Nutrition Knowledge and Dietary Behavior of Students in Physical Education Departments and Colleges of Institutes of Higher Education

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Abstract

The purpose of this paper was to discuss the nutrition knowledge and dietary behaviors of students in physical education departments and colleges and the relationship among nutrition knowledge, dietary behaviors and nutrition education. The author carried out an investigation on the nutritional knowledge and dietary behaviors of students of PE and Sports Training majors of College of Physical Education of Southwest University by questionnaire, and analyzed corresponding data by such method as descriptive, relevant and independent sample T test. The results indicated that 1) The understanding of students in physical education departments and colleges on nutrition knowledge was not sufficient, and gender, major, and whether the students took Sport and Exercise Nutrition as elective course had significant influence on their understanding of nutrition knowledge; 2) Students in physical education departments and colleges had poor performance in ingestion of diary products and fruits and their digestion frequency for calorically dense food and consumption of sugary drinks and processed meat were high; 3) Students in physical education departments and colleges did not fix their time for meals. Sometimes they will skip a meal, eat all food and eat too much etc., which are common unhealthy behaviors; and 4) the eating behaviors and eating skills of students in physical education departments and colleges were relatively poor. In terms of balanced diet and eating skills, female students performed better than male students, students of PE major performed better than that of Sports Training major and students who took Sport and Exercise Nutrition as elective course perform better than those who did not; in terms of ingestion of high energy food and eating behaviors, female students performed better than male students, where there was no difference in balanced diet and eating behaviors for different genders. However, there was significant difference in major; The finding revealed that the dietary behaviors of athletes in Chongqing was likely to be an unbalanced diet with high content of fat and refined sugar, so it was suggested to strengthen the nutrition education of athletes to improve their attitudes toward nutrition and dietary behaviors.

Keywords

nutritional knowledge, nutrition education, eating behavior, PE Students.

1. Introduction

People have their own selections for diet, and food and nutrition knowledge are not knowledge that is learned upon birth. They need to cultivate good dietary behaviors by accumulation of health education and establishing correct attitudes toward food and nutrition and eventually realize the purpose of life-long health. Many researches [1-5] showed that nutrition education can positively change people's attitude toward nutrition knowledge and their dietary behaviors. Introducing nutrition courses for reducing ingestion of fat of adults, providing nutrition education for students of departments irrelevant to nutrition and providing nutrition education course for professional sportsmen all can play a significant part in improving knowledge and dietary behavior. Heaney [6] summarized the cognitive emotion and behavior theory of psychologists and discussed the relationships among nutrition and attitudes of teenagers and their dietary behaviors; research results of such persons as Aerenhouts[7]demonstrate that dietary behavior is in direct proportion to nutrition attitude, and the nutrition attitude of parents of preschoolers was highly relevant to their food purchase behaviors. However, nutrition is irrelevant to dietary behavior.

In the cognition of ordinary people, the health management of sportsmen shall have higher quality than those who were not sportsmen. Researches [8-10] pointed out that sportsmen treat dietary nutrition supply issue as per their own food preference and convenience before and after competitions and trainings. They even adopted inappropriate diet to lose weight for winning the competitions, which brings many negative influences on metabolism. In fact, sportsmen's demand for food is difference from that of ordinary people. Apart from large demand for high calorie, there are differences in the percentage of nutrients in different periods and sports events. They even need special nutritional supplement. High level coaches must pay attention to the scientific matching between training and diet of sportsmen. Only in this way can they increase the energy from muscle cells or quality of muscles (quantity of mitochondria and muscle protein) in one training cycle and improve the competitive ability (maintenance energy, speed and muscle force).

The cultivating object of physical education departments and colleges of China is a group of special students, who participate in the study of cultural courses on the one hand and participate in sports training and competitions on the other hand. So physical education departments and colleges of institutions of higher education have been exploring a cultivation plan that combines physical education and education and promotes all-round development of sportsmen, in which the safe health management of sportsmen is extremely important. As ignoring its effect may not only lead to loss of competition, but also lead to loss of health. There are only a few researches on nutrition knowledge of sportsmen. Mullins [11] found that the sportsmen and ordinary students in universities have similar nutrition knowledge; Nieper[12] pointed out in a research that the nutrition knowledge of non-sportsmen was significantly higher than that of athletes and dancers, and the nutrition knowledge of athletes was higher than that of dancers. Such persons as Froiland [13] pointed out that the unhealthy dietary habit of track and field teenager contestants lead to the result that they cannot reach the standards of required nutrients. Research of such persons as Li Shicheng [14] showed that the nutrition knowledge of cyclists of China was not sufficient and insufficient nutrients ingestion was the main obstacle for them to reach the best competition status.

