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IMPACT OF MID DAY MEAL PROGRAMME ON DIETARY INTAKE AND NUTRITONAL STATUS OF GIRLS (AGED 10-12 YEARS) ATTENDING A GOVERNMENT SCHOOL IN DELHI

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Abstract

This study was undertaken to evaluate the Mid Day Meal Programme (MDM) being run at upper primary level of Govt. Girls Senior Secondary School, Timarpur, Delhi. One hundred and fifty girl students of class 6th aged 10-12 years were subjects of study. A cyclic menu was served in school which was analyzed for its energy, protein, iron and vitamin A content. On the basis of approximate consumption of MDM students were categorized into three groups: **Group 1** consuming 75 to 100% of served meal, **Group 2** consuming 50 to 75% of the served meal and **Group 3** consuming 25 to 50% of the served meal. Analysis of their diet revealed that midday meal helped in bridging the energy gap but not fully as there was need to further improve consumption levels of midday meals by subjects. Protein gap was filled to a great extent but intake of iron and carotene in diets of subjects remained quite low. Anthropometric data reflected that the children had mean weight and height less than 95th percentile of ICMR standard 2010. The difference was statistically significant in three groups of subjects in age group 10-11 years. BMI for age Z scores were not statistically different in three groups. Some clinical signs of iron and vitamin A deficiency were found in a small number of students.

Introduction

Education and child health are important tools of poverty reduction and economic development. With the recent focus on universal elementary education as a development goal, many countries including India have made improvements in school enrolment and attendance rates. Food for education programme which includes meals served to children in schools are important means of improving school participation, while fostering, learning and supplementing the inadequate diets of school age children (Blue, 2005; Mishra *et al*., 2003). When the meals are well timed, they can reduce short term hunger and help children to concentrate and learn. The impact on nutrition can be positive depending on the quality and quantity of food provided (Nathya *et al*., 2008).

Methodology

This study was undertaken to evaluate the midday meal programme (MDM) being run in Government Girls Senior Secondary school, Timarpur, Delhi. 150 girls studying in class 6th were subjects for study. Data about socio economic status of families was collected with the help of a pre structured questionnaire.

Results and Discussion

Socio Demographic Profile of Subjects and their Families

The data gathered from 150 girls of class 6th reflected that 68.7% girls were aged between 10-11 years, 21.3% were aged between 11-12 years while 10% were more than 12 years of age. Subjects belonged to families from low socioeconomic groups, 50% families had monthly income between10 to15 thousand only, while 30% reported income less than 10,000. Mothers of subjects were mainly housewives (68%) and with low educational background. An education level of fathers was also not very high and a large number (54.7%) of them were skilled/semiskilled workers, rests were doing jobs in offices or shops (34%) while some (11.3%) were shopkeepers.

Details of midday meal being served in the school

In the selected school cyclic menu was being served. The details were gathered from school authorities. Cyclic menu included Halwa-Chana, Curry-Rice, Chhole-Puri, Aloo-Puri, Rice-Dal and Chhole-Rice. The energy, protein, iron and carotene content of each menu was calculated. On the basis of approximate consumption of midday meal children werecategorized into three groups: **Group 1** consuming 75 to 100% of served meal, **Group 2** consuming 50 to 75% of the served meal and **Group 3** consuming 25 to 50% of the served meal. There mean consumption that is 87.5% (range 75 to 100%), 62.5% (range 50 to 75%) and 37.5% (range 25 to 50%) was taken into consideration for calculating mean contribution towards their dietary intake.

The data on nutrient intake of subjects was ascertained

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from one day 24 hours dietary recall method. This also included nutrient from midday meal consumed. Data reflected that the mean energy intake of all the subjects was much lower than the RDA of 2010 kcal/day. The girls who were consuming 75-100% of served midday mean had mean energy intake of 1907±99 kcal, whereasthe subjects who consumed 50-75% had mean energy intake of 1813± 98 kcal which further decreased to 1727±70 kcal for the girls who were consuming just 25-50% of midday meal served (Table 1). Data on mean protein intake reflected that mean intake was at par or higher than RDA of protein that is 40.4 grams/day and children who were consuming more MDM had higher intake of proteins.

