



MID DAY MEAL PROGRAMME IMPLEMENTATION AND ITS IMPACT ON CURBING ANEMIA PREVALANCE IN SCHOOL CHILDREN : A STUDY IN NORTH BIHAR

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ABSTRACT

Iron deficiency anaemia is a problem of serious public health significance, given its impact on psychological and physical development, behaviour and work performance. More than 70 percent of Indian children are anaemic (National Human Development report, 2001). According to NFHS-3 (2005-06) girls (69%) and boys (70%) in all groups have high anaemia prevalence. Children belonging to poor family mainly study in government schools where now a days mid day meal programme is in operation. So mid day meal is a good option for improving nutritional status of children. Therefore the present investigation lies with the objective to study the status of anaemia in the school children and impact of mid day meal programme on haemoglobin level of children. For this, three schools of Pusa block (Samastipur dist) of Bihar where mid day meal programme was running regularly selected purposely. Hundred children of age group 7 to 14 yrs were selected. Their back ground details and dietary intake in lunch time and whole day were noted in developed Performa. For detecting anaemia 50 percent of subjects were selected for haemoglobin test. Haemoglobin test was done by acid hematin method before and after three months of mid day meal consumption. Majority of subjects (approx 90 %) had anaemia , however a significant increment was found in haemoglobin level of subjects after three months of mid day meal consumption but they were still below WHO cut off criteria for detecting anaemia in respective age group. A positive correlation was found between iron intake and haemoglobin level of subjects.

During the study it was found that quality of mid day meals was not so good and no micronutrient supplements were provided to the children. It can be concluded from the present investigation that presently anaemia is a serious malnutrition problem in the school children and mid day meal is able to cure anaemia unless its quality and quantity be improved as per the norms set. Hence quality of mid day meal should be limited and micronutrient supplements should be regular provided to the school children .

Key words- Anaemia, Mid day meal , Micronutrient supplements, School children

Introduction

Anaemia, defined as a low blood haemoglobin concentration, has been shown to be a public health problem that affects low, middle and high-income families and has significant adverse health consequences, as well as adverse impacts on social and economic development . It may result from a number of causes, with the most significant contributor being iron deficiency. Iron deficiency adversely affects cognitive and motor development, causes fatigue and low productivity . Report says 59% of Indian women suffer from Anemia. Its highest value over the past 14 years was 54.60 in 2002, while its lowest value was 48.10 in 2011.

National Human Development report, 2001 reported that more than 70 percent of Indian children were anaemic . An alarming 600 million people in South-East Asia are suffering from iron deficiency anaemia, predominantly affecting adolescent girls, women of reproductive age and young children. The school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence (Kumari 2005). Iron deficiency in school age children is associated with retardation of growth , decreased immunity, poor cognitive development resulting in lower Intelligence Quotient (IQ) and behavioral abnormalities.(Gowri , 2005). In the context of Bihar, 87.6 percent children below the age of 3 years are anaemic. (NFHS-3), where 42 percent of population live below poverty line. (Census of India 2001). The level of malnutrition is of great concern in India with over 40% of children being classified as undernourished. Under nutrition is highly prevalent among rural children in India. Survey among rural population of India, by National Nutrition Monitoring Bureau in 2002, reported prevalence of malnutrition, using Gomez classification to be 94.6% among 6-9 year and 97.1% in 10-13 year old. Anaemia affects over 3/4th of the school children due to low intake of iron and folic acid. The reasons for such high levels of malnutrition and

anaemia are complex. They include poverty, gender inequity, specific dietary patterns and recurrent illness, all these acting in conjunction.