In a word, the nutrition knowledge and dietary behavior of students in physical education departments and colleges do worth researching and there are only few relevant researches on the nutrition knowledge, attitude and dietary behaviors of this group of students. So this research takes the independent influence of knowledge as the research frame to understand the status quo of nutrition knowledge and dietary behavior of students in College of Physical Education of Southwest University, with reference to the knowledge, attitude and behavior model put forward by Schwartz [15], and have discussed whether nutrition knowledge independently influences dietary behavior and whether there was relationship between participating in nutrition education and nutrition knowledge.

2. Materials and Methods

2.1 SUBJECTS

The research subjects of this research was the students of PE major and Sports Training major of College of Physical Education of Southwest University, who were in grades 2010, 2011, 2012 and 2013 respectively, with the total of 851 students, average age of 21.35±2.18 and height of 1.71m±4.36cm. The research was carried out by questionnaire during their daily study and training.

2.2 Questionnaire method

The questionnaire was designed based on reviewing a number of references and its contents include the following sections:

1) Basic information of subject, including name, age, height and weight of the sportsman, and whether he or she participated in nutrition related courses as well as the time and place of the courses etc.

2) Questionnaire on nutrition and diet knowledge. This section refers to the questionnaire of national nutrition and diet knowledge and dietary behavior developed by scholar Li Lan. 13 items are set in this questionnaire, 1 score will be obtained for each correct answer and 0 sore for wrong answer or no answer.

3) Scale of questionnaire on dietary behavior. This section refers to the dietary condition evaluation table in weight control index manual for middle school students of Lin. It includes four subsections, i.e. general diet, eating condition of calorically dense food, unhealthy eating behaviors and unhealthy eating skills.

4) Credibility and validity of questionnaire

After the design of questionnaire was completed, 9 sports nutritionists were invited to evaluate the content validity and surface validity of the questionnaire. The pre-testing of the questionnaire was carried out in Chengdu Sport University, with 150 copies distributed and 128 copies of valid questionnaires received. Through project analysis, it was found that the items of questionnaire on nutrition knowledge and questionnaire on dietary behavior reached significance level and the Cronbach's α coefficient of credibility of each section reaches over 0.78. According to the opinions of scholars, the minimum acceptable credibility is that α reaches over 0.7, so it showed that the improved questionnaire had acceptable credibility.

2.3 Mathematical statistics method

Statistics and analysis were made for the data obtained in the investigation using SPSS16.0, main methods adopted were descriptive statistical analysis, independent sample T test, one-way ANOVA and Chi-square test (χ^2-test).The significance level of all statistics was set at a=0.05.

3. Resultes and Discussion

3.1 Analysis of content validity of scales

Table 1 shows that the Cronbach's a of the five scales are respectively 0.834, 0.808, 0.814, 0.859 and 0.856 calculated based on the formal investigation data obtained in the investigation, which means the questionnaire has high consistency and confirms the reliability and validity of investigation data obtained in the research.

3.2 Analysis of nutrition knowledge of students in physical education departments and colleges

Table 2 shows that:

1) Data of distinguishing index D shows the relevant coefficients between each item and the sum of items of the same dimension, the lowest requirement for which is 0.4 in statistics. It is obvious that all items exceed this level, which means that each item is a good composition of the overall rating scale of the corresponding dimension.

2) The average rate of correct answer of the 13 items tested is 72.81, with rates of correct answer for 3 items not satisfied, i.e. Item 10 (15.36%, the lowest rate), Item 13 (43.67%) and Item 5 (58.58%). Of other items, the rates of correct answer for Item 8, Item 6 and Item 4 are also low, which are 62%-75%.

3) Through further comparison, it is found that: with the full score for the 13 items being 13, the average score of students in physical education departments and colleges is only 9.56±2.17, and score of female students (10.87±1.14) is significantly higher than that of male students (8.28±2.28); the average score of students of PE major (11.15±1.45) is significant higher than that of students of Sports Training major (8.05±2.39); the students who take Sport and Exercise Nutrition as elective course get significantly higher score (11.41±13.2) than those who do not (7.74±2.89).

