



Results from a Quasi-experimental Study of a Training Intervention for Healthy Eating Behaviors of Students

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ABSTRACT

Children and adolescents need adequate and healthy nutrition, more than other age groups, in order to achieve adequate physical growth and mental development. Children need to teach nutrition in order to obtain the necessary skills for a proper selection of foods. To examine the effectiveness of a training intervention to improve eating behaviors of students. Quasi-experimental, pre-post-test design with a control group. Participants were elementary students (n = 65 total, n = 31 intervention, n = 34 control group) and male. While there was no significant difference in both groups at baseline, the intervention group showed significantly improved nutritional knowledge, nutritional attitude and nutritional behavior. A training intervention can effectively enhance students' healthy eating behaviors during the school age.

Key Words: Healthy Eating Behaviors, Elementary Students, Nutritional Knowledge, Nutritional Attitude

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Introduction

Adolescence is a unique era in life, one of the most challenging periods of human development (Mahan, 2004). In this evolutionary period, changes in body condition, thinking, and social relationships arise, and one takes on physical, psychological and sexual development and gradually assumes responsibility for his own health (Salahshoori *et al.*, 2014). Changes in juvenile age make adolescents at risk of developing high-risk health behaviors such as inactivity and inappropriate nutritional habits (Jackson and Beaver, 2015). In recent years, the food tastes of children and adolescents, instead of traditional foods and healthy meals, have tended to focus on high-calorie foods that lack adequate nutritional value (Patterson *et al.*, 2009). According to the US Department of Health report, 61% of American teens use snacks that have a lot

of fat and carbohydrates and fewer fibers and only 39% use foods like dairy, fruits, and vegetables as snack foods.

Nowadays, it is well established that poor eating habits in this age group are directly linked to the emergence of some subsequent health problems in the future, such as overweight, hyperlipidemia, and diabetes (Franko *et al.*, 2008). However, obesity and overweight are among the risk factors for the development and spread of chronic diseases (Long and Stevens, 2004; Fattahi *et al.*, 2017), and these diseases, due to high health costs, bring a heavy economic burden on countries. For example, research has shown that only for type 2 diabetes, which is associated with poor physical activity and inappropriate nutrition, the total cost of the disease worldwide is more than \$132 billion a year, and it is estimated that these costs will

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increase to \$156 billion by 2010 and rise to \$192 billion by 2030 (Brunner and Suddarth, 2008).

While changing habits and behaviors is the best way to improve quality of life and reduce illness and mortality, childhood and adolescence periods are the best time to correct and change behavior (Matheson *et al.*, 1991). Diforge *et al.*, (2010) also believe that a large part of the individual's eating habits are established during childhood and adolescence, and patterns learned during this period are effective in the lifestyle of a person throughout his lifetime (Deforche *et al.*, 2009). Therefore, with these issues, students need to get acquainted with the necessary skills and knowledge and healthy nutrition programs, and the issue of strengthening and developing healthy dietary behaviors should become one of the public health priorities of the community (Hutchins *et al.*, 2010). Although some factors such as gender, age and genetics can not be changed to correct lifestyle, specific cognitive-behavioral factors can be considered for the promotion of healthy behaviors.

The implementation of nutrition education programs in schools is an appropriate strategy for increasing awareness and attitudes and correcting wrong nutritional behavior (Nazari *et al.*, 2005). Children need to train nutrition for better growth and skills to choose the right foods (Chen and Kennedy, 2005). Students can play a significant role in learning and transferring to the community due to their specific circumstances (Abdi, 2000). Therefore, planning to implement the educational programs is important and, while economically feasible, is one of the priorities of the World Health Organization and community health policymakers in the region (WHO, 2003). It should be noted that the value of educational programs depends on the effectiveness of these programs, and the effectiveness of the educational programs depends largely on the correct use of the theories and models.

We developed an intervention program called nutritional behaviors of students (NBS) that aims to promote healthy eating behaviors in students. The main objective of this quasi-experimental study was to evaluate the effect of this training intervention program on students' nutrition health for elementary students.

Methods

Design

To investigate the effect of the NBS intervention program on students' nutrition health, a field

quasi-experimental study was carried out for elementary students based on a pretest-posttest control group design with a NBS program as an intervention carried out by the author.