The National Programme of Nutritional Support to Primary Education (NP-NSPE) which is popularly known as the Mid-day Meal Scheme was launched by the Government of India in 1995. NP-NSPE states that it aims to address “classroom hunger” and encourage poor children, belonging to disadvantaged sections, to attend school regularly and help them concentrate on classroom activities. The mid-day meal programme is a multi-faceted programme of the Government of India that, among other things, also seeks to address issues of food security, lack of nutrition and access to education on a nationwide scale. The Scheme is the world’s largest school feeding programme reaching out to about 12 crore children in over 12.65 lakh schools/ Education Guarantee Scheme (EGS) across the country. In Bihar started with dry ration of 3kg/per student/per month and now providing cooked meal in 30 blocks of 10 districts since 2003-04. School feeding programmes are popular in the developing world and beyond, not only because of their educational but also for their nutritional benefits. Mid day meal acts as a regular source of “supplementary nutrition” for children, which facilitates their healthy growth. To achieve the objectives of the Scheme, the guidelines prescribe specific nutritional content in the mid day meal.

The Cooked Mid-Day Meal (CMDM) was introduced in all government and government-aided primary schools in April 2002. CMDM scheme proposed to supply meal containing 300 calories and 8-12 grams of proteins to all children studying in classes I to V in government and government aided schools and Education Guarantee Scheme (EGS)/ Alternative and Innovative Education (AIE) centres w.e.f. September, 2004 (revised to 450 calories and 12 grams of protein with adequate quantities of micronutrients like iron, folic acid, and vitamin-A etc. It is observed that children belonged to poor family mainly study in government schools where now a days mid day meal programme is running, which was initiated firstly in Madras and after that in 1995 introduced all over the country. But in Bihar till 2004 only 5 percent children were covered under cooked mid day meal programme (Mo HRD, 2004).From Jan.2005 the state government in Bihar notified to implement the mid day meal programme in all primary schools which expanded to upper primary class in Oct.2007.(Annual Work Plan and Budget for mid day meal in Bihar,2008-09).

Hence present investigation lies with the objective

1. To study the status of anaemia in school children of age group 7 to 14 yrs of age.

2. To find out the correlation between mid day meal and haemoglobin level of the children.

Materials and Methods

Selection of Block and Schools

Since the study on mid day meal was to be done in Rajendra Agricultural University, Pusa .Bihar, hence Pusa block of Samastipur dist. was selected purposely for this study.

Three schools of Pusa block where mid day meal programme was introduced from same year (March 2005) and were running regularly was selected purposely. In these schools one was basic school (up to VIII) and another two were primary school (up to V).

Selection of Subjects

Initially all subjects from these three schools were selected but due to their irregularity in attendance the number was sticked to 100 only who were regular till the end of study. For this study those subjects were selected which could answer the question rightly .The subjects selected were from the age group of 7 to 14 yrs.

Collection of General Information

In order to extract relevant information such as age, class studying, address, occupation of father/guardian, income, composition of family, details of the family members etc. from the subjects the interview method was adopted and noted in developed Performa.

Dietary intake of subjects

All subjects were interviewed for the dietary intake in lunch time and in whole day by recall method and noted in developed Performa. Daily dietary intake at the time of breakfast, mid morning, lunch, tea, dinner and at bed time was noted by subjects in the Performa. To assess the quantity of food consumed, subjects were shown the standardized utensils and asked to express the amount of food consumed. In addition for eating habit of subjects' consistency and size of cooked food for e.g. rice, dhal, vegetable and chapatti were also shown to the subject. At the time of lunch amount of consuming MDM by subject were also evaluated. Any specific food items if consumed weekly were also noted.

The different food items consumed were converted in to their raw equivalents. The mean intake of nutrients was compared with the Recommended Dietary Allowances (RDA) given by ICMR (1989) to find out the percentage adequacy of nutrients in the diet of children.

Blood Parameters

Blood was taken up by standard method from the 50 percent of subjects. Haemoglobin test for detecting anaemia was done before and after three months of mid day meal. For estimating haemoglobin status by acid haematin method was adopted.

Result and Discussion

General information about the Subjects

It was found that the majority of children who gladly accepted to be a part of study were from the class V and the age range accordingly were between 10 to 12 yrs. As regard food habit approximately 2/3 rd were vegetarian.

