Impact of school meals' type and time on children's food consumption, physical and behavioral activities

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ABSTRACT

Today, proper nutrition is one of the useful tools for the healthiness and sustainability of people's diet and especially student performance and behavior in school. Existing nutrient standards for school meals are always important when packed foods or lunches brought from home. The aim of the present study was to determine the effects of school meals type and time on behavioral response, physical activity and the body mass index (BMI) in elementary students of Razan city, Iran. Elementary school principals (N = 16) and total of 234 students selected from 5 schools completed a survey on the school food and physical and behavioral activities environment. Students were weighed and measured for their body mass index (BMI) that calculated using a standard protocol and also send a BMI report card to their parents. Results of this study showed that effect of type of time regulation in school nutritional program could significantly improve behavioral response, and especially physical activity and BMI and it can be considered as an applicable strategy to the implementation of such programs on the health status of students.

INTRODUCTION

To date, physical activity and nutritional intake are always one of the important factors of overweight and obesity, especially in students. Currently, wrong nutritional regimes, trends and the related disorders in advanced countries are as epidemiology [1, 2]. Recently studies have focused on the health status of students on behavioral and cognitive subjects linked to psychological - physical pathologies and mainly from view point of school nutritional program [2]. Results of early conducted study in Iran showed that almost eighteen percentages of teenagers were suffered from overweight and obesity [3] and from cardiovascular risks like high bad cholesterol or LDL-C (low density lipoprotein cholesterol) and those aged >6-12 years had high triglycerides and low good cholesterol (high DL-C) [4].

Cox et al. [5] referred to some problems as emotional failures, alcoholism, smoking, illegal drugs and eating disorders and reported that it seems that relationship between behaviors and nutrition are more complex than smoking and drinking alcohol, so that quantitative indices can used easily to assess Psychoactive drugs but nutritional behaviors are more complex and multidimensional in terms of evaluation [3]. Some indices as rate of the food intake and calorie, feelings of satiety, anorexia and overweight are various factors that evaluate some aspects of nutritional behaviors. One of the most acceptable and common indices in most of the researches is body mass index. This index is calculated via weight and height of the person and it is a rather reliable index of body fat in most of the people. It is worth to mention that BMI doesn't measure body fat directly, but the researches showed that BMI has linear correlation with direct evaluation of body fat such as weighting under water and dual energy x-ray absorptiometry [6]. BMI in most of the researches is related to a wide range of health issue (increasing risk of cardiovascular diseases, diabetic, cancer and arthritis) [7]. So BMI is considered as an important variable in health researches. Hence, one of the important scopes of experiments is the examination of the factors related to BMI.

In some of the studies, cognitive variables (memory, attention range etc.) are investigated as BMI predictive [8]. In other studies, some indices as food external index, emotional factors and abstain eating are supported as BMI predictive [9, 10]. Some of the researches also referred to some factors as stress, anxiety and

depression as probable predictor of BMI and moderator effects of some variables such as gender and physical activity [8]. In some of the researches, some variables such as knowledge, attitude and performance of guidance and high school students about healthy nutrition were investigated [11] so that they reported that a small percentage of teenagers have good nutritional performance and in most of the cases their attitude and performance is not according to their nutritional knowledge. Nutritional knowledge is not the only effective factor on nutritional behaviors [12, 13] and there are other variables that were more effective in this regard.

Subject of the current study was investigating effect of programming and intervention on nutritional time and type toward a better understanding behavior of students, their physical activity and BMI factors.

MATERIAL AND METHODS

The presented study was conducted in Iranian elementary school principals (N=16) of Hamedan, Razan city, by participating 9, 10 and 11 years students (N = 234) in a survey. A total number of twenty hundred thirty four male students (n=81, n=89 and n=64 for classes III, IV and V, respectively) were randomly selected from 5 schools. The students completed a simple survey on the school food and physical and behavioral activities environment in 2016–12.

Questionnaire and method of collecting data were used according to work of Azadbakht et al. [11]. Questionnaire was contained 21 items including, nutritional knowledge or behavior, attitude toward nutrition and their age and class. In order to study the body mass index of participants, their weight and height measured using a standard protocol. In order to answer the research question, the mean scores of respondent was presented as percentages of students as accepted or rejected program and its types and times.

Ethical approval

The review board and ethics committee of Educational Administration of Razan, Iran approved the study protocol and informed consents were taken from all the participants.

Statistical analysis

For analyze the data, in descriptive statistics section, the indexes of mean and standard deviation was calculated and in inferential section, and the one sample T test was used. All collected data were analyzed by V.16, SPSSS statistical software (Predictive Analytics Software, PASW).

RESULTS AND DISCUSSION

Descriptive statistics of the research variables were shown in Tables 1 and 2. To assess hypothesis of the current study, correlation between predictive matrices and criterion variables such as BMI was calculated. Percentage of Normal BMI for all students was 76.44 and as a consequence, nutritional behavior and attitude had the highest correlation with BMI variable while age variable showed the lowest correlation with BMI (Table 2).

School nutrition program was significantly (P<0.01) accepted by all participants. That is showed a tendency and appetite in elementary students; so that it was desirable for students if nutrition implemented between lesson classes and in recess time or performed within second and third classes. Physical activity after school nutrition satisfied class V's students while those participated from classes III and IV were not acquiescent with this plan. Class III's students loved school nutrition twice in day while satisfactory decreased by class IV and V's students, significantly (P<0.01). School nutrition in bell sports was not accepted by all of volunteers (P<0.01).

