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Original Research Article

Contribution of mid-day meal scheme to students nutrition in Bengaluru, India: time to re-look

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ABSTRACT

Background: The mid-day meal scheme (MDMS) in India is the world's largest free school lunch program. In 2021, the scheme was renamed as PM-POSHAN (Pradhan Mantri Poshan Shakthi Nirman). We conducted a study to quantify the routine daily dietary intake of school children with reference to calorie and protein intake and assess the proportion of calorie and protein intake from mid-day meals compared to routine daily intake.
Methods: This was a cross-sectional study conducted in select five government schools of urban area of Bengaluru. From each school, a sample of 69 students (23 from each class i.e., 5th, 6th, and 7th standard) were selected using a computer-generated random number table amounting to a total sample size of 345. All the data were collected in a structured proforma and electronically entered using Microsoft Excel and analyzed using Epidata analysis software, version 3.1.
Results: Our study findings revealed that nearly 1 in 3.6 children have protein deficiency routinely in their diet and 1 in 7.5 children have both protein plus calorie deficiency.
Conclusions: Our study has the following programmatic implications: first, the protein deficiency among the school children in the age group 9 to 14 is considerably high. Second, it is imperative to evaluate the quality of food distributed to the schools and children at regular point of time. It is also necessary that the food served to the children should be customized to their taste and it should be locally accepted.

Keywords: Calorie, Mid-day meal, Nutrition, PM-POSHAN, Protein

INTRODUCTION

In India, the schools of state governments provide Mid-day meal (MDM) as a wholesome freshly-cooked lunch to children in government.[1] The states of Kerala, Gujarat, Tamil Nadu, and Pondicherry started a mid-day meal program for children studying at primary level during the mid-80s. Following this, the National Program of Nutritional Support to Primary Education (NP-NSPE) which is known as the mid-day meal was introduced in all districts of the country.[2]

It has been reported that MDMS has catered to the nutritional needs of school children in both rural and urban areas. Mid-day meal (MDM) is an important instrument for combating classroom hunger and promoting better learning. MDM is effective in improving physical and psycho-social health for disadvantaged school children in lower income and higher income countries. It increased the school attendance in lower income countries and increased the weight of younger children in both lower and higher income countries.[3]

From 2001 onwards the mid-day meal scheme (MDMS) in India is the largest school lunch programme in the world. The main objective of the scheme is to increase enrolment, retention, attendance and to improve the nutritional level of such children through supplementary

nutrition. Under this scheme, school children are being provided cooked food during different days of the week. Raw wheat and rice are provided free of cost to all schools by the Government of India.[4]

In 2021, the scheme was renamed as PM-POSHAN (Pradhan Manthri Poshan Shakthi Nirman). It covers all the school children studying from Classes 1st to 8th standard of Government schools.[5]

The Government of Karnataka introduced the Mid-Day Meal (MDM) Scheme in the State during the year 2002-03. Free rice is provided to the schools under MDM scheme to provide nutrition for students of 1st to 8th standard.[6]

There are nearly 1403 Government schools in Bengaluru Urban district.[7]

As part of the scheme, the school children are provided with recipes like rice and sambar, bisi bele bath, pulao, puliyogare along with egg or banana and a glass of milk which are commonly consumed in the region. The expected energy from these recipes is nearly about 280 to 460 kcal with a protein content of 15-23 grams per day.

The mid-day meal scheme is expected to provide one-third calorie and half protein daily on top of the routine consumption of food at the children's houses.

Over the last few decades, there has been a subsequent change in the eating habits and the type of food consumed by the school children. It is fully established that mid-day meal program exerts a positive influence on the enrolment and attendance among students in schools; but there still remains a question whether the purpose of ensuring one-third calorie and half protein is still met under the current scenario.

Hence, we conducted a study a) to quantify the routine daily dietary intake with reference to calorie and protein intake. b) to assess the proportion of calorie and protein intake from the mid-day meals when compared to the routine daily intake of total calories and proteins.

METHODS

Study design and sample size

A cross sectional study was conducted among the select five schools of urban Bengaluru during September 2022 to October 2022. All the students of 5th, 6th and 7th standard were included as study participants.

For the purpose of the study the sample size was calculated to be 315 using www.openepi.com software, considering the proportion of protein intake as 52%, with 80% power, 95% confidence interval, dropout rate of 5% and design effect of 1.[8]

Sampling technique

The study participants were chosen based on the PPS (probability proportional to size) method. The sample size of 315 was equally divided among the select five schools and 69 children from each school were selected. Again the 69 children were equally distributed among the three classes and the first 23 students from each class were included in the study. We included more sample anticipating high absenteeism during our visit to the schools.

Data collection process

After obtaining approval from the institutional ethics committee, permission was taken from the deputy director of public instruction (DDPI), block education officer (BEO) and principals of the concerned schools for conducting the study and written informed consent from parents and assent from the students were obtained.

After explaining the study objectives to the teachers and the student data were collected. The required data were collected through the personal interview technique. Each and every question was elaborately explained by the investigator to the students and responses were documented.

The study questionnaire had two components: 1) general and socio-economic status of urban and rural school children, 2) 24-hour semi-quantitative dietary recall method of the child.