Table 1: Summary Table of KMO and Bartlett Tests of Scales of Questionnaire on Nutrition Knowledge and Dietary Behavior of Students in Physical Education Departments and Colleges

Index	Nutrition Knowledge	Balanced Diet	High Energy Food	Eating Behaviors	Eating Skills
Cronbach's α	0.834	0.808	0.814	0.859	0.856
Sig. Level	P=0.000＜0.01	P=0.00＜0.01	P=0.000＜0.01	P=0.000＜0.01	P=0.000＜0.01

Table2: Statistics of Nutrition Knowledge Scales of Students in Physical Education Departments and Colleges (N=815) (1 score will be obtained for each correct answer, and 0 for wrong answer or no answer, the sum is the total score of nutrition knowledge. High score means high nutrition knowledge)

Item	Rate of Correct Answer	Distinguishing Index D	Result
1. It does not matter whether to have breakfast	81.54%	0.534	reserved
2. Eating many instant foods (e.g. fried chicken) is good for health	92.55%	0.521	reserved
3. Obesity has great relationship with the occurrence of hypertension, heart disease and diabetes	95.01%	0.432	reserved
4. Being fat at young age is not fat, so being fat at young age does not matter	72.31%	0.615	reserved
5. Insufficient and too much ingestion of food nutrients are called malnutrition	58.58%	0.587	reserved
6. What is the main food that has composing and repairing functions	71.25%	0.654	reserved
7. What is the richest source for supplying calcium	81.66%	0.502	reserved
8. Which of the following dishes contains high content of iron and can prevent iron-deficient anemia	62.37%	0.526	reserved
9. Which of the following groups of foods have high content of cholesterol	96.38%	0.426	reserved
10. Which kind of oil can be used for cooking to prevent cardiovascular disease	15.36%	0.615	reserved
11. Which kind of food can prevent constipation	83.25%	0.714	reserved
12. Which of the following foods contains high content of salt and it is better not to eat	92.69%	0.536	reserved
13. What is the best cooking method to keep the vitamin C in vegetables	43.67%	0.575	reserved

3.3 Analysis of balanced diet behavior of students in physical education departments and colleges

Table 3: Statistical Table of Ingestion Condition of Balanced Diet of Students in Physical Education Departments and Colleges (N=816) (5-point scoring, the options as "never, seldom, occasionally, usually, and always" scores 1 to 5 points respectively. The higher the score is, the more balanced the diet is)

Item	X±S	Distinguishing Index D	Result
1. Do you have cereals and root food stuff for every meal	3.51±1.06	0.571	reserved
2. Do you drink at least one cup of milk or dairy product of 100% milk content	2.33±0.89	0.556	reserved
3. Do you eat no less than four portions of various kinds of meat, seafood and eggs in one day	2.95±1.25	0.418	reserved
4. Do you eat at least three disks of vegetables in one day (one disk of cooked vegetable is about half bowl)	2.51±1.11	0.651	reserved
5. Do you eat at least two portions of fruits in one day (one portion can mean one apple)	2.38±1.39	0.621	reserved

Table 3 shows that:

1) The data of distinguishing index D shows that it is not less than the level of 0.4. Obviously, the items are the good compositions of the overall rating scale of the Scale.

2) The average score of balanced diet of students in physical education departments and colleges is 2.74, which means their performance of balanced diet behaviors is at medium and low level, of which the scores for Item 2 and Item 5 are low, which are 2.33±0.89 and 2.38±1.39 respectively.

3) Through further analysis, it is found that: the balanced diet behaviors of female students in physical education departments and colleges (3.57±1.14) are better than that of male students (2.77±02.01); the balanced diet behaviors of students of PE major (3.61±0.97) are significantly higher than that of students of Sports Training major (2.64±02.26); the balanced diet behaviors of students who take Sport and Exercise Nutrition as elective course (3.43±1.38) are significantly better than that of students who do not (2.75±2.27).

3.4 Analysis of Ingestion Conditions of High Calorie Food of Students in Physical Education Departments and Colleges

Table 4 shows that:

1) The data of distinguishing index D shows that it is not less than the level of 0.4. Obviously, the items are the good compositions of the overall rating scale of the Scale.

