



DIETARY ADEQUACY AND NUTRITIONAL ASSESSMENT OF CHILDREN RECEIVING GOVERNMENT AND NON- GOVERNMENT MID-DAY MEAL

Home Science

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ABSTRACT

Hunger, poverty and other causatives are the major hindrances in the growth and development of the children. Mid-Day Meal scheme was hence, one of the biggest milestones in this era to not only eradicate hunger but also improve the educational and nutritional status of children, which was later even outsourced to various Non- Governmental Organizations to reach to remote areas. Though the scheme was launched more than two decades ago, yet a question that lingers with all is that if the beneficiaries are really being benefitted in terms of growth and nutrition. Thus, a cross-sectional study was conducted in Bengaluru region among the beneficiaries of Government Mid-Day Meal and Non-Government Mid-Day Meal to assess the dietary adequacy, nutritional status and micronutrient deficiencies. The study was conducted on 100 children and data was collected using a pre-structured questionnaire. It was observed that the mean weight and height was higher of the children receiving Non-Government Mid-Day meal. The dietary adequacy percentage revealed that though the protein and Vitamin A consumption was higher in Government Mid Day Meal male subjects but the energy, fat, zinc and calcium levels were significantly low, except for iron which was more than the RDA among both the groups.

KEYWORDS

Dietary adequacy, Mid-Day Meal, Micronutrient deficiency, Nutritional assessment

INTRODUCTION

Nutrition is the key to health. There is no denial that good nutrition is a stepping stone towards a healthy life. Many a times, this remains unturned and for this reason majority of the population remains malnourished. Children constitute most of the population in our country. India is a home to more than one billion people, of which 42 per cent are children. It is estimated that nineteen per cent of the world's children live in India. More broadly, malnutrition in India is in a state of silent emergency and thereby demands greater priority than ever before [8]. The health and well being of this young generation is of utmost importance not to just their families but to the nation as they are the seeds of our future . One of the major objectives of the Mid-Day Meal Scheme was to improve the nutritional status of school children, but there is not enough evidence to say whether the scheme has been successful in terms of ensuring optimum nutritional status for its beneficiaries. Also, be it the GMDM or the NGMDM, both assure to provide the 1/3 rd calorie requirement for the day, but evidences to instill the fact and belief of it being in practice are not enough. The developmental stage is crucial and needs impeccable care and nutrition for a healthy life. Prolonged hunger or unintentional nutrient elimination from diet could lead to lifelong complications. The overall objective of the study was to know the dietary adequacy and nutrition status of the children .

MATERIAL AND METHODS:

A comparative study using random sampling method was conducted in two schools in urban Bengaluru. Total of 100 subjects were studied using interview cum questionnaire technique. The study subjects were in the age group of 10-12 years. Two schools from the North zone of Bengaluru were selected. Children who consumed the GMDM (n=50) and NGMDM (n=50) were included for the study. The first part of the questionnaire comprised of all the personal details of the subject such as age, gender, ordinal position, family income and qualification., The weight and height was measured and recorded to assess the nutritional status of the study subjects . Weight was measured using digital weighing scale. Dietary recall interview elicits a detailed summary of all foods, beverage, and dietary supplements consumed by participants during last 24-hour (from midnight-to-midnight) for the day preceding the interview. Information was obtained through personal interview with the study subjects and the data regarding the type of meal (breakfast, lunch, dinner, snack), and the location of the meal (home, school, other), as well as the quantity of the meal was collected. Dietary assessment and dietary adequacy of the study subjects receiving GMDM and NGMDM was calculated.

RESULTS AND DISCUSSION

Table -1: General characteristics of the study Subject

Characteristics	Category	Study Subjects				χ ² Test
		NGMDM** (n=50)		GMDM* (n=50)		
		N	%	N	%	
Age of Children	10-11 years	29	58.0	17	34.0	5.80*
	11-12 years	21	42.0	33	66.0	
Gender	Male	20	40.0	18	36.0	0.17 NS
	Female	30	60.0	32	64.0	
Ordinal position	First	13	26.0	17	34.0	1.11 NS
	Second	21	42.0	21	42.0	
	Third	16	32.0	12	24.0	
Number of Siblings	No	0	0.0	3	6.0	16.41 *
	One	7	14.0	17	34.0	
	Two	28	56.0	10	20.0	
	Three	15	30.0	20	40.0	