Participants

A convenience sample consisted of male elementary students, all in fifth grade at three schools in China. Participants had an educated mother (about 87.7%), housewife mother (about 81.5%), educated father (about 95.4%), and employed father (about 95.4%). The male elementary students participated in the study had both father and mother (about 95.8%), with a mean age of 11.15 years (SD = 0.61). In total, we had a sample of 65 eligible elementary students: 31 in the NBS group and 34 in the control group. The demographic results of the study show that both groups were quite similar, in terms of age (NBS group: Mean = 11.15, SD = 0.31; Control group: Mean = 11.09, SD = 0.34), mother educated (NBS group: 90.3%; Control group: 85.3%), educated father (NBS group: 93.6%; Control group: 97.1%), housewife mother (NBS group: 80.6%; Control group: 82.3%), and employed father (NBS group: 96.8%; Control group: 94.1%) (Table 1).

Table 1. Demographic results of the study

Student characteristic		NBS group (n = 31)		Control group (n = 34)	
		n	%	n	%
Mother's education	Illiterate	3	9.7	5	14.7
	Elementary	7	22.6	6	17.7
	Middle	8	25.8	10	29.4
	High school	10	32.2	11	32.3
	Diploma and higher	3	9.7	2	5.9
	Total	31	100	34	100
Mother's job	Employed	6	19.4	6	17.7
	Housewife	25	80.6	28	82.3
	Total	31	100	34	100
Father's education	Illiterate	2	6.4	1	2.9
	Elementary	1	3.2	2	5.9
	Middle	6	19.4	5	14.7
	High school	12	38.7	15	44.2
	Diploma and higher	10	32.3	11	32.3
	Total	31	100	34	100
Father's job	Employee	10	32.3	8	23.5
	Worker	2	6.4	1	2.9
	Free	18	58.1	23	67.7
	Unemployed	1	3.2	2	5.9
	Total	31	100	34	100

Measures

We asked general demographic information by the demographics questionnaire, i.e., mother's education, mother's job, father's education, father's job, as well as age.



Nutritional knowledge, nutritional attitude and nutritional behavior were measured by the Nutrition Behavior Inventory, which consists of 16 items for perceived nutritional knowledge, 12 items for perceived nutritional attitude, and 9 items for perceived nutritional behavior in the original version. The scale perceived nutritional knowledge had three options: the score 1 for "false" option, the score 2 for "I do not know" option and the score 3 for "correct" option. A higher score indicates that the students were more aware of the proper nutritional behaviors and the benefits of observing these behaviors. Perceived nutritional behavior ranged from 1 (I disagree) to 5 (I totally disagree), which the higher score points to students' positive attitudes toward proper nutritional behaviors. Perceived nutritional attitude ranged from 1 to 4, which higher score is related to the most correct and highest score.

Procedure

Participants in the NBS group received the NBS intervention program, while participants in the control group received no intervention program. Before the implementation of the NBS intervention program, the male elementary students filled in a questionnaire on demographic data and questionnaires measuring the study variables. One week after learning in the NBS intervention program, we administered two posttests for students' nutrition health and nutritional behaviors.

Intervention structure and content

The training sessions were conducted for 4 consecutive days, 45 minutes each day. At the first session, a lecture was conducted in the form of a story and poem that was related to the topic raised by the health education expert. For the second session, a video presentation was considered about the disadvantages of soft drinks, street foods, healthy food animation, and so on, which was broadcast to students for 45 minutes. After seeing each educational teaser, questions and answers were made and important notes were recalled. The third session was a role play and a practical demonstration of the proper nutritional behavior, and the students remembered healthy and unhealthy snacks in the form of a game and a practical show. At the fourth session, it was also performed role play and question and answer. Finally, short educational sentences have been written in student-language

sheets, and important points were recalled at the same meeting. In addition, a training session was held for parents and teachers on the importance of nutrition and healthy and unhealthy snacks, and the educational sentences were notified to them within 4 weeks of telephone calls, and the trainer wrote and explained the short educational sentences every week, 2 or 3 times. At a parent meeting and forum where the parents of all students attended in the session, the role and importance of healthy snacks nutrition was trained to the parents by the expert and educational pamphlet delivered to them. The purpose of the parent education program was to engage and actively participate in the study.

Analytical considerations

The outcome analyses were limited to participants in the study groups. We conducted paired t-test to test for significant departures from pretest scores on the study variables for posttest. We also performed additional statistical analysis using SPSS for Windows, version 23.

