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Original Research Article

Nutritional status of mid-day meal program on government and private school students: a comparative study

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ABSTRACT

Background: Mid-day meal scheme is a school meal programme of the Government of India, designed to improve the nutritional status of school-age children. Malnourished children will not attain optimum potential for growth and development and this affects their physical capacity to work and physiological changes in the later phase of life. The food that we eat affects the nutritional status; hence the study was evaluated to find the nutritional status of the mid-day meal program in school going children.
Methods: Total of 100 subjects were selected into 2 groups, 50 students from government schools and another 50 from private schools. Government school groups received mid-day meal scheme and private school students brought their personal lunch. Anthropometric and haemoglobin evaluation was done.
Results: The study showed that mid-day meal effects on nutritional status and one meal gives a calorific value of 357.6 and there was a significant difference between the distribution of MUAC (CM) during pre and post nutritious period in government school students. There was no significant difference between the other anthropometric measurements like height, weight and TSFT and hemoglobin values.
Conclusions: Study showed that mid-day meal affects nutritional status. A balanced freshly cooked meal in the noon is healthier and nutritious impacting the school children's academic performance.

Keywords: Mid-day meal programme, Nutritional status, School nutrition

INTRODUCTION

School-age is one of the active growing phases of childhood, and considered as the dynamic period of physical growth and mental development of the child. School health is a cross-disciplinary field of study and a fundamental strategy that influences both health and education; sub sequentially helps in the future well-being and determines the economic productivity of the populations.[1,2] In India, children represent more than 25% of the population and primary school children are a significant group of 9.2 % of total population.[3]

School health programs provide education, health and also collaborates the other agencies to integrate multiple health components that can synergistically impact on the health. Nutrition is one among it, which is necessary for the children, adolescents to maintain their health, sustain their growth, and development and also helps in preventing the establishment of behavioral patterns that leads to obesity, related physiological risks and consequent development of other non-communicable and chronic diseases in their later period of life.[2,4] Recent studies found that school nutrition programs significantly improve the academic performance, potentially by stimulating the brain development, cognition, memory, attention, behavior and attendance.[5] Among this India's mid-day meal program is the largest school feeding program in the world, it reaches out to about 120 million children across the country.[6]

The mid-day meal scheme is a multi-purpose program implemented by the Government of India to address issues of food security, malnutrition, and access to education and also supports the child in the maintenance of family well-being through maintaining economic stability of the family and eliminating classroom hunger.[7,8] It is defined as; "the mid-day meal scheme is a school meal programme of the Government of India designed to improve the nutritional status of school-age children nationwide".[9]

The nutritional status is a result of multiple factors that interact at different levels and the consumption of adequate amounts of nutrients in terms of quality and quantity. It is defined as an individual's health condition as it is influenced by the intake and utilization of nutrients.[10,11] According to WHO it can be assessed by the nutritional indicators based on the anthropometric measurements like age, height, weight, BMI, and mid-upper arm circumference which provide the data necessary to learn the effects of nutrition on health and disease, to identify any risk of deficiency of nutrients, to prevent and cure nutrition related diseases.[12,13]

The imbalance between the nutrients the body needs and the nutrients it receives is known as malnutrition leading to either under nutrition or obesity. Malnourished children will not attain optimum potential for growth and development. It also affects their physical capacity to work and economic productivity in the later phase of life.[14,15] Hence the current study was evaluated to find the nutritional status of mid-day meal programs in school children.

METHODS

It was a comparative study; there were 100 subjects recruited for the study out of which 50 students selected from government school and another 50 from private school. Government school group received mid-day meal scheme and private school students brought their personal lunch. Subjects were aged 6-14 years and regular to school and mid-day meal schemes were selected for the study and those children who were seriously ill, too agitated and those who were unwilling for the study were excluded. The students were observed for three months after their summer holidays, assessments were done before and after the three months in their respective schools (Figure 1).

Anthropometric measurements

The weights of the subjects were measured by using the calibrated electronic weighing scale with an accuracy of +25 gm. Height was measured with a vertical measuring rod (anthropometric or stadiometer). Body mass index or BMI was calculated from the height and weight of the subjects. MUAC was measured with a non-stretchable MUAC-tape on the participant's left arm at the midpoint between the olecranon and acromion. Triceps thickness was measured by using Harpenden caliper. The triceps skin fold was measured at the back of the left arm, midway between the acromial process of the scapula and the olecranon process of the ulna.

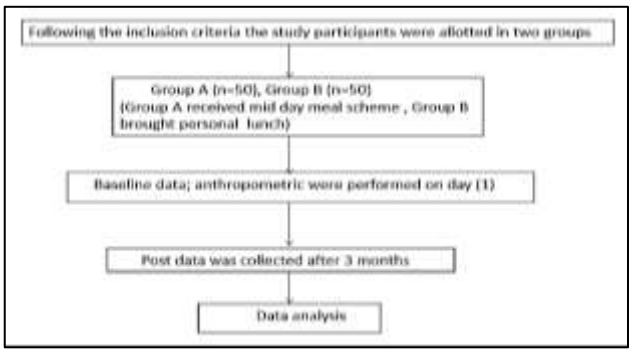

Figure 1: Flowchart of methodology.