* Significant at 5% level, NS : Non-significant

*GMDM: Non Government Mid Day Meal **NGMDM: Government Mid Day Meal

Majority (58%) of study subjects belonging to the age group of 10-11 years were from NGMDM school. While, only 34% of the study subjects belonged to the same age group where GMDM was provided. Likewise, maximum (66%) study subjects in the age group of 11-12 years were from the school which received GMDM. Whereas, only 42% of children in the age group of 11-12 years were from NGMDM school. Hence, it is evident that maximum number of study subjects in the age group of 10-11 years were from the NGMDM school whereas maximum number of study subjects in the age group of 11-12 years were from the GMDM school. A similar study conducted in Nairobi City, Kenya, concluded that majority of the study population (40.6%) was 11 years old and mean age was 10.07±0.9SD, the age distribution being 8-11 years [7].

The above table also reveals that there was more number of female study subjects (64%) as compared to the males (36%) in the GMDM School. A similar pattern was observed in the NGMDM School, where 60% were female subjects and only 40% were male subjects.

It is evident that majority of the study subjects (42%) were second child of their parents, from both the schools. Only, 26% of the study subjects were observed to be first child of their parents, in the NGMDM school, while 34% of the study subjects from GMDM were first child of their parents. The rest, 32% and 24% study subjects were third child, from NGMDM and GMDM school, respectively. However, no significant difference was observed within the groups ($\chi^2=1.11$). There are various hypotheses in the literature about the

impact of birth order, including positive and negative hypotheses. The birth order has effects on child's education. It was found that shares decreases in the family's educational resources and children from larger families have lower levels of education and that there is in addition a separate negative birth order effect [3].

Table -2 : Mean Weight and Height of the study subjects

Age group (in years)	GMDM*		NGMDM**	
	Weight (kgs) (Mean±SD)	Height (cms) (Mean±SD)	Weight (kgs) (Mean±SD)	Height (cms) (Mean±SD)
10-11 years	32.95±6.26	133.41±3.61	37.38±6.41	145.10±7.18
11-12 years	32.73±4.78	134.00±4.67	37.62±6.90	145.57±7.19

*GMDM: Non Government Mid Day Meal **NGMDM: Government Mid Day Meal

It can also be inferred that only 6% of the study subjects from GMDM school were the only child. Also, it was seen that maximum (56%) study subjects were from the NGMDM and had one sibling while only 20% from GMDM school had one sibling. A significant difference was evident between the groups ($\chi^2=16.41$). In a study researchers found a correlation between large number of siblings in the families and poverty. Parents of children in large families were more likely to be not working, from ethnic minorities, have had their first child at younger ages, be less educated [4].

Table 2 shows that GMDM school study subjects between the age

Table -3 : Mean Nutrient comparison with RDA among NGMDM and GMDM (Male study subjects)

Nutrients	RDA#	NGMDM**			GMDM*			Std 't' Test	
		Mean	SD	%A	Mean	SD	%A	NGMDM	GMDM
Energy (Kcal)	2190	2143.6	119.6	97.9	2072.4	140.3	94.6	1.65 NS	3.75*
Protein (g)	39.9	24.4	4.1	61.2	24.9	4.2	62.4	16.01*	22.19*
Fat (g)	35	26.5	2.1	75.7	25.3	4.1	72.3	17.05*	25.54*
Calcium (mg)	800	514.8	46.4	64.4	502.1	54.3	62.8	26.11*	37.54*
Iron (mg)	21	25.3	2.9	120.5	25.3	2.4	120.5	6.32*	42.22*
Vitamin A (ug)	600	489.2	41.3	81.5	512.2	43.7	85.4	11.38*	48.17*
Zinc (mg)	9	5.1	1.1	56.7	4.4	1.4	48.9	15.96*	10.84*

#IFCT,2017 *Significant at 5% Level, NS : Non-significant, %A : Percentage adequacy