Socio-economic status of the Subjects

Table 1 depicts the socio-economic status of the Subjects.

Table 1. Socio-economic status of subjects (N=100)

Particulars	Percentage		
	Boys	Girls	Total
A. Religion			
a) Hindu	45	47	92
b) Muslim	5	3	8
c) Others	-	-	-
B. Cast			
a) Forward	-	-	-
b) Backward	22	19	41
c) Schedule casts	28	31	59
C. Father's Education			
a) Illiterate	21	20	41
b) Below Matric	17	20	37
c) Matric but below graduation	12	10	22

D. Mother's Education

a) Illiterate	30	25	55
b) Below Matric	15	16	31
c) Matric but below graduation	9	5	14

E. Parent's Occupation

a) Landless Labour	19	20	39
b) Agri. Labour	4	6	10
c) Agri. Farmers	5	3	8
d) Business	2	1	3
e) Casual Staff in University	10	13	23
f) Others	10	7	17

F. Family Income (Rs.)

a) < 2000	15	10	25
b) 2001-5000	22	25	47
c) 5001-7000	13	15	28

G. Family Type

a) Nuclear	30	27	57
b) Joint	20	23	43

H. Family Size

a) 3-5	25	18	43
b) 6-8	14	17	31
c) Above 8	11	15	26

e) Casual Staff in University	10	13	23
f) Others	10	7	17

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From the table it is clear that a total of 92 percent subjects belonged to Hindu religion in which majority of subjects (59 %) was from of schedule cast and rest 41 percent belonged to back ward cast. In the respect of father and mother's education illiteracy was found in larger percentage of both in father (41) and mother (55).Only 22 and 14 percent father and mother were matriculate.

Highest percentage of subject's parents (39) were land less labour followed by 23 percent were casual staff in university,10 percent agricultural labour , 8 percent farmers and 3 percent had small shop.Fortyseven percent of subjects had the family income between rupees 2000 to 5000 per month .Majority of the subjects (57 %) belonged to nuclear family followed by 43 percent of subjects had 3 to 5 family member, where as rest 31 and 26 percent of subjects had 6 to 8 and more than 8 family members respectively.

Haemoglobin level of the subjects

Mean value of haemoglobin level before and after three months of mid day meal consumption are presented in table-2.

Table -2.Haemoglobin level of Subjects (N=50)

Age(yr)	Haemoglobin level (g/dl)					
	Boys (n-25)			Girls (n-25)		
	Initial Mean±SD	After3months Mean±SD	Increments Mean±SD	Initial Mean±SD	After3months Mean±SD	Increments Mean±SD
7+	8.30 ± 1.70	8.55 ± 1.75	0.25 ± 0.35	6.64 ± 0.37	7.07 ± 0.67	0.33 ± 0.26
8+	6.75 ± 0.35	7.25 ± 1.06	0.50 ± 0.70	7.10 ± 0.45	7.45 ± 0.46	0.35 ± 0.37
9+	8.00 ± 1.11	8.05 ± 1.04	0.05 ± 0.46	8.16 ±0.62	8.30 ± 0.60	0.14 ± 0.27
10+	8.40 ± 0.84	8.40 ± 0.90	0.00 ± 0.66	7.58 ± 0.65	7.93 ± 0.56	0.35 ± 0.35

11+	8.33 ± 1.03	8.66 ± 0.81	0.33 ± 0.51	8.17 ± 0.68	8.24 ± 0.55	0.07 ± 0.44
12+	8.50 ± 1.32	9.00 ± 1.00	0.50 ± 0.50	8.20 ± 0.44	8.70 ± 0.75	0.50 ± 0.35
13+	8.80 ± 2.30	9.20 ± 2.89	0.40 ± 0.54	9.40 ± 1.14	9.40 ± 0.96	0.00 ± 0.35
14+	9.40 ± 2.41	9.70 ± 2.44	0.30 ± 0.44	9.60 ± 2.89	9.80 ± 2.75	0.20 ± 0.41

