



INVESTIGATION AND ANALYSIS ON OUTDOOR SPORTS AND DIETARY NUTRITION OF COLLEGE STUDENTS

Ming Li*

Department of social sports and leisure sports, Xi'an Physical Education University, Xi'an Shaanxi, China 710068

** lm713@126.com*

Article history:

Received:

22 January 2016

Accepted:

23 August 2016

Keywords:

competitive sports performance;

Nutritional intervention;

Outdoor sports;

College students.

ABSTRACT

This paper shows that the balanced diet and adequate nutrition of sophomores and juniors have great significance for college students in daily work and study as well as the future work, this paper presents the investigation of 500 sophomores and juniors in five universities in a city to know the dietary characteristics, structures as well as the impact on physical quality by means of 24-hour recall and KAP questionnaire, and also gives some comments and suggestions through analyzing the existing problems of the investigation results. Through relevant researches, the subject is purposed to attract attention in Changsha about balanced diet of college students to improve the health for college students.

1. Introduction

Human beings cannot exist without food and nutrition, and the food and nutrition status is closely related with population quality, having great impact on prosperity of a nation. Study of epidemiology and nutrition proves that the growth & development, physique, working efficiency of human body as well as many chronic diseases like gastric cancer, diabetes, esophageal cancer and renal failure are not separated from the daily dietary structure.

Since reform and opening-up, our country has developed the economy very rapidly while the living standard of people has been improved greatly (Burford, 2004). College students can enjoy abundant food in canteens as well as many other snacks from some restaurants in or near campus (Parsons et al., 2005). However, college students are so particular that most of them like to choose food relying on their favorites, and they tend to eat meats, convenient food and quick meal instead of milk, beans and seafood. College students are mainly at the age of 19~23, the critical period for growth and development, longing for all kinds of nutrition elements. Unreasonable dietary structure may lead to

obesity and other problems because of excessive energy, or will cause malnutrition due to lack of some necessary microelements such as calcium, iron, vitamins, high-quality protein, or further result in hypoglycemia because of insufficient energy and protein, therefore, students may not concentrate their attention during study and will get failed in examination (Williams, 2005). Long-term lack of nutrition elements will lower the immunity of body, inducing many types of infectious diseases and weakening the metal work capability, so the normal college students will be affected on their physique, or even their normal study as well as their life will be negatively impacted (Burke et al., 2010).

On premise that the balanced diet and adequate nutrition of sophomores and juniors have great significance for college students in daily work and study as well as the future work, this paper presents the investigation of 500 sophomores and juniors in five universities in a city to know the dietary characteristics, structures as well as the impact on physical quality in Changsha by means of 24-hour recall and KAP questionnaire, and also gives some comments and suggestions through analyzing the

existing problems of the investigation results. Through relevant researches, the subject is purposed to attract attention in Changsha concerning on balanced diet of college students to improve the health for college students (Castell, 2010).

2. Materials and methods

The paper presents the questionnaire survey to 500 students in five universities in Changsha. The dishes in the university canteens are weighed before and after cooking to work out the included nutritional elements by comparing to the Food Composition Table 1 and 2, besides, the student received the dietary survey for

continuous three days by means of “investigation on dietary frequency” and “24-hour recall”, then the ingestion of nutritional elements and heat energy each day were recorded in detail as per the investigation results as the reference data for analysis of relationship between dietary structure and physical quality of college students. The students will be regarded as light manual workers for conducting nutritional evaluation as per Chinese DRIs issued by Chinese Nutrition Society. The appraisal index for evaluation of dietary nutrition status included heat energy and other nutritional elements as specified in Table 3.

Table 1. Dietary nutrition evaluation standard

Index/percentage	Inadequate intake	Serious lack
Heat energy	92	85
Other nutrients	84	65

Table 2. City University students’ breakfast

Breakfast	Every day or eat mostly	Occasionally or almost don't eat	P value
sophomore	84	18	0.148
Junior	95	10	
Total	86.3	13.9	

Table 3. City University students’ breakfast foods

Types of food choice	Sophomore	Junior
eggs	44.2	60.2
milk	26.3	26
cereal	78.4	80.5
vegetables	50.2	41.2
fruit	1.6	0
fish	0	0
meat	0.8	0.6

The 500 sophomores and juniors, or the objects of investigation take meals in the canteens and shops in campus every day, so the dining table 2 in canteens of Central South University, Hunan Normal University, Central South University of Forestry and Technology, Hunan University of Chinese Medicine and Changsha University are used as the samples (Stear et al., 2009). Every university has several canteens, but generally they provide meals as the

mixture of rice, noodle, vegetable and fruit with different cooking methods. The meals can basically satisfy the tastes of students at low price although some students think that they cannot stand the excessive spices such as salt and oil.

