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Nutritional status of mid day meal beneficiaries: A comparison with non–beneficiaries

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The study aimed to find out the nutritional status of mid day meal beneficiaries (MDM) and to compare the same with non beneficiaries (NMDM). A sample of 250 girls from schools having the MDM scheme and 250 girls from schools not having MDM scheme in Allahabad district, Uttar Pradesh were selected randomly. The girls were students of class 1st to 8th. All the information was recorded on a survey schedule. Heights and weights were measured and diet survey carried out by standard procedure. Nutritional status of the children was assessed by Gomez classification as well as by IAP classification. Results showed that children having PEM in MDM category formed 76 per cent and in the NMDM category 84 per cent based on the NCHS 50th percentile values. As per the ICMR reference values of well-to-do Indian children, the per cent of PEM affected subjects were 46.4 per cent in the MDM and 51.2 per cent in the NMDM category. On the whole the MDM beneficiaries had better nutritional status than the non beneficiaries, although neither the international nor the national standards of anthropometric status could be met by majority of the subjects in MDM as well as NMDM subjects.

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INTRODUCTION

Children contribute to the vital human potential and impart strength to the national economy and development. Nutrition is the most important basic need, being a major determinant of health, labour productivity and mental development. Better the nutritional status of the children, higher will be the nation's growth. Protein energy malnutrition (PEM) and certain micronutrient deficiencies continue to be widespread in India. The government introduced the mid day meal (MDM) scheme in schools on 15th August, 1995 with the objectives of enhancing enrollment, retention of attendance and improving nutritional status of children. Until the year 2007 the meal was provided to the primary school children only, but thereafter has been extended to 8th standard (middle school). Under the scheme, lunch is provided to the children on all working days. As per the government- guidelines the meal served in primary school must provide 450kcal and 12g protein whereas for the middle school beneficiaries the energy must be 700kcal and protein 20 g per child per day. The main objective of the present investigation was to assess the anthropometric nutritional status of school children who are MDM beneficiaries and to compare the same with non-beneficiaries.

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METHODOLOGY

The present study was carried out in eight schools of rural areas of Allahabad district, Uttar Pradesh. Four schools had mid day meal facilities and remaining four did not. They were coded as MDM and NMDM, respectively. From each of the two categories 250 children were selected randomly, forming a total of 500 subjects. The age group of children selected was 5 to 16 years.

Tools and techniques:

The nutritional status of sub- samples of children drown from all schools was determined using heights and weights as criteria. Standard procedure of Jellife (1966) as published by Srilakshmi (2002) was used for the anthropometric measurements and assessment of nutritional status. Heights (cm) and weights (kg) were measured by anthoprometer and personnel weighing machine (digital), respectively. Comparisons were made with the international standard (NCHS 50th percentile values) as well as with the Indian (ICMR 1995) reference values. Classification of subjects into various categories of PEM and normal was done based on Gomez classification and IAP classification. Mid day meal menus were recorded based on school-records made available by school personnel as well as by investigator's own observations. Average intakes of nutrients per day of MDM beneficiaries and non-beneficiaries were computed from data collected by 24 hours dietary recall method using the procedure prescribed by Swaminathan (2002). The entire data was subjected to statistical analysis, applying percentage and t- test.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation have been presented under following heads :

Anthropometric status of MDM and NMDM subjects:

Body weights and heights of children reflect their state of health and growth rate. In many developing countries with widespread food inadequacy and malnutrition, the weights and heights that prevail among the population will be below normal.(ICMR 2002). The view of the ICMR has been found to be applicable in the case of present study's subjects.

Height :

Table 1 depicts the mean heights of surveyed MDM and NMDM children of the age between 5 to 16 years. The age-wise frequency distribution shows that out of the 12 groups, seven showed better heights in the MDM category. When the height of MDM and NMDM subjects were compared, by applying "t" test the calculated t value (5.67) was greater than the table value (2.074) at 5 % probability level, thus showed significant difference in the heights, the MDM children showing better results.

When the MDM and NMDM heights were compared with the NCHS 50th percentile values, it was revealed that the deficit in heights was greater in the NMDM category than in the MDM category. However, none of the subjects in MDM or NMDM category reached the NCHS 50TH percentile value. On the whole the heights of MDM as well as NMDM subjects were significantly lower than the NCHS standard. When the MDM and NMDM subjects were compared with the ICMR reference (well-to-do Indian children's) heights, it was found that at the age 13,14 and 15 years the MDM subjects reached the reference values whereas in the NMDM category only in two age groups *i.e.*13 yrs and 14yrs, the heights were satisfactory. On the whole, the heights of MDM as well as NMDM subjects were significantly lower than the ICMR reference values also.