**NGMDM: Non Government Mid Day Meal *GMDM: Government Mid Day Meal

The table 3 shows that the mean nutrient comparison with the RDA among the NGMDM and GMDM school male study subjects, which signifies the deviation from the recommended intake. It was observed that though among the male subjects consuming NGMDM had a mean intake of 2143.60±119.60 Kcal/day, the male subjects from GMDM school consumed only 2072.40±140.30 Kcal/day. Also, the protein intake among both the groups were found significantly lower than the RDA, i.e. 24.40±4.10 and 24.90±4.20 amongst the ones consuming NGMDM and GMDM, respectively. Though the RDA for fat was 35g/d, it was observed that the mean intake among NGMDM and GMDM subjects was 26.50±2.1 and 25.30±4.1 respectively. The Zn (5.10±1.10 in NGMDM and 4.40±1.40 in GMDM), Vitamin A (489.20±41.30 in NGMDM and 512.20±43.70 in GMDM) and Calcium (514.80±46.4 in NGMDM and 502.1±54.30 in GMDM) intake was visibly low among both the groups but the iron intake met the RDA. The mean nutrient comparison with RDA was found to be significant at 5% level for all nutrients in both the schools except for the energy intake by the NGMDM consuming male subjects.

The dietary adequacy was assessed (in terms of %RDA) and it was observed that the study subjects receiving GMDM had significantly reduced quantities of nutrients as compared to the NGMDM study subjects except for protein and Vitamin A. On comparing with the RDA it was seen that the male subjects from the NGMDM school met

group of 10-11 years had mean weight 32.95±6.26 and the age group between 11-12 years had 32.73±4.78. On the other hand, the NGMDM school study subjects depicted the mean weight of 37.38±6.41 and 37.62±6.90 in the age group of 10-11 and 11-12 years, respectively. It was evident that the mean weight in all the age groups was higher in the study subjects consuming the NGMDM in comparison to the ones consuming the GMDM. A similar study in urban area of Mysore, observed that mean weight of boys and girls of 11 years was 30.00±8.5 and 30.00±3.00, respectively. Whereas, among 12 year old boys and girls it was seen that the mean weight was 31.00±2.30 and 33.00±4.70, respectively. It further concluded that as compared to the 50th percentile of the NCHS standards the observed weights for the age were below than the normal standards among the children [1].

The mean height of the GMDM school study subjects in the age group of 10-11 years was 133.41±3.61 as compared to 134.00±4.67 in the 11-12 years age group. On the other hand, the NGMDM school study subjects were observed to have the mean height of 145.10±7.18 and 145.57±7.19 in the age group of 10-11 and 11-12 years, respectively. It was evident that the mean height in all the age groups was higher in the study subjects consuming the NGMDM in comparison to the ones consuming the GMDM. A similar study by [10] revealed that the mean height of the boys receiving the MDM was 141.50±10.50 while the ones not receiving the MDM 149.20±8.90. Similarly, the girls consuming MDM had a mean height lesser (140.80±8.30) than the ones not consuming the MDM (148.90±7.10).

97.9% of energy, 61.2% protein, 75.7% fat, 64.4% Calcium, 81.5% Vitamin A and 51.6% zinc requirements. While the study subjects from the GMDM school met only 94.6% of energy, 62.4% of protein, 72.3% of fat, 62.8% of Ca, 85.4% of Vit.A and 48.9% of zinc requirements. The iron intake between both the groups was above the RDA. This could be due to consumption of non-vegetarian food by maximum study subjects from both schools. The other micronutrients intake as evident from the table in the male subjects is approximately 50% of the RDA. Though the RDA for Zinc was 9mg/d it was observed that the NGMDM and GMDM study subjects consumed only 5.5mg/d and 4.4mg/d. Similarly, the RDA for Calcium was 800mg/d and only 514.8mg/d and 502.1mg/d was being consumed by NGMDM and GMDM study subjects. The protein intake was observed to be low too, nearly 60% RDA was being met. A study conducted in government schools of Mangalore observed similar results where 84.54% of the study subjects thought breakfast to be important for health [5].

Similar results were found [10] where the nutrient intake among the beneficiaries of the MDM had significantly low nutrient intake as compared to the non-MDM beneficiaries. The non-MDM receiving beneficiaries had close to or above RDA intake for all the nutrients, while the fat intake was seen to be higher than the RDA in both the groups. In a study conducted [6] in 2015 concluded that the study subjects had their specific demands for food of their choices and this led to higher attendance on those specific days of the week.