Results

Baseline nutrition health scores of students who entered the NBS intervention program were significantly higher than of those who participated in the control group (Table 2). The scores of the variable nutritional knowledge show that there is a significant increase of nutritional knowledge in the NBS group (Baseline: $M = 26.88$, $SD = 0.54$; posttest: $M = 30.82$, $SD = 0.43$; p -value = 0.04), but an increased non-significant tendency in the control group (Baseline: $M = 26.19$, $SD = 0.46$; posttest: $M = 26.32$, $SD = 0.55$; p -value = 0.11) (Fig. 1). For the variable nutritional attitude, there is a significant increase of nutritional attitude in the NBS group (Baseline: $M = 31.23$, $SD = 0.57$; posttest: $M = 39.18$, $SD = 0.35$; p -value = 0.02), but an increased non-significant tendency in the control group (Baseline: $M = 32.19$, $SD = 0.53$; posttest: $M = 32.34$, $SD = 0.44$; p -value = 0.23) (Fig. 2). Furthermore, the scores of the variable nutritional behavior show that there is a significant increase of nutritional behavior in the NBS group (Baseline: $M = 20.09$, $SD = 0.49$; posttest: $M = 25.94$, $SD = 0.38$; p -value = 0.03), but an increased non-significant tendency in the control group (Baseline: $M = 21.92$, $SD = 0.61$; posttest: $M = 22.08$, $SD = 0.47$; p -value = 0.19) (Fig. 3).



Table 2. Average scores of students' nutrition health for intervention and control group

Variables		NBS group (n=31)			Control group (n=34)		
		Mean	SD	P-value	Mean	SD	P-value
Nutritional knowledge	Base-line	26.88	0.54	0.04	26.19	0.46	0.11
	Post-test	30.82	0.43		26.32	0.55	
Nutritional attitude	Base-line	31.23	0.57	0.02	32.19	0.53	0.23
	Post-test	39.18	0.35		32.34	0.44	
Nutritional behavior	Base-line	20.09	0.49	0.03	21.92	0.61	0.19
	Post-test	25.94	0.38		22.08	0.47	

Discussion

Nowadays, social welfare of people in different countries is assessed based on various criteria, including their nutritional status, and an advanced society is a society in which people have a good health and well-being. Food habits develop from childhood and continue to the next. Given the low level of nutritional knowledge and behavior of students, many researchers emphasized the need for nutritional education (Shirk, 2009; Naeni *et al.*, 2014; Lakshman *et al.*, 2010; Lua and Elena, 2012). The purpose of our investigation was to understand the efficacy of a training intervention for healthy eating behaviors of students. One of the key goals of this training investigation was to improve nutritional knowledge, attitude and behavior. The results of this study showed that the knowledge, attitude and behavior of the students in relation to healthy snack consumption was low before the intervention, but after the training, it increased significantly. These findings are consistent with previous research findings (Vardanjan *et al.*, 2015; Åstrøm, 2012).

