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Original Article

A Study of Breakfast Eating Patterns of School Children Between 5 and 9 Years of Age and its Impact on Nutritional Status and School Performance

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Abstract

Introduction: "You are what you eat" an ancient saying that motivates health professionals to be concerned with what people eat especially at the start of the day. A nutritionally adequate breakfast is important for achieving and maintaining physical and mental health.

Aims and Objectives: The aim of the study was to study the breakfast eating patterns and its impact on nutritional status, scholastic performance and the reasons for not taking adequate breakfast.

Materials and Methods: The study was a comparative cross-sectional study done in 1000 children of 5–9 years of age from two urban-based school in Madurai, over a period of 1 year. Breakfast eating patterns and anthropometric measurements were taken and correlated.

Results: In this study,a total of 1000 children (500 – study group and 500 control group) of age 5 -9 years were included. The study group showed nutrition adequacy ratio values significantly lower for all essential nutrients. Mean breakfast intake of the study group is significantly lower than that of controls in all age groups. Anthropometric measurements showed the statistically significant difference ($P < 0.05$) between study and control groups in all age groups.

Conclusion: Consumption of breakfast appears to have a positive impact on the nutritional status regardless of age. Skipping breakfast affects physical and mental development and scholastic performance.

Key words: Breakfast eating pattern, Essential nutrients , Nutrition adequacy ratio, Nutritional status, school performance

INTRODUCTION

"You are what you eat" an ancient saying that motivates health professionals to be concerned with what people eat especially at the start of the day.A nutritionally adequate breakfast is important for achieving and maintaining physical and mental health.This is the fact borne out and based on several controlled studies that have been carried out to determine the effect of different breakfast habits on the physiological responses, attitudes, and scholastic achievements of subjects under study.[1]

A link between hunger and a large number of behavior problems exhibited by children such as fighting, stealing, and indiscipline, having problems with teachers, and so on, has been established.

Breakfast consumption made a significant contribution for the child mean daily nutrient intake.[2] Total energy intake of children who skipped breakfast is lower than that of children who consumed breakfast at home or school; energy intake is not increased at other meals to compensate for the deficit.Children who consumed breakfast had a

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higher daily intake of vitamin and minerals than children who skipped breakfast.

Skipping breakfast may hinder the growth of children because the body is forced to call on body stores of protein for meeting energy requirements. Skipping breakfast has become the norm in modern India because of lifestyle changes in family life, and when this happens largely among children, it can result in sub-optimal growth and development.[3]

During overnight sleep, brain activity except for periods of rapid eye movements slow markedly and regulatory mechanisms allow for a continuous supply of endogenous fuel to maintain cerebral metabolism. When the overnight fast is extended, the gradual decline of insulin and glucose levels among other metabolic changes could determine a stress response that interferes with different aspects of cognitive function.[4]

Foods can be placed into five groups depending on the content of major nutrients. They are

1. Cereals grains and products
2. Pulses and legumes
3. Milk and meat products
4. Fruits and vegetables
5. Fats and sugars.

Growth and physical development of children are widely used as indicators of overall health and nutritional status.Anthropometric measures such as height, weight, weight for height, and skinfold thickness are valuable indicators of nutrient status.

A good diet survey provides information about dietary intake pattern, specific foods consumed, and nutrient intake.

Aim and Objectives

1. To study the breakfast eating patterns of school children between 5 and 9 years of age.
2. To study the impact of breakfast eating on nutritional status of children.
3. To study the reasons for taking inadequate breakfast or skipping breakfast.
4. To study the influence of breakfast on the scholastic performance of children.

Table 1: Age and sex wise distribution of study group

Age	Total	Male	Female
5	100	70	10
6	100	61	39
7	100	53	47
8	100	49	51
9	100	65	35

Table 2: Breakfast eating habits of children

Eating habits	Study group (T-500) *n* (%)	Control group (T-500) *n* (%)
Regular breakfast	240 (48)	445 (89)
Irregular breakfast	170 (34)	40 (8)
Skipping breakfast	90 (18)	15 (3)

MATERIALS AND METHODS

The study was a comparative cross-sectional study done on 1000 school children age group of 5–9 years from two urban based schools within Madurai city [Table 1]. Children were allocated into two groups - study and control group. The study was done for a period of 1 year. The study was designed to evaluate nutrient intake of children who skipped breakfast compared with children who consumed breakfast and its relationship to the total daily intake and dietary adequacy.

A total of 1000 healthy children were selected randomly (100 children each from I standard–V standard). Breakfast eating habits of subjects were determined through questionnaires designed for children and their parents. 24 h dietary recalls were used to assess dietary intake on any one school day [Table 2]. Anthropometric measurements such

Table 3: Nutrition adequacy ratio of diets of 5–6-year-old boys and girls between study and control groups

Nutrients	Study male	Study female	Control male	Control female
Energy	0.65	0.64	0.83	0.80
Protein	0.64	0.64	0.81	0.79
Calcium	0.62	0.59	1.05	1.05
Iron	0.57	0.59	0.66	0.64
Beta carotene	0.21	0.21	0.26	0.26
Vitamin C	0.62	0.61	1.12	1.11
Thiamin	1	0.95	1.36	1.37
Riboflavin	0.75	0.75	1.05	1.25
Niacin	0.63	0.62	0.9	0.93

Table 4: Nutrition adequacy ratio of diets of 7–9-year-old boys and girls between study and control groups

