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Prevalence of Anaemia and Associated Factors Among Children Aged 03-06 Years in Rural Haryana

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Abstract: Three fourth among Indian children are reported anaemic. Diet poor in iron are effecting their overall growth and development**.** In this community based cross sectional study all the children aged 3-6 years attending Anganwadis in the rural Haryana state in India were studied. A Semi-structured, pilot tested questionnaire was used to collect data regarding socio-demographic profile, dietary intake, and utilization of health services. Haemoglobin estimation was done by cyanmethaemoglobin method. SPSS (version 17.0) software was used. Rates, proportion and chi square test were used to analyze the data. Sample size was 402 and response rate was 93.5%. Mean age of the participants was 4.24±0.89 years. The study reported that 271(72.07%) of the children aged between 3-6 years in the study area were anaemic. Anaemia was more prevalent among 177(83.1%) girls, 46(79.3) with Low Birth Weight, 139(85.8%) underweight children and 179(79.9%) children not taking Fruits and Vegetables at least once a day and differences were statistically significant. Prevalence of anaemia among children taking IFA supplementation and de-worming was 10(58.8). The study concludes that all most three fourth of children aged 3-6 years in the study areas were anaemic due to gap in quantity and quality of iron rich foods in their diet. It is recommended to strengthen the IFA supplementation and de-worming program for the children as well create awareness among the community for better use of locally available iron rich foods like fruits/ vegetables and haem-iron rich foods of animal origin.

Keywords: Anaemia, Children, Haemoglobin, Nutritional Status, Socio-economic Status

1. Introduction

Anaemia is considered as the most prevalent nutritional deficiency globally affecting about a quarter of world population, especially children and women of child bearing age [1]. Nutritional anaemia is a major public health problem in India and is primarily due to iron deficiency [2]. In India seven out of every 10 children aged 6-59 months are anaemic, the percentage of children with any anaemia increased from 74.3 per cent in National Family Health Survey-2 (2005-06) to 78.9 per cent in National Family Health Survey – 4 (20015-16) [3].

In young children, iron deficiency is due to increased iron requirement during periods of rapid growth, which are almost 10 times higher per kilogram of body weight than that of an adult male. In addition, infant and toddler diets are often poor in bio-available iron, particularly post-weaning. Children who suffer from anaemia have delayed psychomotor development and impaired performance; in addition, they experience impaired coordination of language and motor skills, equivalent to a 5–10 point deficit in intelligence quotient [2], [3], [4], [5].

Understanding the contribution of iron deficiency and associated causes to overall burden of anaemia is crucial to the development of appropriate childhood anaemia control strategy [6]. A very less emphasis has been given to childhood anaemia. A few studies have been done in Haryana regarding this topic and not even a single research has been done in this part of the state. We hypothesized that low haemoglobin concentration in rural Haryana children primary result from micronutrient (especially iron) deficiency attributable to dietary intake compounded by adverse socioeconomic conditions.

2. Method

2.1. Study Design

Community based cross sectional study.

2.2. Study Setting

Rural field practice area of Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan in Sonepat district of Haryana state in India.

2.3. Study Population

Children aged 3-6 years attending Anganwadis in area under study.

2.4. Sampling and Sample Size

All the children aged 3-6 years attending Anganwadis on the day of data collection and qualify inclusion criteria were included in the study.

2.5. Study Variables

Socio-demographic profile of children: Age, sex, birth order, weight, height of children. Per capita monthly income of the family. Education status of mother and father, Dietary intake, Utilization of health services, Haemoglobin estimation by cyanmethaemoglobin method [7].

2.6. Inclusion Criteria

All the children of age group 3-6 years attending Anganwadis in rural field practice area of Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan, Sonepat, Haryana.

2.7. Exclusion Criteria

Severely unwell children, children suffering from any haematological disorder, children who had received a blood transfusion during last 3 months or the children whose parents/ guardians did not give consent were excluded from the study.

2.8. Data Collection

A Semi-structured, pilot tested questionnaire was used to collect data.

For Haemoglobin Estimation 0.02ml of capillary blood was drawn by puncture in micropipette under aseptic precautions and it was collected in dry test tube containing Drabkin's solution (5.0 ml). The collected blood sample was mixed well and kept for five minutes and analyzed by expert technicians using photoelectric colorimeter (Digital).

WHO classification was used for the diagnosis of anaemia and assessment of its severity [1].

The 24 hours foods recall method was used for dietary assessment. Guardians were asked to recall the exact content of their children's diet over previous 24 hours, using standardized cups, bowls & spoon for estimation of food volume.

2.9. Statistical Analysis

Data were entered in MS-EXCEL, Version 2007 and SPSS (version 17.0) software. Rates, proportion and chi square test were used to analyze the data. p value less than 0.05 considered was as level of significance.