2.1 Dietary structure status of college students

Breakfast is very important for person as it can supplement energy and all kinds of

nutritional elements after the whole-night of metabolism. The survey of breakfast is shown in Table 3, and there is no obvious different between the sophomores and juniors according to the Chi-square test ($P > 0.05$).

Refer to Table 4 for the food categories of breakfast for college students in Changsha, which proves that the sophomores are obviously different from junior students in terms of food selection (Senchina et al., 2011).

According to the nutrition theory, the following selections of breakfast are regarded to be unreasonable during Chi-square test for

relevance: only select cereal, only select milk, only select egg, only select fish added to meal, and only select vegetable added to fruit; and the selections of breakfast below will be regarded as reasonable: choose cereal added to milk, choose cereal added to egg, chose cereal, milk and egg, or choose milk added to egg (Senchina et al., 2011). The investigation results are shown in Table 5, proving that the sophomore are more rational than juniors in terms of breakfast category ($P < 0.01$).

Table 4. The rationality of the college students' breakfast food choices

Food choices	Reasonable	Unreasonable	P value
sophomore	45.36	56.36	0.00036
Junior	21.25	78.45	
Total	32.69	65.23	

Table 5. City university students lunch and dinner meal

Types of food	Twice a day		Once a day		Once every two days	
	sophomore	Junior	sophomore	Junior	sophomore	Junior
choose						
cereal	24.3	30.5	44.8	60.3	14.3	10.2
eggs	45.2	34.5	56.3	52.4	21.5	12.3
meat	39.6	25.1	26.3	48.5	36.2	21.5
vegetables	17.5	40.6	29.5	52.1	19.6	45.6
soy	20.6	16.9	36.5	12.3	19.4	51.2
dairy	51.0	25.8	42.1	32.5	32.5	23.6
fruit class	0.5	1	21.3	21.4	70.1	25.2
fish	0.8	0.6	15.3	12.6	30.2	12.3

Table 6. College students' physical quality index comparison in 2012

	Male			Female		
	50m	100m	The experimental steps	50m	100m	The experimental steps
sophomore	7.23	233.5	84.2	8.94	245.6	66.3
Junior	7.25	235.3	85.3	9.52	248.9	67.4

Refer to Table 6 for the dietary condition of launch and dinner. According to Chi-square test, sophomores intake more milk, meat, fish and fruit than juniors with obvious different ($P < 0.05$ or 0.01), but juniors intake more cereal and fruit than sophomores ($P < 0.01$). Both the sophomores

and juniors intake little fish, egg product, dairy product and bean product in daily diet.

2.2. Analysis on dietary structure college students in Changsha

The subject, in line with the study demand, designed the KAP questionnaire to survey the

current dietary structure of 500 sophomores and juniors in five universities in a Changsha, including the daily three meals (breakfast, lunch and dinner), snack, supper, as well as acquisition of meat, fish and daily nutritional elements. Based on the above condition, this section will give the analysis of dietary structure for sophomores and juniors. The investigation shows that people may become short of some nutritional elements or have excessive heat energy, protein and fat due to their unreasonable diet, while may lead to hazards of chronic diseases in a long term (Ranchordas et al., 2010).

(1) Analysis on breakfast

Breakfast can greatly perfect the ingestion of nutritional elements for students and help them to keep their mind active and easier to understand and master knowledge. However, the cognitive ability, physique and other aspects of college students will be badly influenced if they do not eat breakfast or have unscientific breakfast (Lowery, 2004). The investigation results in Table 6 shows that juniors tend to have scientific breakfast as there are only 10% students in the five universities who do not eat breakfast or seldom eat breakfast, and this data is the lower limit of the literature proportion at 10% and at the same time lower than the proportion reported by Hu Xiaoqi about the problem that primary and secondary students who do not eat breakfast (King et al., 2013). Among the 500 sophomores and juniors, the proportion of sophomores and juniors who do not eat breakfast are 17% and 10% separately, and there is no obvious different between the two groups as per the Chi-square test ($P > 0.05$).