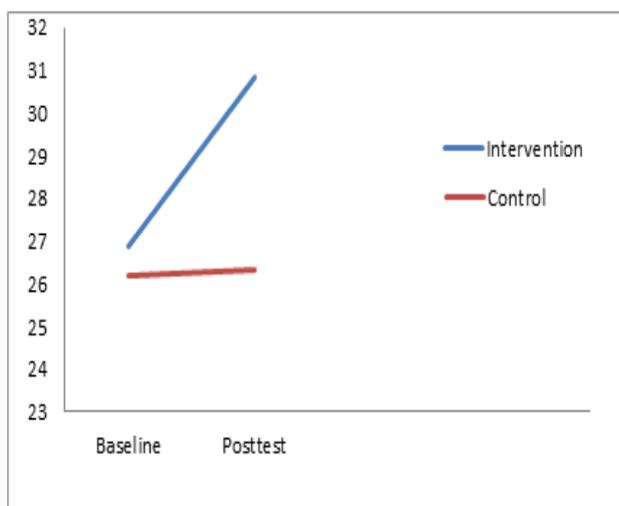


Figure 1. Changes in nutritional knowledge over time at baseline and post-test

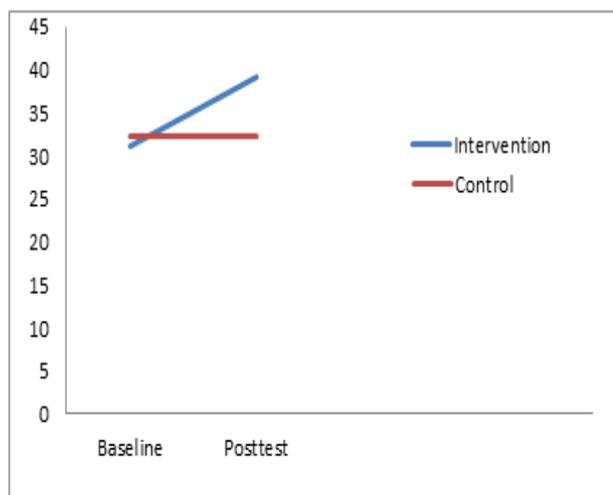


Figure 2. Changes in nutritional attitude over time at baseline and post-test

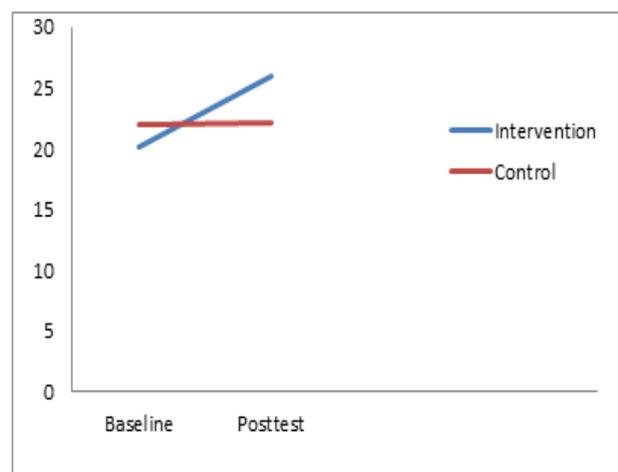


Figure 3. Changes in nutritional behavior over time at baseline and post-test

The findings showed that students' knowledge of nutritional health has increased significantly after the intervention program in the intervention group, but no in the control group. Pretest findings indicate that students' nutritional knowledge has not been sufficient to lead to healthy eating habits, and the mass media were not able to raise public awareness of children and



adolescents about nutritional behaviors. In this regard, the results of a study in Ireland aimed at examining the effect of the child-to-child training method on increasing healthy consumption snacks among elementary students indicated that the students had increased awareness about snacks after the intervention. In this study, the proportion of the control and test group were able to recognize fruits, vegetables, sandwiches and low-fat yogurt, milk and water as a healthy food for snacks.

The findings of this study also showed that students' attitude of nutritional health has increased significantly after the intervention program in the intervention group, but no in the control group. Therefore, the Nutritional Behaviors of Students (NBS) program seems to have a positive effect on the students' attitude regarding the importance of nutrition. This finding also is consistent with previous research findings (Vardanjani *et al.*, 2015; Lee *et al.*, 2008; Wang *et al.*, 2014; Roszanadia and Norazmir, 2011; Watson *et al.*, 2009). These results show the importance of students' attitudes and beliefs in the formation of proper nutritional behaviors.

The present study also showed that students' behaviors of nutritional health have increased significantly after the intervention program in the intervention group, but no in the control group. Many studies have confirmed the positive effects of training on the nutritional behavior of individuals (Vardanjani *et al.*, 2015; Åstrøm, 2012; Wang *et al.*, 2014; Roszanadia and Norazmir, 2011; Watson *et al.*, 2009; Lua and Elena, 2012). According to the results of this study, the combined training (movie show, role play and lecture) has been effective on students' eating behaviors. In the movie show method, we can use the child's imagination and engage him in practical training. Role play is one of the most widely used educational methods for teaching communication skills (Ostovar *et al.*, 2013).

Given the results obtained and the impact of using this model in providing appropriate education for children, it is suggested that similar research be done in students of other educational levels and in other parts of the country, taking into account the role of families and their attitude towards breakfast and meals, especially in deprived areas of the country, and taking into account the effectiveness of education through Mass media for breakfast and snacks.