Assessment of nutritional status through structured questionnaire

A structured questionnaire was prepared and was evaluated by experts and required modification was done. It included questions related to mid-day meal scheme, menu, quality and quantity of the meal, dietary intake of the students, attendance, enrolment, overall improvement, health status of the students and their socioeconomic status of the family. Calorie intake was calculated using tables of nutritive value of Indian foods. The calorific value of the mid-day meal was calculated based on the menu provided by the school and per day calorie was calculated by using 24-hour dietary recall.

Statistical analysis

Data analysis was done to assess mean differences across the baseline and endpoint. Shapiro-Wilks test/quantile-quantile (QQ) plot used to check the normality of variables. Two sample t-test, the Wilcoxon rank-sum test, chi-square test was used to identify the significant differences. Data was analyzed using R software version 4.0.2 and excel. Wilcoxon signed-rank rum test was used within-group comparison p value less than or equal to 0.05 indicated significance.

RESULTS

The study showed that mid-day meal effect on nutritional status and one meal gives a calorific value of 357.6 and there was a significant difference between the distribution of MUAC (CM) during pre and post nutritious period in government school students. The anthropometric measurements like BMI showed the significant difference between govt. School students and private school students with the p value of 0.005. There was no significant difference between the other anthropometric measurements like height, weight, and TSFT and haemoglobin values (Tables 1 and 2, Figures 2, 3 and 4).

Table 1: Anthropometric measurements.

Categories		Government school	Private school	P value
Age (in years)		11.97 (10.1, 13.7)	11.5 (10,14)	0.0049^{wr}
Gender	Male	25	27	0.8414^{ch}
	Female	25	23	
Height		138.4±26.45	140.58±17.37	0.6273^{t}
Weight	Pre	34.68±6.43	38.02±6.8	0.0066^{t}
	Post	34.94±5.85	36.84±6.37	0.1238^{t}
	Mean decrement	-0.26±1.34	1.18±1.51	<0.0001^{t}
	P value	0.1754^{Pt}	<0.0001^{Pt}	-
BMI	Pre	16.82±2.32	18.58±2.18	<0.0001^{t}
	Post	16.99±2.02	18±1.9	0.0058^{t}
	Mean decrement	-0.17±0.78	0.58±0.77	<0.0001^{t}
	P value	0.119^{Pt}	<0.0001^{Pt}	-
MUAC(CM)	Pre	17.46 (13.2,26)	19.33 (13.8,22.8)	<0.0001^{Wr}
	Post	17.42 (13.2,26)	19.05 (13.8,22.1)	0.0002^{Wr}
	Difference	0.04 (0,0.2)	0.28 (-0.1,0.9)	<0.0001^{Wr}
	P value	0.0013^{Ws}	<0.0001^{Ws}	-
Attendance percentage		95.98%	96.82	0.0067

Wr: Wilcoxon rank sum, Ws: Wilcoxon signed rank, t: t-test, pt: paired- t test, Ch: Chi-sq test

Table 2: Calorific value.

Categories	Govt. school	Private school
***Calorific value (noon meal)**	357.6	306 kcal
****Calorific value (per day)**	1468 kcal	1686 kcal

*calculated based on the menu provided by the school and in private school based on 1 week menu and the average has been taken. **24 hour dietary recall.

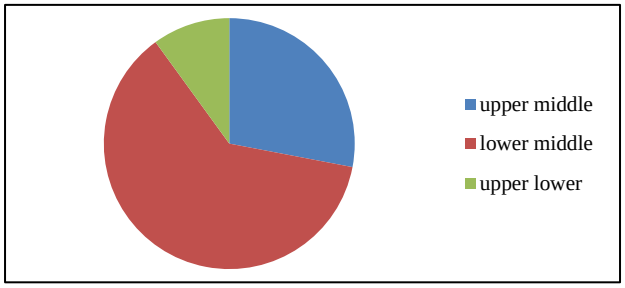

Figure 2: The socioeconomic status of government school children.

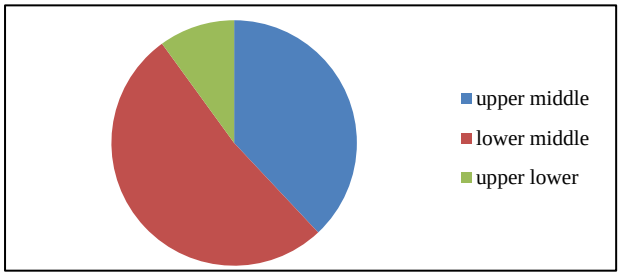

Figure 3: The socioeconomic status of private school children.