As for the sophomores and juniors who tend to eat breakfast, the proportion of sophomores and juniors choose cereal are 79.8% and 80.5% separately, and there is no obvious different between the two groups as per the Chi-square test ($P > 0.05$) (Pilis et al., 2014). Nevertheless, the breakfast of juniors is unscientific, simple, lacking nutrition. According to researches, scientific breakfast should consist of cereal+ egg, cereal+ milk, cereal+ egg+ milk, or egg+ milk. The Chi-square test shows that the sophomores

tend to be more reasonable than junior in terms of breakfast category ($P < 0.01$).

(2) Analysis on launch and dinner

Dietary nutrition status is closely related to the physical quality. According to the diet pagoda in China, an adult shall intake cereal of 300~500g, vegetable of 400~500g, fruit of 100~200g, fish of 50g, egg and poultry of 50~100g, egg of 25~50g, milk of 100g, bean & bean product of 50g, and oil & fat not exceeding 25g. According to the investigation results (as shown in Fig 5 & 6), the daily consumption of seafood, egg product, milk product and bean product is somewhat low, which is in compliance with the conditions in China.

The sophomores have meat and fish more than the juniors and the ingestions of meat and fish between the two groups are not different greatly based on the Chi-square test ($P > 0.05$). Fish contains high protein and low heat energy rich in unsaturated fatty acid, mineral substance and Vitamin D, greatly helpful to human body especially for students who are busy in examination and heavy schoolwork. Juniors intake more cereal than sophomores, and there is an obvious difference in terms of cereal ingestion based on the Chi-square test ($P < 0.01$).

Sophomores intake more milk than juniors, and there is an obvious difference in terms of cereal ingestion based on the Chi-square test ($P < 0.01$).

3. Results and discussions

3.1. Physical quality

The investigation tests physical fitness and endurance of female sophomores and juniors through women's 50m & 800m and also tests physical fitness and endurance of male sophomores and juniors through men's 50m & 1000m, moreover, the muscle tolerance of sophomores and juniors is reflected in step experiment. Refer to Table 7 for the testing results of physical fitness of sophomores and juniors.

3.2. Physical function

The vital capacity and body mass index are used in the investigation to show the vital function of sophomores and juniors. The overall vital function standard of sophomores and juniors in 2012 is shown in Table 8, indicating that the difference between sophomores and juniors in terms of vital capacity is great ($P < 0.01$), and another index of body function-vital capacity /body mass index (vital capacity index)

is also lower than the overall average in our country, presenting obvious different ($P < 0.01$).

The results obtained by this method is different to that of BM method and method of weight for height, in which the low body fat is 4.47%, and overweight or obesity weight is 21.23%, among which the obesity rate is relatively high while the low-weight rate is low.

Table 7. Sophomore, junior functional index contrast in 2012

	Male		Female	
	Lung capacity	Vital capacity index	Lung capacity	Vital capacity index
sophomore	3362.52	54.21	2248.12	43.65
Junior	3265.54	51.69	2128.10	45.58

Table 8. Rise in 2012, weight table

	Male		Female	
	height	weight	height	weight
sophomore	174.26	62.31	159.45	49.52
Junior	175.36	62.59	157.26	44.23

Table 9. Percentage of weight status of sophomore and junior

	malnutrition	The low weight	The normal weight	overweight	obesity
sophomore	10.25	22.59	54.28	10.26	2.45
Junior	13.23	18.45	52.69	11.59	3.69

3.3. Height & weight

(1) Normal weight

Refer to Table 8 for height and weight information of sophomores and juniors in five universities of a city in 2012.

(2) Standard weight converted from height

The standard height is converted by height based on the certain rate between height and weight. Standard weight can reflect the circumference and intensity of human body, and it is very important to evaluate the development standard, nutrition and symmetry of body shape. Refer to Table 9 for percentage statistics of standard weight of all grades for sophomores and juniors converted by height.