It is evident from the table that haemoglobin level was very low both in boys and girls. Although a small increment was found in haemoglobin level after three months of mid-day meal consumption but it did not match the WHO cut off value for anaemia , which is 11.50 g/dl for boys and girls of the age group 7 to 11 yrs , for 12 to 14 yrs of girls and boys of age group 12 to 13 yrs it is 12 g/dl respectively and for 14 yrs boys it is 13 g/dl.(WHO 1998).

Similar results were found by Satato (1993) who studied the school feeding programme in Lombok, Indonesia and Adelman et al (2008) who evaluated the nutritional impact of Food For Education (FFE) programme of Northern Uganda, both were found that school feeding programme did not have any impact on haemoglobin or anaemic status of school children. Other studies indicated that mid-day meal programme combined with other intervention programme showed beneficial effect on haemoglobin level of the school children. Gopaldas and Gujral (1996) found in Gujrat that school feeding programme integrated with the provision of a six monthly dose of an anthelmintic, vitamin A and daily iron supplements with feeding for 85 days in a school term significantly improved the haemoglobin status from 10.5 µg/c to 11.9 µg/c for boys. Similar results were found by Badenhorst and Cruger (1994), Silva *et al.* (2006), Nga *et al.* (2009) who observed that school feeding programme combined with iron fortified soup, zinc supplements and multi micronutrient fortified biscuits, respectively improved the haemoglobin level significantly and cured anaemia.

Table-3 Impact of mid-day meal on haemoglobin status of subjects

Measurement	Initial (Mean ± SD)	After 3 months (Mean ± SD)	't' value
Boys (N=25)			
Hb level (g/dl)	9.28±2.16	9.48±2.15	2.746*
Girls (N=25)			
Hb level (g/dl)	8.96±2.10	9.22±2.05	5.14*

*Significant at 5% level.

The table 3 reflects that there was a significant improvement in the haemoglobin level of subjects after three months of mid-day meal consumption. Haemoglobin level in boys and girls increased from 9.28 ± 2.16 to 9.48 ± 2.15 (g/dl) and 8.96 ± 2.10 to 9.22 ± 2.05 (g/dl) respectively after three months. However anaemia could not be cured in the subjects.

Similar results were obtained by Badenhorst and Cruger (1994) who found that school feeding combined with iron fortified soup and deworming of students brought significant positive effects on haemoglobin and also observed that children with low baseline iron status benefited most from the intervention. Nga *et al.* (2009) evaluated the efficacy of school based intervention using supplementation of multi micronutrients fortified biscuits for 4 months to Vietnamese school children and found that multimicronutrient fortification significantly improved the concentration of the haemoglobin . Its contrary Adelman *et al.* (2008) concluded that no evidence were found about the effect of food for education programme on anaemic status of the school children in their sample.

Table- 4 Correlation coefficient between nutrient intake and haemoglobin level of Subjects

Nutrient intake	Hb. Level
Protein (g)	0.075 ^{NS}
Iron (mg)	0.252*

* significant at 5 % level

^{NS} Non significant

From Table 4 it appears that a significant correlation was found between iron intake and haemoglobin level of the subjects.

Similar results were found by Gopaldas and Gujral (1996) and Buzina et al (1998) who concluded that there was a significant positive relationship between providing of daily iron supplements to children and their haemoglobin level.

Similar results were observed by Kumar and Rajagopalan (2006, 2007 & 2008), Vijayalakshmi et al. (2008) and Nga et al. (2009) that there was a significant positive correlation between supplementation of multi micronutrient beverage (including iron) and haemoglobin level of the students. Based upon the result of present investigation it may be concluded that most of the subjects were suffering from anaemia and no micronutrient supplements were provided to them. Still mid day meal is a good option for improving nutritional status of subjects, if the quality and quantity of meal is provided as per the norms set in mid day meal programme and micronutrient supplements is regularly provided to the school children and school authority should have freedom to purchase the food material from local market otherwise delay in transportation of food grain can negatively affect the nutritional status of school children.