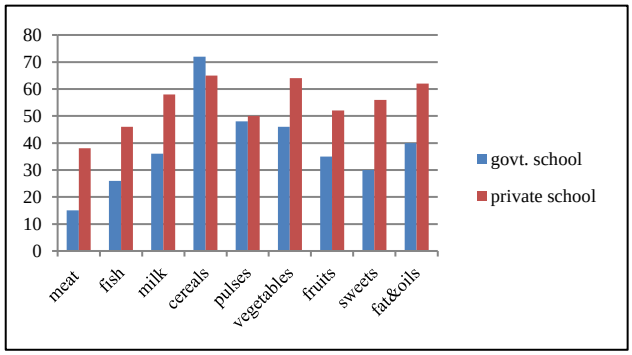

Figure 4: Comparison of dietary intake between two groups.

DISCUSSION

The study was conducted to evaluate the nutritional status of mid-day meal program on government school students and to compare this with private school student's personal lunch.

The study showed government school students in the afternoon are having more calories than private school students which make them more attentive in the school. The mean caloric intake in mid-day meal was higher (357.6) in mid-day meal provided by the government school as compared to that in personal lunch (306.6) brought by the private school students. According to the Supreme Court order, 2001, a school meal is supposed to provide 300 kcal and 8-10 grams of protein and the current study matched these recommendations.[16] According to a study conducted by Madhavi et al showed that mean caloric intake in mid-day meals was higher as compared to that in personal lunch in private school attendees and the difference was statistically significant.

The mean 24-hour caloric intake was compared in both private school attendees and mid-day meal beneficiaries, the mean intake in former was more and which was less in mid-day meal beneficiaries from government school.[17]

Height is a genetically controlled characteristic though not sensitive to the nutritional deprivation as body weight. It reflects the long-term influence of prolonged nutritional status on linear growth. Weight is the best index for recognizing nutritional status.[18] BMI is considered to be the best variable for the anthropometric evaluation in nutritional and general health screening. Based on this index, the relative proportion of normal undernourished and obese people can be assessed.[19] A study showed that school-age children are in the phase of rapid growth and development and hence their nutritional needs are considerable. Growth refers to the natural changes in the size resulting from the multiplication of cells or increase in intercellular substances.[20] Since school-age period is nutritionally significant as it is the prime time to build up the nutrients in the body for rapid growth and performance and it is also supported by a study conducted in Andhra Pradesh which showed that the nutritional component revealed better growth performance among the regular beneficiaries in the mid-day meal program.[21] A study conducted in Delhi showed that birth weight affects nutritional status in schoolchildren; based on this finding a birth weight stratified MUAC cut-off will more accurately identify vulnerable children.[22]

A study by Katherine et al showed that the availability of nutritious foods as part of school meals increases children's consumption of whole grains, fruits, vegetables, and low-fat milk which may be an effective strategy to promote healthy eating habits among school children.[23] There was an increasing trend towards the consumption of processed foods especially in private school children. Foods such as bread, cookies, sweets, and soft drinks, ice cream, sweetened beverages that are high in sugar, saturated fat, sodium and salt were preferred particularly by the school going children.[24] In the present study students in private school group found more overweight as compared to government school children. This may be because of more intake of fats and oils and sweets. Some of the studies reviewed that children and adolescents particularly those who were from higher socioeconomic status tend to consume more than adequate amounts of energy which confirms that nutrition transition takes place which is associated with the development of adiposity and increases the risk of being overweight or obese in the future.[25]

It is an incontrovertible fact that mid-day meal programs exert a positive influence on enrolment and attendance in schools.[26] The present study also showed the significant difference between the attendances of the students over the schools. A hungry child is less likely to attend school regularly. A study showed that most in rural areas most of the students comes from poor sections of society they fail to eat two meals a day and this affects the academic result of the students because with unbalanced diet there is a major chance for students to be irregular to classroom and they will show little or no interest in their studies. Since school plays a vital role in promoting the intellectual, physical, and emotional development of the child.[26,27] Mid-day meal and its related educational activities can help to improve health, to encourage better diet habits and contribute to all-round development of the child. In this study, mid-day meal had a significant role in the student's enrolment and which made them perform well in the school.

Universal and nutritious mid-day meal is an important step towards good nutrition in school-age children as shown by this study. A balanced freshly cooked meal in the noon is healthier and nutritious whereas a home-cooked lunch requires more attention to include healthy food which is essential during childhood.

It is well evidenced that nutrition plays a major role in the health of an individual. Since good improvement observed in government school children after the implementation of mid-day meal, it is clear that parents should be well educated to provide balanced food to their children then providing a processed food to keep them healthy.

CONCLUSION

Study showed that mid-day meal affects nutritional status. A balanced freshly cooked meal in the noon is healthier and nutritious impacting the school children's academic performance.

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