EFFECT OF BREAKFAST ON BODY MASS INDEX (BMI) IN MALE CHILDREN IN NORTHERN BORDER REGION SAUDI ARABIA

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ABSTRACT

OBJECTIVE: to determine the effect of regular homemade breakfast on body mass index (BMI) of school going male children in Northern region of Saudi Arabia.

METHODOLOGY: This cross-sectional study was conducted during September and November 2013, in primary schools of Arar city of Kingdom of Saudi Arabia. All classes from the first to the third grade, 359 students of age group 5-9 years in each selected school were included in the study. Of the total 558 questionnaires distributed, asking them whether taking breakfast or not, we measured height in meters weight in kg, and calculated BMI by the formula BMI= weight in Kg/ height in (meters)^2.

RESULTS: The mean age of the primary school-going male children in grade 2-5, was 7.09±0.89 years. Mean height of the children was 1.18±0.077 meters and mean weight was 25.03±6.74Kg, while mean BMI was 17.97±3.59. Mean BMI was 18.78±2.34 in students who were taking breakfast (n 372) and 15.10±2.66 in students who were not taking any breakfast ($p<0.001$). The odds ratio of the children who were "taking" regular breakfast and who were "not taking" regular breakfast for having abnormal BMI (overweight/underweight) or normal BMI was 0.02 ($p = < 0.001$).

CONCLUSION: The result shows that the regular consumption of breakfast in home results in a normal BMI and a reduced likelihood of being underweight in school going male children. There is a positive effect of having regular breakfast on school going male children.

KEY WORDS: Breakfast, Body Mass Index, BMI, Children, Male.

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INTRODUCTION

Body mass index (BMI) is derived from the equation: Body weight in kilograms divided by length or height in squared meters.[1] It is a useful index for measurement of optimal physical growth in children.[2] BMI norms are well established in the World Health Organization (WHO) and the Center for Disease Control (CDC) growth curves.[3]

It is widely recognized that unhealthy eating patterns in childhood can lead to adverse health conditions, particularly obesity.[4] However, debate still remains around the precise eating behaviors that lead to these conditions are still inconclusive; particularly with regard to the relationship between meal frequency, breakfast consumption and BMI in children.[5] Breakfast consumption, in particular, has received much attention in recent years, with evidence showing greater fiber, calcium and lower saturated fat intakes in children who consume breakfast regularly[6-7] and some studies also suggest children who eat breakfast regularly maintain healthier weights and undertake more healthful food choices.[8] The expansion in the fast-food market and lack of appropriate food courts, students usually face breakfast skipping, having inadequate variety of foods, and snacking.[9] Some cross-sectional studies have shown an inverse relationship between body weight and breakfast consumption[10], whereas others report instead that a higher meal frequency, and not regular breakfast eating, is the most important factor in the inverse obesity relationship.[11-12]

Much of the current research originates from the USA and Europe; hence, the findings should not be applied to a Saudi setting where children exhibit different behavioral eating patterns.[13] Several attempts have been made to establish BMI curves for Saudi children and adolescents but none were thorough and representative.[14-15] Surveys in a number of different areas and provinces have reported a high prevalence of overweight and obesity in Saudi children in all age groups. Government and local authorities

have implemented educational programs to help weight reduction or prevention of obesity.[16] Therefore we planned this study to determine the effect of regular homemade breakfast on BMI of school going male children in Northern region of Saudi Arabia.

METHODOLOGY

This cross-sectional study was conducted in Arar city with the help of Northern Border University, College of Medicine, Department of Pediatrics, and Directorate of Education in the northern border province of Saudi Arabia during September and November 2013. In this study, the 359 Students of age group 5-9 in selected schools of the region were included. While the children with any disease i.e. diabetes mellitus, anemia were excluded. The permission was obtained from the authorities of the local School Health and Education Directorate.

The teaching and administrative school staff underwent prior orientation. Before commencing the procedures of interviewing and measurements, the students underwent a brief orientation. After a brief orientation, selected school children were subjected to the following experiments:

Anthropometric measurements: Weight was measured using a standardized scale to the nearest 0.5 kg. This scale was standardized at the beginning of every working day using a standard 5 kg weight, and while wearing light clothes. Height was measured in centimeters using a tape measure, with the children standing straight next to the wall, without shoes, heels together, and child's heals, buttocks, shoulders and head touching the vertical wall surface with line of sight aligned horizontally.

Questionnaire: A questionnaire was circulated asking the students whether they took the breakfast regularly in home, if yes then the contents of breakfast was asked if the breakfast contains bread (how many slices), if eggs (how many), if chees or butter (how much in approximate grams), if milk (how much in approximate ml), and honey or jam as spreads on bread.