In terms of iron intake in the present study, the intake was much lower than the recommended dietary allowances of 27 milligrams per day. Even the children who were consuming 75-100% of MDM were not able to meet the RDAs. The iron content of MDM was only 1.67-4.84 mg/day and if the child was not consuming the entire amount the contribution further decreased. Similar results were found in a study conducted by Deodhar *et al*. (2007) in Ahmadabad city to evaluate the quality of food provided by kitchen of an NGO food service and MDM kitchen were low in iron per day (ranging from 3.43 mg to 4.9 mg). Data on carotene intake reflected that it was much lower than the RDA i.e. 4800 microgram and it ranged from1885 micrograms to 2001 micrograms in all three groups. Not much contribution was made by midday meal with respect to carotene. Therefore it is essential that MDM being served should have rich sources of carotene.

In a study conducted on twelve schools of Delhi slums to evaluate the status of MDM, it was found that food distribution did not provide required amount of calories and proteins (Samson *et al*., 2005). An evaluation done by Nutrition Foundation of India confirmed that in most of schools children were getting less than stipulated minimum of calories and other nutrients (NFI, 2003). In the present study, dietary intake data was further analyzed for percentage adequacy of diet (Table 2). In terms of NAR for proteins, 86% children were consuming adequate amount of protein (100% of RDA or more) and 14% were consuming marginally adequate amount of protein (less than 66 % of RDA) whereas none had inadequate intake of protein (less than 66% of RDA).

Further the nutrient data was analyzed to find difference in protein intake of three groups of children. The group consuming 75-100% MDM had maximum protein adequacy (98.6%) as compared to the group consuming 50-75% of MDM (79.3%) and 25-50% MDM (55.6%). This difference was statistically significant ($\chi^2 = 25.84$; $p<0.05$). This indicates that MDM is contributing to protein adequacy thus it is an effective strategy to address the problem of protein malnutrition. However no significant differences were found in all the three groups in terms of iron and carotene intake. It was easy to understand as MDM was not rich in both carotene and iron. Addition of green leafy vegetables in MDM could have made it more nutritious.

In a study conducted to assess the nutritional status of 1503 school children in Vadodara revealed that green leafy vegetables were not added to any of the recipes served to them (Bhoitre and Iyer, 2010). Data collected by food frequency revealed that milk and/ Milk products were consumed daily but their quantity was less as source of milk in their diet was mainly tea. Consumption of non-vegetarian food among the study group was low as only 44% were consuming non vegetarian food that too once in 15 days. Eggs consumption was reported more in winters in comparison to summers. Intake of refined cereals was high in the study population as 40% of respondents consumed them daily while consumption of whole pulses was very low. It was clear from the study that there was need to encourage children to consume more pulses and consumption of sprouts needs to be promoted. Consumption of roots and tubers was high. Green leafy vegetables were consumed mainly in form of *chutney* only.Intake of fruits and nuts was also low and none of the respondent was consuming them daily. Low intake of fruits, green leafy vegetables, milk and eggs/meat appeared to be responsible for low iron and vitamin A intake in diet of subjects.

Data on Anthropometric measurements of the children

Anthropometric data of subjects reflected that all children of all groups had mean weight and height less than 95th percentile of ICMR standard 2010 (Table 3). Mean weight for age values of subjects reflected that group 1 which was consuming 75 to 100% of MDM had better weight than the group which was consuming 50 to75 percent of MDM which was better than group 3 which was consuming only 25 to 50% of MDM served. However these differences were not statistically significant (as tested by ANOVA) except in children aged 10-11 years.

A Study was conducted in Pakistan by Pappas *et al*. (2008) on introduction of a balanced meal as a school lunch program in which 4,035 government primary school girls (n = 2,03,116) were selected for the study. Result indicated significant decrease in wasting by 41 percent. Underweight in children decreased by 21.70 percent and stunting by six percent but was not significant. In the present study data on height for age of children indicated that they were behind 95th percentile of ICMR standard 2010. There was no significant differencein the height of three groups of children. Data was also treated to compute BMI for age Z-score (WHO growth standard 2007), revealed that 40.6 percent children were normal whereas 52% were mildly thin and 4.6% were found to be moderately thin. Chi square analysis revealed that although there were higher number of children in group 3 who were

moderately malnourished the difference was not statistically significant(χ^2==5.93; p>0.05). A large scale survey conducted in five zones of India by Akshaya Patra Foundation revealed high level of underweight and wasting in children despite of them being beneficiary of MDM Programme (Akshaya Patra Foundation, Bangalore, 2006).

Clinical Symptoms of the Children

Data on clinical symptoms for Vitamin A deficiency revealed that there were no signs of bitot spots and none of the child reported night blindness. However, 8% cases of conjunctival xerosis were identified by the researcher. Similarly signs of iron deficiency anaemia were observed only in 3-12% of subjects. Very few children showed any clinical symptoms of PEM except thinness of hair which was seen in case of 7.3% children. There was no statistical difference with regard to all clinical symptoms among the three groups (p>0.05).