2) It can be seen from the overall conditions that the average score for ingestion of high energy food of students in physical education departments and colleges is 2.40, which is low and means the phenomenon of consumption of high calorie diet of students is not severe. However; they get high scores for three items, which need attention. The first is Item 9, the second is Item 4 and the third is Item 5, with the scores of 3.38±1.27, 3.37±1.51 and 3.34±1.24 respectively.

3) Through further comparison, it is found that: the ingestion of high energy food of male students in physical education departments and colleges (2.57±1.56) is higher than that of female students (2.23±2.01); the balanced diet behaviors of students of PE major (2.37±0.95) have no difference with students of Sports Training major (2.44±1.39); the ingestion of high energy food of students who take Sport and Exercise Nutrition as elective course (2.23±1.44) is significantly lower than those who do not (2.62±1.58)

Table 4: Statistical Table of Ingestion Conditions of High Energy Food of Students in Physical Education Departments and Colleges (N=831)(5-point scoring, the options as "at least 1 time/month, 2-3 times/month, 1-3 times/week, 4-6/week and at least 1 time/day" scores 1 to 5 points respectively. The higher the score is, the more the ingestion of calorie contained food is)

Item	X±S	Index D	Results
1. Fried food such as fried pork chop, chicken, shrimp, vegetable, etc.	2.76±1.63	0.511	reserved
2. Sausage, preserved pork, hot dog, meat ball, etc.	2.32±0.95	0.563	reserved
3. Ham hock, pork chop, beefsteak, etc.	2.09±1.17	0.454	reserved
4. Minced meat and its products	3.37±1.55	0.614	reserved
5. Whole milk, cheese or hamburger	3.54±1.24	0.627	reserved
6. Short crust pastries such as mooncakes, egg-yolk paste, suncakes, etc.	1.88±1.31	0.502	reserved
7. Nuts such as pistachio nuts, sunflower seeds, cashew nuts, almonds, peanuts, etc.	1.78±0.89	0.464	reserved
8. Fried wheaten food such as scallion cakes, fried dough sticks, fried stuffed bun with sugar, fried dough twists, etc.	1.95±1.09	0.606	reserved
9. Sodas, sports drinks, tea drinks with sugar, coffee, chocolate, etc.	3.38±1.27	0.617	reserved
10. Candies, chocolate and stewed fruits	2.44±1.19	0.509	reserved

3.5 Analysis on eating behaviors of students in physical education departments and colleges

Table 5: Evaluation Results Statistics of Eating Behavior in Physical Education Departments and Colleges (N=817) (5-point scoring, the options as "never, seldom, occasionally, usually, and always" scores 1 to 5 points respectively. The higher the score is, the poorer the diet control is)

Item	X±S	Distinguishing Index D	Results
1. Pay no attention to control the diet intake	2.95±1.63	0.632	reserved
2. Have three meals irregularly with a meal omitted within one-day	3.37±0.95	0.517	reserved
3. Have snacks other than the meals	3.05±1.17	0.426	reserved
4. Chew the food thoroughly and swallow it slowly	2.39±1.55	0.601	reserved
5. Eat up all the food with nothing left or until feel extremely full	3.44±1.24	0.557	reserved
6. Eat at the time of reading or watching TV	3.11±1.31	0.503	reserved
7. Eat at the time of feeling bad, under pressure or bored	2.81±0.91	0.554	reserved
8. Eat as an award or celebration for oneself	2.89±1.36	0.436	reserved
9. Eat everything you can find when you want to have something for eating badly	2.72±0.89	0.607	reserved
10. Never say no to anything delicious	3.23±1.09	0.612	reserved

Table 5 indicates that:

1) The data of distinguishing index D shows that it is not less than the level of 0.4. Obviously, the items are the good compositions of the overall rating scale of the Scale.

2) The average score for eating behaviors of students in physical education departments and colleges is 2.97, which is a high score showing that there is seriously unhealthy eating behaviors among the sportsmen. For the specific items, there are 4 items that need the attention, which are Item 5 (with

highest score of 3.44±1.24), Item 2 (3.37±0.95), Item 10 (3.23±1.09) and Item 6 (3.11±1.31) in a high-to-low order.

3) Through further comparison, it is found that: in physical education departments and colleges, the male students (3.16±1.61)have poorer eating behaviors than the female students (2.82±2.26); the students (2.91±1.73)major in physical education have eating behaviors almost identical to the students (2.99±1.28) major in sports training; and the students (2.85±1.89) taking Sport and Exercise Nutrition as an elective course have better eating behaviors that the students (3.14±1.79) not taking the course.