Statistical analysis was performed with SPSS 17 for descriptive statistics, comparison of means by paired samples t-test. Differences were considered as significant at $P < 0.05$. Data were presented as mean ± SD. The Odds Ratio (OR) was calculated by the formula[17]

$$OR = (axd)/ (bxc)$$

Where; OR = Odds Ratio, a = is the number of abnormal weight children taking breakfast, b = is the number of normal weight children taking breakfast, c = is the number of abnormal weight children not taking breakfast, d = is the number of normal weight children not taking breakfast.

RESULTS

The Mean age of the primary school going male children in grade 2-5, was 7.09±0.89 years. Mean height of the children was 1.18±0.077 meters and mean weight was 25.03±6.74 Kg, while mean BMI was 17.97±3.59.

Table I is showing comparison of height, weight and BMI between the children who were taking breakfast (n 372) and the children who were not taking breakfast (n 187). Mean BMI was 18.78±2.34 in students who were taking breakfast and 15.10±2.66 in students who were not taking any breakfast ($p<0.001$).

TABLE 1: COMPARISON OF HEIGHT, WEIGHT AND BMI BETWEEN THE CHILDREN WHO TAKE BREAKFAST AND THE CHILDREN WHO NOT TAKE BREAKFAST

Parameter	Breakfast (n 372)	No breakfast (n 187)	Significance
Age (years) Mean ± SD	6.99±0.68	7.39±0.83	p<0.001
Height (m) Mean ± SD	1.18±0.061	1.19±0.06	p>0.05*
Weight (Kg) Mean ± SD	26.43±4.71	21.64± 5.21	p<0.001
BMI Mean ± SD	18.78±2.34	15.10±2.66	p<0.001

Means were compared by student's t – test.
Differences were considered as significant at $P < 0.05$
*Differences were considered as non-significatn at p>0.05

TABLE II: THE ODDS RATIO OF THE CHILDREN WHO ARE "TAKING" REGULAR BREAKFAST AND WHO ARE "NOT TAKING" REGULAR BREAKFAST

Regular Breakfast	BMI		Odds
	Abnormal (over/ underweight)	Normal	
Yes	128	244	0.52
No	180	7	25.7
Totals	309	246	(0.52/25.7) 0.02

Odds ratio: 0.02; Chi squar (X2) = 203; p = < 0.001

As per Table II, the odds ratio of the children who were "taking" regular breakfast and who were "not taking" regular breakfast for having abnormal BMI (over/ underweight) or normal BMI was 0.02 (p = < 0.001).

DISCUSSION

The present study examined the frequency of eating, breakfast consumption and BMI of 6-8-year-old school going boys, the purpose was to determine the effect of regular homemade breakfast on BMI of school going male children in Northern region of Saudi Arabia to investigate any relationship that may exist between these variables and to contribute to the lack of research. However, more evidence from long-term trials and investigations are needed to eliminate possible confounding factors and determine causality. Unhealthy dietary pattern increases the risk metabolic disorders in growing children and adolescents. However, the way the habitual pattern of breakfast consumption influences body composition and risk of underweight in children is not well defined.[18]

According to Iannotti et al, regular consumption of breakfast leads to lower BMI and a reduced likelihood of being overweight in children and adolescents[19] The findings of de la Hunty et al supported the idea that breakfast omission results in being overweight as they will take snacks and junk food instead[20] Thus Fairclough et al stressed the importance of regular breakfast consumption in youth to prevent a heightened risk of obesity due to snacks and junk food they take in schools.[21] Tin et al, reported the same that skipping breakfast predicts a greater increase in BMI among Hong Kong children as breakfast is a modifiable dietary habit,[22] which is not in agreement with our study, Tin himself gave explanation for this finding that this is the location of the breakfast which matters, as just one year later in international journal of obesity, he concluded that having breakfast, particularly at home, could have important implications for weight management and reducing obesity in children.[23] This is in agreement with our study as reported by Guinn et al[24] and Baxter et al, that there is a positive relationship between BMI and breakfast intake,[25] and almost same was reported by MacDiarmid et al.[26]

All these evidences reviewed are suggestive that regular consumption of breakfast at home results in a lower BMI and a reduced likelihood of being abnormal weight in children.

CONCLUSION

The present findings indicate that regular consumption of breakfast in home results in a normal BMI and a reduced likelihood of being underweight in school going children. There is a positive effect of having regular breakfast on school going children.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

SAA: Concept and design, drafting the manuscript & final approval of the version to be published

HWA: drafting the manuscript, final approval of the version to be published

OMA & MSA: acquisition, analysis and interpretation of data, final approval of the version to be published

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Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declare no conflict of interest

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