Conclusion

Midday meal scheme was found to be beneficial as it helped in enhancement of nutrient intake of children but the nutrient gap still exists in the diet of the children. In the present study it was observed that 458 to 598 kcal/day and 7-17 gram of protein per day was provided by MDM. Moreover the study revealed that entire portion of midday meal was not consumed by all the children thereby decreasing the contribution of midday meal further. Also, the food did not have much of iron and carotene rich food ingredients. The efforts should be made by government to make the meals more nutritious so as to further improve the nutritional status of its beneficiaries. There is also a need to educate parents so that they provide more nutritiousfood at home.

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Table 1: Data on Macro-nutrient and Micro-nutrient contribution of one day dietary intake and mid day meal

Nutrient				MDM contribution (Mean ± SD)		
	Group 1 (n=74)	Group 2 (n=58)	Group 3 (n=18)	Group 1 (n=74)	Group 2 (n=58)	Group 3 (n=18)
Energy (kcal)		1813±98	1727±70	476 ±44	333±33	195±21
Protein (g)	53.54±5.24	47.52±6.68	43.14±4.68	11.22±2.36	7.97±1.94	4.55±1.24
Iron (mg)	17.72±3.20	15.99±2.97	15.90±2.73	3.21±1.12	2.06±0.80	1.12±0.49
Carotene (µg)	2001±885	1900±785	1885±720	55±17	36±13	20±9

***Group 1** consumption Range 75-100 %, **Group 2** consumption Range 50-75% and **Group 3** consumption Range 25-50%

Table 2: Percentage adequacy of Diet

Nutrients	**Adequate** (100 % of RDA or more) **n (%)**	**Marginally Adequate** (66 % to 100 % of RDA) **n (%)**	**Non-Adequate** (less than 66% of RDA) **n (%)**
Protein (g)	129 (86)	21 (14)	0 (0)
Iron (mg)	3 (2)	93 (62)	54 (36)
Carotene (µg)	0 (0)	38 (25)	112 (75)

Table 3: Data on weight and height of the subjects

Parameter	**Age (in years)**	**Group 1 (Mean ±SD)**	**Group2 (Mean ±SD)**	**Group 3 (Mean ±SD)**	**Pooled Data (Mean ±SD)**	**95th Centile (ICMR, 2010)**
Weight (kg)	**10 -11 yrs***	29.30±5.27 (n=41)	27.66±3.95 (n=48)	24.5±3.11 (n =14)	27.90±4.65 (n=103)	31.2
	11-12 yrs^{ns}	31.83±5.98 (n=21)	28.76±4.80 (n=8)	26.83±0.74 (n=3)	30.59±5.62 (n=32)	34.8
	>12yrs^{ns}	36.06±6.58 (n=12)	30.70±5.66 (n=2)	32.20±0.00 (n=1)	34.42±7.16 (n=15)	39.0
Height (cm)	**10-11yrs^{ns}**	136±8 (n=41)	137±8 (n=48)	136±8 (n=14)	137±8 (n=103)	140.0
	11-12 yrs^{ns}	138±9 (n=21)	138±9 (n=8)	141±4 (n=3)	138±9 (n=32)	145.3
	>12^{ns}	145±9 (n=12)	148±11 (n=2)	127±0 (n=1)	144±9 (n=15)	150.2

*= $p<0.05$; *ns- non significant

***Group 1** consumption Range 75-100 %, **Group 2** consumption Range 50-75% and **Group 3** consumption Range 25-50%

Table 4: Data on BMI for Age z-score

BMI Z-Scores	**Group 1 n (%)**	**Group 2 n (%)**	**Group 3 n (%)**	**Pooled Data n (%)**
>=1SD (Overweight)	3 (4.1)	1 (1.7)	0 (0)	4 (2.7)
1 SD to -1 SD (Normal)	41 (55.4)	18 (31.0)	2 (11.1)	61 (40.6)
-1 SD to -2 SD (Mildly underweight)	30 (40.5)	32 (55.2)	16 (88.9)	78 (52.0)
-2 SD to -3 SD (Moderately underweight)	3 (4.05)	3 (5.17)	1 (5.56)	7 (4.6)
>-3 SD (Severely underweight)	0 (0)	0 (0)	0 (0)	0 (0)

(χ^2==5.93; $p>0.05$)