References

- Abdi H. Impact of individual hygienic education in prevention of parasitic relapses among students of fifth grade in Ilam, (1996). *Journal of Ilam University Medical Sciences* 2000; 8(28):3-6.
- Åstrøm AN. Changes in oral health related knowledge, attitudes and behaviours following school based oral health education and atraumatic restorative treatment in rural Tanzania. *Norsk Epidemiologi* 2012; 22(1): 21-30.
- Brunner LS, Suddarth D S. *Text book of medical surgical Nursing*. 11th Ed, Philadelphia: Lippincott, 2008:134-60.
- Chen JL, Kennedy C. Factors associated with obesity in Chinese-American children. *Pediatric Nursing* 2005; 31(2):110-15.
- Deforche B, Van Dyck D, Verloigne M, De Bourdeaudhuij I. Perceived social and physical environmental correlates of physical activity in older adolescents and the moderating effect of self-efficacy. *Preventive Medicine* 2010;50:S24-29.
- Fattahi S, Naderi F, Asgari P, Ahadi H. Neuro-Feedback Training For Overweight Women: Improvement of Food Craving And Mental Health. *NeuroQuantology*. 2017;15(2): 232-38.
- Franco DL, Cousineau TM, Trant M, Green TC, Rancourt D, Thompson D, Ainscough J, Mintz LB, Ciccazzo M. Motivation, self-efficacy, physical activity and nutrition in college students: Randomized controlled trial of an internet-based education program. *Preventive Medicine* 2008; 47(4):369-77.
- Hutchins M, Yassenka P, Jeff T. Fitness for life: changes in motivation and self-efficacy. *Public Health Nursing* 2010; 23:210-14.
- Jackson DB, Beaver KM. The role of adolescent nutrition and physical activity in the prediction of verbal intelligence during early adulthood: A genetically informed analysis of twin pairs. *International Journal of Environmental Research and Public Health* 2015;12(1):385-401.
- Lakshman RR, Sharp SJ, Ong KK, Forouhi NG. A novel school-based intervention to improve nutrition knowledge in children: cluster randomised controlled trial. *BMC Public Health* 2010; 10(1):123.
- Lee SY, Hoerr SL, Weatherspoon L, Schiffman RF. Nutrition students improve attitudes after a guided experiential assignment with older adults. *Journal of Nutrition Education and Behavior* 2008;40(5):279-87.
- Long JD, Stevens KR. Using Technology to Promote Self-Efficacy for Healthy Eating in Adolescents. *Journal of Nursing Scholarship* 2004; 36(2):134-39.
- Lua PL, Elena WD. The impact of nutrition education interventions on the dietary habits of college students in developed nations: a brief review. *The Malaysian Journal of Medical Sciences: MJMS* 2012; 19(1):4-14.
- Mahan LK. Kathleen. Krause's food, nutrition, & diet therapy. Edited by Sylvia Escott-Stump. Vol. 11. Philadelphia: Saunders, 2004.
- Matheson DM, Woolcott DM, Matthews AM, Roth V. Evaluation of a theoretical model predicting self-efficacy toward nutrition behaviors in the elderly. *Journal of Nutrition Education* 1991;23(1):3-9.
- Mohseni M. *Medical Sociology*. 8th ed. Tehran, Tahoori Publication, 2006: 44-45.
- Naeeni MM, Jafari S, Fouladgar M, Heidari K, Farajzadegan Z, Fakhri M, Karami P, Omidi R. Nutritional knowledge, practice, and dietary habits among school children and



- adolescents. *International Journal of Preventive Medicine* 2014; 5(Suppl 2):S171.
- Nazari M, Hidarnia A, Niknami S, Babaei G, Ghahramani L. Evaluation health education on nutrition behavior in primary school girls. *Daneshvar Medical Journal* 2005; 61:65-70.
- Ostovar R, Fararue M, Mohamed F. Comparison of Classic vs. Role plays Teaching Methods on the Menstrual Hygiene Behavior of Secondary School Girls in Iran. *Armaghan e Danesh* 2013; 18(5):410-19.
- Patterson E, Kearney J, Wärnberg J, Sjöström M. The tracking of dietary intakes of children and adolescents in Sweden over six years: the European Youth Heart Study. *International Journal of Behavioral Nutrition and Physical Activity* 2009; 6(1):91.
- Roszanadia R, Norazmir MN. Knowledge, attitude and practice on healthy eating among special needs boarding school students. *International Journal of Dairy Science* 2011; 6(5):1-9.
- Salahshoori A, Sharifirad G, Hassanzadeh A, Mostafavi F. An assessment of the role of perceived benefits, barriers and self-efficacy in predicting dietary behavior in male and female high school students in the city of Izeh, Iran. *Journal of Education and Health Promotion* 2014; 3:8.
- Shirk BN. "A School-Based Intervention Increased Nutrition Knowledge In High School Students." PhD diss., The Ohio State University, 2009.
- Vardanjani AE, Reisi M, Javadzade H, Pour ZG, Tavassoli E. The Effect of nutrition education on knowledge, attitude, and performance about junk food consumption among students of female primary schools. *Journal of Education and Health Promotion* 2015; 4: 1-5.
- Wang D, Shi Y, Chang C, Stewart D, Ji Y, Wang Y, Harris N. Knowledge, attitudes and behaviour regarding nutrition and dietary intake of seventh-grade students in rural areas of Mi Yun County, Beijing, China. *Environmental Health and Preventive Medicine* 2014;19(3):179-86.
- Watson LC, Kwon J, Nichols D, Rew M. Evaluation of the nutrition knowledge, attitudes, and food consumption behaviors of high school students before and after completion of a nutrition course. *Family and Consumer Sciences Research Journal* 2009; 37(4):523-34.
- WHO. *Oral Health Promotion: An Essential Element of a Health-Promoting School*. Geneva, Switzerland: WHO 2003.