Table 4 : Mean Nutrient comparison with RDA among NGMDM and GMDM (Female study subjects)

Nutrients	RDA#	NGMDM**			GMDM*			Std 't' Test	
		Mean	SD	%A	Mean	SD	%A	NGMDM	GMDM
Energy (Kcal)	2010	1883.2	62.8	93.7	1876.8	74.3	93.3	11.06*	10.14*
Protein (g)	40.4	27.3	4.8	67.6	24.7	2.5	61.1	15.03*	36.20*
Fat (g)	35	26.7	1.9	76.3	26.5	2.1	75.7	24.02*	22.47*
Calcium (mg)	800	498.8	52.6	62.4	487.6	72.5	61.0	32.41*	23.60*
Iron (mg)	27	12.9	2.7	47.8	12.8	2.8	47.4	29.75*	28.34*
Vitamin A (ug)	600	516.7	48.6	86.1	487.6	47.7	81.2	9.70*	12.91*
Zinc (mg)	9	5.0	1.0	55.6	4.1	1.3	45.6	22.11*	20.20*

#IFCT,2017 * Significant at 5% Level %A: Percentage adequacy

**NGMDM: Non Government Mid Day Meal *GMDM: Government Mid Day Meal

The mean nutrient comparisons with RDA among the female subjects from both schools were found to be statistically significant at 5% level (Table 4). The mean nutrient intake among the NGMDM school female subjects was higher for macronutrients as compared to the mean nutrient intake of the GMDM school female subjects.

The mean energy intake was 1883.20 ± 62.8 and 1876.80 ± 74.30 , whereas, the mean protein intake was 27.30 ± 4.80 and 24.70 ± 2.5 among the NGMDM and GMDM consuming female subjects. The mean intake of the micronutrients, on the other hand, was found to be higher among the GMDM consuming female subjects as compared to the NGMDM consuming subjects, though for both the groups the mean intake was lower than the RDA.

The daily mean intake of Calcium was found to be 498.80 ± 52.60 and 487.60 ± 72.50 among the GMDM and NGMDM consuming female subjects. The mean intake of iron, Vitamin A and Zinc whereas was 12.90 ± 2.70 , 516.70 ± 48.60 and 5.00 ± 1.00 respectively among the GMDM school female subjects. Meanwhile amongst the NGMDM school subjects the mean intake was 12.80 ± 2.80 , 487.60 ± 47.70 and 4.10 ± 1.30 for iron, Vitamin A and Zinc respectively. A study conducted in Dehradun [2] found that the mean caloric intake among the non-MDM consuming subjects during the day was higher (1662.2 ± 426.8) as compared to the MDM consuming subjects (1413.3 ± 388.0)

The dietary adequacy was assessed (in terms of %RDA) and it was observed that the female study subjects receiving GMDM had significantly reduced quantities of all the nutrients as compared to the NGMDM study subjects. On comparing with the RDA it was seen that the female subjects from the NGMDM school met 93.7% of energy, 67.6% protein, 76.3% fat, 62.4% Calcium, 47.8% iron, 86.1% Vitamin A and 55.6% zinc requirements. While the study subjects from the GMDM school met only 93.3% of energy, 61.6% of protein, 75.7% of fat, 61.0% of Calcium, 41.7% of iron, 81.2% of Vitamin A and 45.6% of zinc requirements. Hence, the nutrient intake per day was lower than the recommended intake and the iron requirements were less than 50% of the RDA. This could be due to consumption of low bioavailable foods sources or low intake of Vitamin C which hinders the absorption of iron. A study [11] concluded that 50.9% of the female study subjects had moderate degree of anemia. The requirements of iron among female was higher than in males, yet they were found to be significantly deficient of the nutrient. A study conducted in 2014 [9], found similar results wherein, the dietary intake of iron was 83.7% of the RDA among the Haryana region girls.

CONCLUSION:

Hence, it can be concluded that the dietary adequacy and mean weight of the study subjects was below than the standards followed in the study. Although the study subjects consumed Mid Day Meal, they still were not meeting the required RDA for the day and the diet lacked in both micro as well as macronutrients. The reason could be due to restricted portion size or picky eating. It was also evident that the mean weight in all the age groups was higher in the study subjects consuming the NGMDM in comparison to the ones consuming the GMDM. The negligence of incorporation of all the food groups daily could be another causative of lower micronutrients intake.

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