2.10. Ethical Consideration

Ethical approval was taken from Institute Ethics Committee of Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan in Sonepat district in Haryana state of India before the research. Prior permission was taken from concerned authorities. Informed consent for participation was obtained from mother/ father or legal guardian of participants.

3. Result

The present cross-sectional community based study was conducted among all the children attending Anganwadis of rural field practice area of Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan in Sonepat district of Haryana. A total of 932 children were registered under 31 Anganwadis falling under study area and all of the 402 children available in the anganwadis on the day of visit were enrolled as study participants. Parents/guardians of 376 children gave consent for Haemoglobin estimation so the overall response rate was 93.5%. Socio-demographic profile of the participants is given in Table -1.

In the present study mothers of the study participants 336 (83.6%) had received full antenatal care while 66(16.4%) received incomplete ANC. With respect to health service utilization 378 (94%) children were fully immunized as per their age. Three hundred seventy three (92.8%) had received vitamin A supplement by age. Majority of the participants 347 (86.7) and 362 (90%) had not received any IFA supplementation or treatment for worm infestation respectively. As per Anganwadi records more than 95% children had attended anganwadi for more than 60% of the days, 400(99.5%) had taken supplementary food regularly and growth monitoring was done for all of them.

The present study reported 167 (41.5%) of the study participants taking fruits and vegetables at least once a day while majority of study participants 235 (58.5%) were not taking fruits and vegetables at least once. 359 (89.3%) were vegetarian and only 43 (10.7%) study subjects were non-vegetarian but non-vegetarian food was consumed occasionally. 233 (58%) were having normal weight for age while 169 (42%) were of under- weight.

Present study reported that 271(72.07%) of the children aged between 3-6 years attending aganwadis in the study area were anaemic (Table-2).

The study shows that the factors like gender, birth weight, nutritional status, consumption of fruits/vegetables (at least

once in a day), IFA supplementation and de-worming were affecting the anaemic status of the participants in a statistically significant manner (Table 3).

Table 1. *Distribution of the study participants by socio-demographic characteristics.*

Attributes		No. of study participants N=402 (%)
Sex	Males	178 (44.3)
	Females	224 (55.7)
Age	3-4 years	95 (23.6)
	4-5 years	144 (35.8)
	5-6 years	163 (40.6)
Birth Order	1st	141 (35.1)
	2nd	150 (37.3)
	3rdor more	111 (27.6)
Birth Weight	<2.5 Kg	59 (14.7)
	>2.5 Kg	343 (85.3)
Religion	Hindu	389 (96.8)
	Sikh	04 (1.0)
	Others	09 (2.2)
Caste	SC	125(31.1)
	OBC	143(35.6)
	General	134(33.3)
Education Status of Head of Family	Illiterate	28 (7)
	Primary	194 (48.3)
	High School	141(35.1)
	Senior Secondary and More	39 (9.7)
Occupation of Head of Family	Unemployed	4 (1)
	Unskilled	184 (45.8)
	Semi-Skilled	66 (16.4)
	Skilled	1 (0.2)
	Clerical/Shop Owner/Farmer	137 (34.1)
	Semi Professional	3 (0.7)
	Professional	7 (1.7)
Socio –Economic Status	Lower	289 (71.9)
	Upper Lower	90 (22.4)
	Lower Middle	17 (4.2)
	Upper Middle	4 (1)
	Upper	0

Table 2. *Distribution of study participants in relation to anaemia.*

Anaemia status		Study participants n=376 (%)
No anaemia		105 (27.93)
Anaemia	Mild Anaemia	58(15.43)
	Moderate Anaemia	186(49.47)
	Severe Anaemia	27(7.18)
	Any Anaemia	271 (72.07)
Total		376(100.00)

Table 3. *Showing the factors associated with anaemia among the study participants.*