The purpose of the presented study was investigating effect of programming and intervention on nutritional time and type in order to better understanding behavior and acceptability of program in elementary students, their physical activity and BMI factors.

According to the results of previous researches, some factors such as nutritional behavior, nutritional knowledge, attitude toward nutrition, physical exercise and demographic variables of age and gender were investigated as predictive variables of body mass index. In the current results, examined factors predicted normal BMI significantly which these results were supported hypotheses of the research.

Study of the results obtained from Sadrzadeh Yeganeh et al. [14] showed relationship of the obesity with some the nutritional behaviors among school girls. In another study [11], it was shown that despite having good nutritional knowledge, low values of nutritional behavior in high school students were detected. Likewise, results of the presented study revealed that predictive variable of nutritional behavior are referred as the most important BMI predictive variable. The various studies showed that nutritional behavior, nutritional knowledge, attitude toward nutrition and physical exercise are good variables to investigate the nutritional trend of elementary students and their weights [12, 15]. The results observed in the current study is similar to the findings of the same researches carried out in this field [16-18].

As presented in results section, a programmed nutritional time and type has good influence on promotion of behavior of elementary students and their physical activity and therefore culture of using the modern

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6

educational tools and providing proper opportunities for enriching the student's scientific threshold via a proper and managed nutrition.

Table 1. Descriptive statistics of correlated variables of school meals

Nutritional Variables	M	SD	Min	Max
Age	10.5	2.15	9	11
Knowledge	8.24	1.05	5.5	9
Attitude	9.15	1.16	6	11
Behavior	6.5	1.60	4	8

Table 2. Descriptive statistics of categorical variables

Variables \ Body Mass Index	Third Grade	Fourth Grade	Fifth Grade	Total	Normal	Abnormal
Frequency	81	89	64	234	172	55
Percentage	97	95	98	100	76.44	24.45

Table 3. Percentage and standard deviation of studied items and comparison between scores by single group T statistical test for students in three classes

Range of effectiveness	N	Percentage	SD	MD	T value	DF	Significance
Third Grade							
Acceptability of school meal program	81	91.3	4.58	2.68	6.64	80	P < 0.01
Meals between lesson classes and in recess time	81	93.82	5.53	4.95	9.76	80	P < 0.01
Meals within first and second classes	81	71.43	1.56	4.23	4.25	80	P < 0.08
Meals within second and third classes	81	60.49	2.46	3.56	5.51	80	P < 0.01
I love physical activity after school meal	81	37.03	1.63	2.37	3.26	80	P < 0.05
I love school meals twice in day	81	67.90	2.52	2.84	8.77	80	P > 0.05
I love school meals be in bell sports	81	25.92	1.53	2.68	7.06	80	P > 0.05
Fourth Grade							
Acceptability of school meal program	89	94.38	5.50	4.68	6.64	88	P < 0.01
Meals between lesson classes and in recess time	89	80.89	4.53	3.95	9.76	88	P < 0.01
Meals within second and third classes	89	73.03	4.56	3.56	5.51	88	P < 0.01
I love physical activity after school meal	89	37.03	3.63	2.37	3.26	88	P < 0.01
I love school meals twice in day	89	29.21	2.52	2.84	8.77	88	P < 0.01
I love school meals be in bell sports	89	42.69	3.53	3.68	7.06	88	P < 0.01
Fifth Grade							
Acceptability of school meal program	64	95.31	5.56	4.68	6.64	63	P < 0.01
Meals between lesson classes and in recess time	64	60.93	4.53	3.95	9.76	63	P < 0.01
Meals within second and third classes	64	54.68	3.56	2.56	5.51	63	P < 0.01
I love physical activity after school meal	64	78.12	4.63	2.37	3.26	63	P < 0.01
I love school meals twice in day	64	23.43	2.52	2.84	8.77	63	P = 0.10
I love school meals be in bell sports	64	10.93	1.25	1.68	7.06	63	P < 0.01
Principals							
Acceptability of school meal program	16	95.31	5.56	4.68	6.64	15	P < 0.01
Meals between lesson classes and in recess time	16	60.93	4.53	3.95	9.76	15	P < 0.01
Meals within second and third classes	16	54.68	3.56	2.56	5.51	15	P < 0.01
I love physical activity after school meal	16	78.12	4.63	2.37	3.26	15	P < 0.01
I love school meals twice in day	16	23.43	2.52	2.84	8.77	15	P < 0.01
I love school meals be in bell sports	16	10.93	1.25	1.68	7.06	15	P < 0.01

MD= Mean difference, DF= Degree of freedom, SD= Standard error

CONCLUSION

Results showed that non-profit elementary schools had high influence and effectiveness on compensating the opportunities of education, reinforcement of scientific capacity and stamina of students, facilitating the scientific-investigative relations, providing new educational opportunities for employees, generalizing and

stabilizing a scientific-healthy educational system. Previous findings of studies made in this area are also in conformity with the results of the present survey.

In future researches, obstacles of using modern education-nutritional tools and also cognitive and emotional consequences of using remote education system can be examined. As a consequence, implementation of the self-report questionnaire, which was limited to managers and educational employees of elementary schools, should be under consideration.

DECLARATIONS

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Authors' contributions

All authors contributed equally to this work.

Competing interest

The authors declare that they have no competing interests.

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8

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