Weight:

The age–wise mean wrights of MDM and NMDM subjects, 5 to 16 years, surveyed may be seen in Table 3. When, the comparison of weight of NMDM subjects was made with the MDM subjects there was significant difference since the calculated t value (4.54) was greater than the table value (2.074) at 5 percent probability level revealing that MDM exerted a positive effect on school children's body weights. Although mid day meal did show a positive effect on weight, a comparison with the NCHS standard did not give satisfactory result because neither the MDM nor the NMDM category could reach the

Table 1. Comparison of mean weight (kg) of MDM beneficiaries and non beneficiaries (NMDM) (5-16 years) with NCHS standard

Age	50Th percentile NCHS std.	MDM Girls			NMDM Girls		
		n=250	Observed mean ±SE	Difference	n=250	Observed mean ±SE	Difference
5	18.6	15	12.88±0.49	5.72	20	13.63±0.351	4.97
6	20.6	16	16±2.51	4.6	22	17.05±1.37	3.55
7	23.3	22	14.91±0.936	8.39	23	18.61±1.70	4.69
8	26.6	27	20.52±0.998	6.08	27	16.65±1.41	9.95
9	30.5	22	25.9±1.17	4.60	28	26.58±2.25	3.92
10	34.7	30	27.12±0.66	7.58	35	26.77±1.69	7.93
11	39.2	26	28.37±4.52	10.83	21	30.38±0.24	8.82
12	43.8	23	38.78±4.30	5.02	26	32.59±0.215	11.21
13	48.3	27	42.23±1.51	6.07	18	42.11±1.51	6.19
14	52.2	15	44.09±1.56	8.11	12	45.63±3.48	6.57
15	55.0	22	48.82±1.67	6.18	15	46.75±3.53	8.25
16	56.4	5	42.9±0.92	13.5	3	43.33±23.79	13.07

NCHS standard weights. Almost similarly, the results while comparing with the ICMR reference values were also not satisfactory, except for the 15 year age group.

Nutrient intakes of MDM beneficiaries and non beneficiaries:

The daily average nutrient intakes of MDM beneficiaries and non-beneficiaries, based on the 24 hour dietary recall data are summarized in Table 4. The daily intake of MDM group was much better than that of the NMDM group. This can easily be justified because the non-beneficiaries obtained their nutrients only from home diets, whereas the MDM children consumed additional nutrients from the school-mid day meals also. The weekly menu of the school meal can be seen in table. It may, however be noted that even though the intakes of MDM group were closer to the ICMR recommended dietary allowances (RDA) (Table 7) there were inadequacies.

Prevalence of malnutrition, based on heights and weights:

More than half (51%) of the NMDM subjects and a relatively lower proportion (46.4%) of MDM subjects were found to be having different degrees of malnutrition varying between grade I to grade IV, based on the IAP Classification as shown in Table 8 . The proportion of normal was greater (53.6%) in the MDM beneficiaries in comparison to the non beneficiaries (48.8%). When the international (Gomez) classification was used for assessment, it was found that per cent prevalence of malnutrition was much higher, children in the "Normal" category being only 24 per cent in the MDM category and 16 per cent in the NMDM category. However, on the whole the beneficiaries of mid day meal had better nutritional status than those who did not have the mid day meal facility. It is evident from Table 3 that although both MDM and NMDM categories consumed lower quantities than the recommended dietary

Table 2. Comparison of mean weight (kg) of MDM beneficiaries and non-beneficiaries (NMDM) (5-16 years) with Well-to-do Indian children

Age	MDM Girls				NMDM Girls			
	n=250	Observed mean ±SE	ICMR Value	Difference	n=250	Observed mean ±SE	ICMR Value	Difference
5	15	12.88±0.49	18.67	5.79	20	13.63±0.351	18.67	5.04
6	16	16±2.51	21.56	5.56	22	17.05±1.37	21.56	4.51
7	22	14.91±0.936	24.45	9.54	23	18.61±1.70	24.45	-5.84
8	27	20.52±0.998	25.97	5.45	27	16.65±1.41	25.97	9.32
9	22	25.9±1.17	29.82	3.92	28	26.58±2.25	29.82	3.24
10	30	27.12±0.66	33.58	6.46	35	26.77±1.69	33.58	6.81
11	26	28.37±4.52	37.17	8.8	21	30.38±0.24	37.17	6.79
12	23	38.78±4.30	42.97	4.19	26	32.59±0.215	42.97	10.38
13	27	42.23±1.51	44.54	-2.31	18	42.11±1.51	44.54	-2.43
14	15	44.09±1.56	46.70	-2.61	12	45.63±3.48	46.70	-1.07
15	22	48.82±1.67	48.75	+0.07	15	46.75±3.53	48.75	-2.00
16	5	42.9±0.92	49.75	-6.85	3	43.33±23.79	49.75	-6.42

Table 3. Comparison of mean height (cm.) of MDM beneficiaries and non-beneficiaries (NMDM) (5-16 years) with Well-to-do Indian children