Analysis on eating skills of students in physical education departments and colleges

Table 6 indicates that:

1) The data of distinguishing index D shows that it is not less than the level of 0.4. Obviously, the items are the good compositions of the overall rating scale of the Scale.

2) The average score for eating skills of students in physical education departments and colleges is 3.24, the higher of which is in the scale, the poorer the eating skills are. During the further viewing in specific items, it is found that the relatively poor skills consist of Item 3 (3.62±1.17), Item 5 (3.45±1.55), Item 2 (3.39±0.95) and Item 4 (3.30±1.24) in a high-to-low order.

3) By comparing the student features, it is found that: in physical education departments and colleges, the male students (3.52±1.14)have poorer eating skills than the female students (2.97±2.26); the students (3.45±1.16)major in physical education have better eating behaviors than the students (2.96±1.44) major in sports training; and the students (2.45±1.26) taking Sport and Exercise Nutrition as an elective course have better eating behaviors that the students (2.99±1.47) not taking the course.

Table 6: Statistics of Eating Skill of Students in Physical Education Departments and Colleges (N=837) (5-point scoring, the Items 1-6 are reverse questions, in which the options as "never, seldom, occasionally, usually, and always" scores 5 to 1 points respectively while the options for Items 7-10 scores 1 to 5 respectively. The higher the score is, the poorer the eating skill is)

Item	X±S	Distinguishing Index D	Results
1. Eat the meat after removing the fat and skin	3.06±1.63	0.614	reserved
2. Eat fried food after removing the coating flour around the food	3.39±0.95	0.528	reserved
3. Pick dishes with low fat content	3.62±1.17	0.566	reserved
4. Eat the cake after removing the fresh cream or chocolate on the surface or in the interlayer	3.30±1.24	0.611	reserved
5. Drink the soup after removing the fatty oil on the soup	3.45±1.55	0.714	reserved
6. Replace whole milk with skimmed or low-fat milk	3.11±1.31	0.512	reserved
7. Eat the vegetable in the soup with meat juice, sesame oil, salad dressing, etc.	2.92±0.91	0.517	reserved
8. Eat large piece or whole piece of meat	2.96±1.36	0.547	reserved
9. Put the whole oil in the package when having prepared food or instant noodles	3.02±1.09	0.626	reserved
10. Have all the soup when eating noodles with soup	3.03±1.09	0.628	reserved

4. Conclusion

1) The students in physical education departments and colleges show unsatisfactory understanding of nutrition knowledge with the rate of correct answers to all questions of only 72.81%. In the questions, there are extremely low correct answer rates in questions as "which kind of oil can be used for cooking

to prevent cardiovascular disease", "what is the best cooking method to keep the vitamin C in vegetables" and "insufficient and too much ingestion of food nutrients are called malnutrition". The understanding of nutrition knowledge is significantly influenced by different genders, majors, and whether the students take Sport and Exercise Nutrition as elective course or not.

2) The students in physical education departments and colleges perform averagely in the behavior of balanced diet and score relatively low in ingestion of high energy food. However, there are low scores in the items as "drink at least one cup of milk or dairy product of 100% milk content" and "eat at least two portions of fruits in one day" while high scores in the calorically dense food as "sodas, sports drinks, tea drinks with sugar, coffee and chocolate", "minced meat and its products" as well as "whole milk, cheese or hamburger".

3) The students in physical education departments and colleges have relatively poor eating behaviors and skills with the scores of 2.97 and 3.24 respectively, in which the eating skills perform worse than the eating behaviors. And there are 4 worst items in two of the 10 options for eating behaviors and eating skills.

4) In the aspects of balanced diet and eating skills among in physical education departments and colleges, the female students perform better than the male students, the students major in physical education perform better than those major in sports training, and the students taking Sport and Exercise Nutrition as an elective course perform better than those not taking the course. And in the aspects of ingestion of high energy food and eating behaviors, the male students ingest more high energy food than the female students while have poorer eating skills than the female students. There is no professional difference in balanced diet and eating behaviors. However, the students taking Sport and Exercise Nutrition as an elective course ingest less high energy food and perform better in eating behaviors than those not taking the course.

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