Data analysis

A data collection instrument that uses a pre-designed and pre-structured format was developed to capture the data manually. The data from the data collection instrument was entered into electronic format using Microsoft Excel (2010). The continuous variables were analyzed for mean, median, standard deviation, and range. The categorical variables were assessed for frequency and percentage.

We performed the Chi-square test/Fisher exact test among categorical variables to determine any association. A p value of <0.05 was considered to be significant. The data was analyzed using a statistical software Epidata analysis software, version 3.1.

RESULTS

A total of 354 school children were included in the study, of which, 90 (25%) children were from 5th standard, 131 (37%) from 6th standard and 133 (37.6%) from 7th standard. The proportion of male to female students was approximately 50%. Most of the children consumed non-vegetarian (86%) and were belonging to nuclear families (52%).

Table 1: Proportion of students who did not meet the protein, calorie and protein plus calorie requirements (n=354).

	Protein	Calorie	Protein + Calorie
Total	96 (27%)	12 (3%)	10 (13%)
Males	48 (27%)	9 (5%)	7 (4%)
Females	48 (28%)	3 (2%)	3 (2%)

Our study findings revealed that nearly 3% (12), 27% (96) and 13% (10) were found to be deficient in calorie, protein and; protein plus calorie requirements respectively. Similarly, when both genders were compared, calorie deficiency was high in males (5%), protein deficiency was high in females (28%) and protein plus calorie deficiency was high among males (4%) (Table 1). The calorie and protein deficiency among non-vegetarian students were considerably less. The school children belonging to nuclear family were found to be less deficient for calorie and protein when compared to the students of joint families (Table 2). However, all those differences were statistically not significant.

Table 2: Proportion of protein, calorie, and protein plus calorie deficiency among the school children (n=354).

Variables		Protein		Calorie		Protein plus Calorie	
		<50% protein	**>50% protein**	**<33.3% energy**	**>33.3% energy**	**<50% protein + <33.3% energy**	**>50% protein + >33.3% energy**
Gender	Male	48 (26.5)	133 (73.5)	9 (4.9)	172 (95.1)	7 (3.8)	131 (96.2)
	Female	48 (27.7)	125 (72.3)	3 (1.7)	170 (98.3)	3 (1.7)	125 (98.3)
Age (yrs)	9-11	45 (28.8)	111 (71.2)	8 (5.1)	148 (94.9)	8 (6.7)	111 (93.3)
	12-14	51 (25.7)	147 (74.3)	4 (2)	194 (98)	2 (1.3)	145 (98.7)
Family	Nuclear	54 (29.3)	130 (70.7)	5 (2.7)	179 (97.3)	4 (2.2)	129 (97.8)
	Joint	42 (24.7)	128 (75.3)	7 (4.1)	163 (95.9)	6 (3.5)	127 (96.5)
Diet	Veg	16 (31.3)	35 (68.7)	3 (5.8)	48 (94.2)	3 (5.8)	35 (94.2)
	Non-veg	80 (26.4)	233 (73.6)	9 (2.9)	294 (97.1)	7 (2.3)	221 (97.7)
Standard	5^{th}	32 (35.6)	58 (64.4)	8 (8.9)	82 (91.1)	7 (7.8)	57 (92.2)
	6^{th}	32 (24.4)	99 (75.6)	3 (2.3)	128 (97.7)	3 (2.3)	99 (97.7)
	7^{th}	32 (24)	101 (76)	1 (0.7)	132 (99.3)	0	100 (100)

DISCUSSION

To the best of our knowledge, this is one of the few studies conducted in the recent years to assess the calorie and protein deficiency among government school children in Karnataka, south India.

Our study findings revealed that nearly 1 in 3.6 children have protein deficiency and 1 in 7.5 children have both protein and calorie deficiency routinely in their diet.

Our study has the following programmatic implications: First, the protein deficiency among school children in the age group 9 to 14 is considerably high. However, there is no considerable difference between males and females. The reason for the same could be that the parents of the school children who attend government schools usually belong predominantly to the underprivileged section and hence it is presumed that nourishment to the children will not be sufficient. The intent of the government to complement the diet of the children with additional protein and calorie in the food still remains as a far-fetched reality. Further research needs to be conducted in the larger section of the state to get the true estimates. Second, it is imperative to evaluate the quality of food distributed to the schools and children at regular points of time. It is also necessary that the food served to the children should be customized to their taste and it should be locally accepted. Third, the government should look for newer strategies like "Nikshay Mithra" the one implemented in National TB Elimination Program (NTEP).[9] All those kids who are deficient in calories and proteins should be made available for adoption to the general public or corporate sector as part of corporate social responsibility.

Our study has the following strengths and limitations. 1) The study was conducted in government schools where the mid-day meal scheme activity was implemented from the past 4 years and hence reflects the ground reality. 2) The limitations of the study are a) The study was conducted in a smaller group of students and hence we should not extrapolate the findings of this study to the larger population. b) Further larger studies need to be undertaken at regular intervals to evaluate and make interim corrections in the ongoing programs.

CONCLUSION

To conclude, the mid-day meal scheme implemented partially fulfils the objectives of decreasing malnourishment among school children. New strategies need to be adopted to empower the nutritional component of school-going children by leveraging on other sectors using newer digital technologies. Efforts should be made to address the deficiencies in calorie and protein intake

and continuously evaluate and improve the mid-day meal program to ensure the well-being and development of school children.

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