parts of India.

In India, 88% of pregnant and 74% of non-pregnant women are affected by anaemia (WHO, 2008). The prevalence of anaemia was 44.8% among the rural adolescent girls in Tamil Nadu (Rajaratnam et al., 2000). Vyas and Choudri (2005) reported 93.7 % prevalence of anaemia among the school children of Rajasthan. Among adolescent girls aged 13-16 years in Nidoni of Karnataka state, 80.0% have suffered from various forms of anaemia such as mild (39.0%), moderate (43.0%) and severe with 7.0% (Shuchitra and Shashikumar, 2014). Another report of the prevalence of anaemia

among adolescent girls of Karnal district, Hariyana was 88.0% in which 21.2% in the mild, 51.2% in the moderate and 15.6% in the severe form (Kaur and Kaur, 2015. Even among the adolescent girls of sports academy, Manipur 50 % of them suffered from anaemia. WHO have taken up many consultation programs to prevent diseases. In 1993, WHO with UNICEF as partners held consultation programme after receiving reports of iron deficiency from many countries all over India since it has great impact on health to human lives at all age groups and recommended action oriented programmes to provide iron supplement, improve food consumption to accelerate global processes for preventing iron deficiency, with the goal of substantially reducing the problem of anemia in the forthcoming decades.

The objective of the present review study is to identify the prevalence of anaemia and to find out the trend 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 were conducted during 2009 to 2017 years. Studies were assessed against predetermined inclusion and exclusion criteria. Included studies were online full-text and peer-reviewed Information on objective, design, setting, methodology, sample size, were examined minutely. Due to the heterogeneity of reviewed studies, meta-analysis was not done. A narrative approach was used. Results on anaemia prevalence of each particular age group were recorded. There was variability in the use of techniques for estimation of haemoglobin. Cyanmethemoglobin method and Sahli's method were common used techniques.

Results

The findings of the various studies are 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 found highest among those adolescent girls as compared to 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 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, the anaemia was 40. 41% and in another study of rural children of Udaipur, Rajasthan conducted by Sajay and Subhash in (2015) anaemia were 50.54% for boys and 91.69% for girls. In Faridkot district of Punjab also Nishi and Manjit (2016) examined the anaemia pattern among the children (5-16 years) and found that maximum number of the children (92.65%) 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. 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. Children were mostly suffered from mild anaemia i.e. 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	School	do	8-16	450	450	38.0 %	

	et al., (2011).	children in Kattakulathur, T.N.		years				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 various methods used for estmation of haemoglobon, it is cleared that estimations of haemoglobin were different among the reviewed studies. Cyanmethemoglobin and Sahli's methods were commonly used methods. Most of the studies focused on particular age group and cut off grades for defining anaemia for children were also different and cut off grades were found higher in the mild grades than given by WHO (2011). Therefore, some children who were not anaemic would be categorized as mild, as a result, the overall higher prevalences of anaemia have been recorded, on the other hand, it has been observed that lower cutoff grade for anaemia than grades given by WHO (2011) in certain reviewed studies is also found. As such,

some anaemic children were assessed as having normal haemoglobin level. Moreover, age groups of the reviewed papers were different from those of given by WHO. However, cut off grades of adolescent girls were found uniform and same as those of WHO. In the present paper, accurate comparison cannot be made due to above mentioned differences in the methods used, age group variations and cut off differences. Although, there are possibilities of additions and subtractions in the prevalences of anaemia along with different methods employed, it is generally accepted that anaemia is a common problem faced in every age groups all over the world. In the present reviewed studies anaemia ranges from 38.0% to 91.69% in case of boys and 31.0 % to 93.94% in case of girls. The highest prevalences of anaemia have been recorded in Faridcot district of Punjab among the boys and girls with 91.69% and 93.94% respectively. Among adolescent girls, it ranges from 49.41% to 88.0 %. Worldwide prevalence of anaemia during (1993-2005), survey conducted by WHO indicated that the highest proportion of anaemia was among the preschool age children (47.4%). It is 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 data of WHO (2015). The findings of the reviewed papers have revealed that the proportions of anaemia in different age groups children are higher than the anaemia reports given by WHO.

The age groups considered in the above reviewed papers are different from those given by WHO, as a result, a complete statistical comparison can not be made. Although there are differences in the considerations of age groups of the study design of the reviewed papers, it is a fact that prevalences of anaemia still continue in different parts of India in all age group individuals except some.

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) 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

This review paper envisages to reconstruct a summarized picture of the prevalence of anaemia among children of various age groups in different parts of India during the year 2009- 2016 and has clearly shown that anaemia is still continuing. However, statistical comparison can not be made due to certain limitations. To intervene this problem, recommendations of WHO/FAO of the International Conference (Rome 1992) should be fully implemented and the programmes be reached, particularly, to children, child bearing women and all women with an integrated approach to eradicate anaemia.

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