Attributes		Anaemia N=271	No anaemia N=105	P value
Age	3-4 years	65(74.7)	22(25.3)	p value >0.05
	4-5 years	98(71.0)	40(29.0)	
	5-6 years	108(71.5)	43(28.5)	
Sex	Male	94 (57.7)	69 (43.3)	p value <0.05
	Female	177 (83.1)	36 (18.9)	
Religion	Hindu	261 (71.9)	102(28.1)	p value >0.05
	Sikh	3 (75.0)	1(25.0)	
	Others	7 (78.8)	2(22.2)	
Caste	SC	84(74.3)	29(25.7)	p value >0.05
	OBC	101(74.3)	35(25.7)	
	Others	86(67.7)	41(32.3)	
Socio-economic status	Lower	201 (73.4)	73 (26.6)	p value >0.05
	Upper Lower	57 (68.7)	26 (31.3)	
	Lower Middle	9 (60.0)	6 (40.0)	
	Upper Middle	4 (100)	0 (0)	
Nutritional status	Underweight	139 (85.8)	23 (14.2)	p value < 0.05
	Normal	132 (61.9)	82 (38.1)	
Birth weight	<2.5 Kg	46(79.3)	12(20.7)	p value < 0.05
	>2.5 Kg	225(70.8)	93(29.2)	
Dietary intake (Energy kcal)	Adequate or ≤ 10% RDA	155(71.4)	62(28.6)	p value>0.05
	Deficient by >10% RDA	116(73.0)	43(27.0)	
Dietary habits	Vegetarian	240(71.9)	94(28.6)	p value >0.05
	Non-vegetarian	31(73.8)	11(26.2)	
Fruits/vegetables taken at least once in a day	Taken	92 (60.5)	60 (39.5)	p value < 0.05
	Not taken	179 (79.9)	45 (20.1)	
IFA supplementation	Yes	34(65.4)	18(34.6)	p value < 0.05
	No	237(73.2)	87(26.8)	
Place of defecation	Sanitary latrine	54(72.0)	21(28.0)	p value >0.05
	Open field/court yard Defecation	217(72.1)	84(27.9)	
History of intestinal worm infestation	Yes	28(75.7)	9(24.2)	p value>0.05
	No	243(71.7)	96(28.3)	
De-worming for intestinal worm infestation	Yes	10(58.8)	7(41.2)	p value < 0.05
	No	261(72.7)	98(27.3)	

4. Discussion

Iron deficiency remains a major nutritional problem among infants and young children in India [8]. There is a high burden of anaemia in India which leads to intellectual property loss as well as reduction in work output. It may also attribute to increased burden of infectious diseases as a result of decreased immune status. National Nutritional Anaemia Control Programme (NACP) was launched in the country in 1970 to tackle the problem of anaemia but failed to make any impact [9].

The present study reported that 271(72.07%) of the children aged between 3-6 years were anaemic which is similar to 72.9 % reported in National Family Health Survey-4 for the Children age 6-59 months in rural Haryana [3].

A study conducted by N Arlappa et al (2012) on "Prevalence of anaemia among rural pre-school children of Maharashtra, India" found that relatively a higher (63%) proportion of girls were anaemic as compared to boys (57%) [10]. Similar findings were observed in our study which revealed that association of Anaemia in relation to sex of study participants was found to be statistically significant.

The study carried out by Joycelyne E Ewusie et al (2014) on "prevalence of anaemia in under-five children in the Ghanaian population" reported the high prevalence rate of anaemia was in the rural part of the country as a result of poverty and less favourable socio-economic status [11]. Similar findings were observed in our study that anaemia prevalence was high among lower socioeconomic strata.

Leite et al (2013) [12] carried out a study to detect "Prevalence of anaemia and associated factors among indigenous children in Brazil" found that with regard to indicators of nutritional status, anthropometric deficits measured in terms of weight-for-age, height-for-age, and weight-for-height increased the prevalence of anaemia. The findings are in-coherence with our study with respect to weight for age.

The study carried out by Joycelyne E Ewusie et al (2014) on "prevalence of anaemia in under-five children in the Ghanaian population" found that high prevalence rate of anaemia in the rural part of the country attributed due to limited consumption of fruits as a result of poverty and less favourable socio-economic status [11]. Similar observations were made in our study that the association of Anaemia in relation to fruits and vegetables taken at least once in a day among study participants was found to be statistically significant (p value < 0.05).

Our observation that birth weight significantly affect the occurrence of anaemia is similar to Taqueco T Uchimura et al (2003) [13] but differ from that of Leite et al (2013) [12] and Joycelyne E Ewusie et al (2013) [11] who observed that birth weight did not significantly affect childhood anaemia.

A study conducted by N Arlappa et al (2012) on "Prevalence of anaemia among rural pre-school children of Maharashtra, India" found that no significant ($p>0.05$) differences were observed in the prevalence of anaemia with respect to use of sanitary latrine [10]. The findings are in-coherence with our study that relationship of anaemia with respect to place of defecation was found to be statistically non-significant (p value>0.05).

Our study has further reported that IFA supplementation and De-worming has a statistically significant effect on anaemia. Similar findings are reported by others also [14], [15].

5. Conclusion

The present study revealed that all most three fourth of children aged between 3-6 years in the study areas were suffering from anaemia. The anaemia was more prevalent among girls, underweight children and children not taking Fruits and Vegetables at least once a day. That means there is a deficiency of food as well as the iron content in the diet of the participants.

Recommendation

It is recommended to strengthen the IFA supplementation and de-worming program for the children as a short term measure and as long term measure Behaviour Change Communication (BCC) should be used to create awareness among the community for better understanding the cause of anaemia and use of locally available iron rich foods like fruits/ vegetables in general and haem-iron rich foods of animal origin in particular for control of anaemia. Monitoring and evolution of government program like ICDS Supplementary Nutritional Program should be strengthened.

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