Nutrients	Study male	Study female	Control male	Control female
Energy	0.64	0.63	0.77	0.76
Protein	0.57	0.56	0.83	0.78
Calcium	0.58	0.58	1.04	1.04
Iron	0.53	0.50	0.58	0.56
Beta carotene	0.12	0.11	0.17	0.13
Vitamin C	0.60	0.57	1.03	1.08
Thiamin	0.8	1.06	1.23	1.23
Riboflavin	0.76	0.88	1.13	1.07
Niacin	0.66	0.66	0.89	0.82

Table 5: Weight measurements of subjects

Age	Study group		Control group		*P* value
	<50th percentile	>50th percentile	<50th percentile	>50th percentile	
5	72	28	45	55	0.00019 significant
6	53	47	41	59	0.0119 significant
7	57	43	42	58	0.04770 significant
8	55	45	37	63	0.0158 significant
9	64	36	46	54	0.0156 significant

Table 6: Height measurements of subjects

Age	Study group		Control group		*P* value
	<50th percentile	>50th percentile	<50th percentile	>50th percentile	
5	55	45	33	67	0.0027 significant
6	37	63	11	89	0.0003 significant
7	42	58	31	69	0.14189 Not significant
8	37	63	15	85	0.0007 Significant
9	41	59	31	69	0.1848 Not significant

Table 7: Weight for height measurements of subjects

Age	Study group		Control group		*P* value
	<50th percentile	>50th percentile	<50th percentile	>50th percentile	
5	72	28	53	47	0.00856 significant
6	66	34	55	45	0.111804 Not significant
7	72	28	54	46	0.0127 significant
8	72	28	54	46	0.0127 significant
9	72	28	55	44	0.0128 significant

Table 8: School performance of subjects

Features	Study group %	Control group %
Regular school attendance	63	72
Regular class test attendance	66	80
Good class test performance	47	58
Participation in extracurricular activities	54	65

Table 9: Reasons for missing school

Features	Study group %	Control group %
Repeated sickness	60.9	46.7
Fear of test	8.7	2.2

as weight, height, weight for height, and skinfold thickness were used to assess their nutritional status.

RESULTS

Cereal based foods such as Idly, Dosai, and Chapathi are preferred by around 80% of breakfast eaters in both study and control group.

Mean daily nutrient intake of 5–9 years old children from the study group is less than that of the control group. Mean breakfast intake of the study group is significantly less than that of the control group in all age groups [Table 3 and 4].

Mean values of anthropometric measurements such as weight, height, and triceps skinfold thickness showed a significant difference between the study and control groups [Table 5-7].

DISCUSSION

Breakfast Eating Habits of Children

Our study revealed that the percentage of children in the study group who consumed breakfast regularly every day was 48% and that of the control group was 89%. According to Prof. Mohini Seth Ph.D., about 50% of the children were on regular breakfast, 34% were on irregular breakfast, and 16% children skipped breakfast. Polus-Szeniawska *et al*[5]. revealed that 78% of children were on irregular breakfast and 3% of children skipped breakfast.

Among the breakfast eaters, 37% of students said that they enjoy the meal and overall gave the following reason for eating it.

1. Most important meal
2. Prevents headache and stomach ache
3. To gain weight.

The perception of subjects parents with respect to breakfast eating were recorded, and it was found that:

1. 48% believed that eating this meal leads to better thinking and work efficiency.
2. 23% said that it keeps the child active throughout the day.
3. 19% reported no complaints about headache or stomach ache.
4. 10% felt that it was the most nutritious meal of the day.

Nutritional Intake of Children

In our study, children from control group showed deficient intake of iron and beta-carotene, whereas children from study group had distinctly lower values than the control group. In the case of iron and beta-carotene, both the groups are found to be short of the recommended values for their age. This is attributed to the lower intake of green leafy vegetables in the diet and low bioavailability of iron from cereal-based foods. Except for Vitamin B, the diet of the study population in all age groups fell short of the RDA for all nutrients in contrast to those of the control group.

Nutrient Adequacy Ratio

An NAR value of 0.66 reflects adequate intake of particular nutrient. NAR was calculated by dividing daily intake of a particular nutrient with RDA of the same. In our study, the study group showed values lower for all essential nutrients, energy, and protein reflecting inadequate nutrient intake.

Nutrients from Breakfast

According to Lowa breakfast studies[6], a basic breakfast is the one which provides one-fourth of the total daily requirement of energy and protein. Mean breakfast intake of both the study and the control groups was calculated and presented in tables.

Anthropometry

Growth and physical development of children are widely used as indicators of overall health and nutritional status. Anthropometric measurements of subjects were recorded with respect to weight, height, and triceps skinfold thickness and compared with the percentiles of NCHS standards.

The relationship between weights at birth to the present weight was found to be significant. Birth weight of both the study and control groups was recorded from parents. Although all the subjects showed incremental growth pattern and were born with normal birth weight, the study group subjects failed to reach the desired weight gain. This can be partly attributed to the omission of breakfast.

Regarding height, about 77.8% children in the control group were above the 50th percentile in all the age groups whereas in the study group it was about 57.6%. Low height gain in Indian children may be partly due to genetic factors and partly to the fact that their diet is predominantly cereal based and rich in phytates leading to poor bioavailability of calcium from them.

Regarding weight for height, which is a sensitive indicator of the current nutritional status of children and independent of age, about 43% of children from the control group were above the 50th percentile in contrast to the study group where it was 29.2% in all age groups.

School Performance

Many studies conducted abroad underlined the importance of breakfast on the school performance of children.[7-10] In the present study, school performance was judged using the attendance, class test performance, and participation in extracurricular activities of the subjects [Table 8 and 9]. This study revealed that, children from study group had lower school attendance and lesser scholastic performance than the control group.

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