Age	MDM Girls				NMDM Girls			
	Number of subjects	Observed mean ±SE	ICMR Value	Difference	n=250	Observed mean ±SE	ICMR Value	Difference
5	15	109.58±8.63	112.24	2.66	20	108.84±1.36	112.24	-3.4
6	16	114.99±3.59	117.73	2.74	22	111.59±8.87	117.73	6.14
7	22	118.79±2.52	122.65	-3.86	23	107.24±0.79	122.65	15.41
8	27	125.85±1.95	127.22	-1.37	27	124.89±1.04	127.22	-2.33
9	22	128.43±1.56	133.08	-4.65	28	130.81±0.87	133.08	-2.27
10	30	134.06±2.22	138.90	-4.84	35	136.06±1.36	138.90	-2.84
11	26	144.32±2.03	145.00	-0.68	21	133.72±5.67	145.00	11.28
12	23	147.13±5.45	150.98	-3.85	26	149.98±3.02	150.98	-1.00
13	27	155.79±2.01	153.44	-2.35	18	154.06±6.23	153.44	+0.62
14	15	159.05±0.99	155.04	-4.01	12	156.17±3.24	155.04	1.13
15	22	157.08±1.67	155.98	-1.1	15	155.70±9.60	155.98	-0.28
16	5	150.40±2.20	156.00	-5.6	3	153.63±18.22	156.00	-2.37
	Results	Calculated value t= 5.32		S	Results	Calculated value t= 4.13		S

Table 4. Comparison of mean height (cm.) of MDM beneficiaries and non-beneficiaries (NMDM) (5-16 years) with NCHS Standard

Age	50^{Th} percentile NCHS std.	MDM Girls			NMDM Girls		
		Number of subjects	Observed mean ±SD	Difference	n=250	Observed mean ±SD	Difference
5	111.6	15	109.58±8.63	2.02	20	108.84±1.36	2.76
6	117.6	16	114.99±3.59	2.61	22	111.59±8.87	6.01
7	123.5	22	118.79±2.52	4.71	23	107.24±0.79	16.26
8	129.3	27	125.85±1.95	3.85	27	124.89±1.04	4.40
9	135.2	22	128.43±1.56	6.77	28	130.81±0.87	4.39
10	141.5	30	134.06±2.22	7.44	35	136.06±1.36	5.44
11	148.2	26	144.32±2.03	3.88	21	133.72±5.67	14.48
12	154.6	23	147.13±5.45	7.47	26	149.98±3.02	4.62
13	159	27	155.79±2.01	3.21	18	154.06±6.23	4.94
14	161.2	15	159.05±0.99	2.15	12	156.17±3.24	5.03
15	162.7	22	157.08±1.67	5.62	15	155.70±9.60	7
16	162.7	5	150.40±2.20	12.3	3	153.63±18.22	9.07

Table 5. Mid day male menu in Allahabad schools:

Day	Menu
Monday	Roti, Soybean ki subji or dal badi
Tuesday	Rice, Dal or subji
Wednesday	Kadhhi rice or keer
Thursday	Roti, Dal ki subji
Friday	Thahari
Saturday	Rice, Soybean ki subji

allowances of energy and nutrients, the average daily intakes of mid day meal beneficiaries were far higher than those of the non beneficiaries. This is the most likely reason that the proportion of subjects suffering from PEM is lower in the MDM category than in the NMDM category. Provision of the high protein food "soya chunks" and also pulses in the mid day meal has considerably contributed to the protein content. Cereals, pulses, potatoes and oil contribute greatly to the energy content. Thus the mid day meal can be said to be helping in decreasing per cent prevalence of malnutrition among school children. It must, however, be recognized that in order to reach the standard anthropometric status (whether NCHS or ICMR, reference values), the school children need to be given a lot more attention in terms of diet and other relevant health care.

Table 6. Average daily nutrient intakes of MDM beneficiaries (MDM) and non beneficiaries (NMDM)

Age (yrs)	Energy (Kcal)		Protein (g)		Fat (g)		Calcium (mg)		Iron (mg)		Vitamin C (mg)		Beta Carotene(µg)		Folic acid (mg)	
	MDM	NMDM	MDM	NMDM	MDM	NMDM	MDM	NMDM	MDM	NMDM	MDM	NMDM	MDM	NMDM	MDM	NMDM
5-6	1451	1141	30.19	24.26	19.16	17.66	290	213	16.27	14.21	26.67	21.42	425	401	46	21
7-9	1709	1309	39.01	30.21	20.75	16.49	280	255	15.27	14.23	34.95	30.46	425	410	54	22
10-12	1862	1475	45.40	35.51	16.39	15.54	362	314	14.92	11.81	31.56	29.40	797	792	61	40
13-15	2040	1515	52.15	42.40	26.61	17.85	416	421	16.74	12.25	37.64	32.00	913	847	84	56
16-18	1934	1427	53.37	43.70	19.95	16.87	347	345	18.98	14.57	35.00	25.00	891	876	90	64

Table 7. Recommended dietary allowances (RDA) of nutrients for children (ICMR,1995)

Age (yrs)	Energy (Kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin C (mg)	Beta-carotene (µg)	Folic acid (mg)
5-6	1690	30	25	400	18	40	1600	40
7-9	1950	41	25	400	26	40	2400	60
10-12	1970	57	22	600	19	40	2400	70
13-15	2060	65	22	600	28	40	2400	100
16-18	2060	63	22	500	30	40	2400	100

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