References

- [1].Adelman, S.; Alderman H.; Gilligan, D. and Lehrer, K. (2008). The Education and Nutrition Impacts of Alternative Food for Education Programs in Northern Uganda.
- [2].Badenhorst, C.J. and Kruger, M. 1994. The effects of an iron fortification in a school feeding scheme and anthelmintic therapy on the iron status and growth of 6-8 year old school children. (Unpublished).
- [3].Buzina, K.S.; Buzina, R.; Stavejenic, A.; Meri, T.B. and Vesna, J.M. (1998). Effect of iron supplementation on iron nutrition status and cognitive functions in children. *Food and Nutrition Bulletin*, **19** (4).
- [4].Gopaldas, T. and Gujral, S. (1996). The pre-post impact evaluation of the improved mid-day meal programme. Gujrat (1994-continuing). Tara Consultancy Services, Baroda, India.
- [5].Gowri, A.R. and H.J. Sangunam, 2005. Assessment of mental and motor abilities of school going children with anemia. *Ind. J. Nutr. Dietet*, **42**: 99-105.
- [6].Health The enterprise of health care.(2015) 59% Indian women suffer from anemia says report.

- [7]. ICMR, 1989. Nutrient Requirement and Recommended Dietary Allowances for Indians. A report of the Expert group of the ICMR, NIN, Hyderabad, India.
- [8]. James, G. (2013) Fighting classroom hunger – Achievement of Mid Day Meal Scheme. *yojana* Issue, sept 2016.
- [9]. Nga, T.T.; Winchagoon, P.; Dijkhuizen, M.A.; Khan, N.C.; Wasantwisut, E.; Furr, H.; Wieringa, F.T. (2009). Multi-micronutrient-fortified biscuits decreased prevalence of anemia and improved micronutrient status and effectiveness of deworming in rural Vietnamese school children. *Journal of Nutrition*, May **139** (5) : 1013-21.
- [10]. Kumar, M.V. and Rajagopalan, S. (2006). Impact of a multiple micronutrient food supplements on the nutritional status of school children, *Food and Nutrition Bulletin*, September. **27** (3) : 203-210.
- [11]. Kumar, M.V. and Rajagopalan, S. (2007). Multiple micronutrient fortification of salt and its effect on cognition in Chennai School children, *Asia Pacific Journal of Clinical Nutrition*, Jan., **16** (3) : 505-11.13.
- [12]. Kumar, M.V. and Rajagopalan, S.; (2008). Trial using multiple micronutrient food supplement and its effect on cognition, *Indian Journal of Pediatrics*, July, **75** (7) : 671-78.
- [13]. Kumari, S. and R. Jain, 2005. Assessment of school children from rural Bihar. *Ind. J. Nutr Dietet*, **42**: 326 - 334.
- [14]. Satoto 1993. Preliminary Executive Report Evaluation of School Feeding Program (PMT-AS) in Lombok. (Unpublished).
- [15]. Shrivastawa, B.K.; Das, N.L. and Sahay, J.N. (1971). Text Book of Practical Physiology, 2nd Ed. : 60
- [16]. Silva, A.P.; Vitolo, M.R.; Zara, L.F.; Castro, C.F. (2006). Effects of zinc supplementation on 1-5 year old children, *Journal of Pediatrics*, Brazil, May-June; **82** (3) : 227-31
- [17]. Vijayalakshmi, P.; Premakumari, S. and Haripriya, S. (2008). Supplementation of Milk Based Health drink Enriched with Micronutrients – Part-1 Impact on Growth and Hemoglobin status of 7-12 years old children. *Indian Journal of Nutrition and Dietetics*, April, **45**: 449-465.