3.4. Analysis on physical health of college students in Changsha

The investigation tests speed quality of female sophomores and juniors through women's 50m & 800m and leg muscle tolerance through step experiment, and also tests physical fitness and endurance of male sophomores and juniors through men's 50m & 1000m. The physical fitness testing results of sophomores and juniors is shown in Table 9, showing that female sophomores get the women's 50m grade better than female juniors by 0.05s, resulting in no obvious difference, while male sophomores get the men's 50m grade better than male juniors by 0.35s, resulting in obvious difference. 50m is a simple exercise, but it can reflect the flexibility, body harmony, suppleness of joint & muscle and strength & tolerance of muscle of human body,

therefore, 50m can show comprehensive quality of human body to some extent. 50m examination is targeted to know running speed, sensitivity and flexibility level of nervous system of students.

Female sophomores get the women's 800m grade better than female juniors by 3s, resulting in obvious difference ($P < 0.01$), while male sophomores get the men's 1000m grade better than male juniors by 4s, also resulting in obvious difference ($P < 0.01$). 800m and 1000m are mainly purposed to test endurance of students, and it can also reflect whether the function of cardiovascular and respiratory systems as well as the muscle tolerance of college students. Generally the step experiment is used to evaluate the muscle strength and tolerance as it can work out the muscle strength and tolerance in a safety way. Female sophomores get the step experiment grade better than female juniors by 2/min., resulting in obvious difference ($P < 0.05$), while male sophomores get the step experiment grade better than male juniors by 1.7/min., also resulting in obvious difference ($P < 0.05$), proving that sophomores is superior than juniors regarding to their strength at waist and legs.

The vital capacities between sophomores and juniors in 2012 are largely different from each other ($P < 0.01$) as shown in Table 9. According to the theoretical analysis, the absolute value of vital capacity is related to the following three factors: anatomical vital capacity, lung ventilation ability and the self-contraction strength of respiratory muscle. Except being affected by growth and development condition, the body vital capacity is also connected with exercise condition and living habit (for example smoke or not), however, juniors are faced with employment difficulty and heavy schoolwork, and they cannot concentrate themselves into physical exercise, thus their vital capacity will be affected. The investigation indicates that 70.13% of juniors treat the exercise randomly, 20.7% have exercises once a week, 6.49% have exercises twice a week, only 2.59% have exercises three times or more every week, and none of them have exercises four times or more every week, showing that juniors have not get

the good awareness for having exercise and insisting on exercise, as a result, their vital function is poor. Sophomores do better than juniors on having exercise as they have one PE class every week (Lan and Xue, 2013). To strengthen the exercise of heart-lung function for sophomores and juniors, enhance exercise and regulation beyond PE class and perfect the body function for sophomores and juniors through the way like morning exercise can not only perfect the heart-lung function but also let college students have the awareness for having exercise in all of their life (Guerra et al., 2001).

4. Conclusions

The investigation and analysis on dietary structure and physical quality of college students in Changsha proves that the sophomores and juniors have many problems in dietary structure and physical quality such as insufficient ingestion of Ca, vitamin C, vitamin B1 and vitamin B2, which causes nutritional deficiency because they pay too much attention to their stature and insist on weight loss on the one hand, and on the other hand, they do not have enough consumption ability. For example, they are still rely on their parents in terms of economy, they tend to not have breakfast or eat breakfast so late or even in class, besides, the light-out time in dormitories is so last as lasting to 1:00-2:00 in midnight that they will eat supper at excessive amount such as snacks, which will result in obesity or other diseases. College students choose food relying on their tastes and daily dietary habit instead of the contents of nutritional elements in food. The dietary management and intervention are necessarily strengthened to guide college students for reasonable diet, and the specific measures below can be taken: strictly manage the schedule in dormitories and specify the light-out time at 11 pm in night, avoid some bad habit such as having food before sleep; insist on drill in the morning while make them eat breakfast in correct time to help them get enough nutrition; limit or ban snake shops or retail departments in campus to make them do not has access to snacks, or limit the supply or adopt

fixed supply in snake shops or retail department in campus.

To sum up, sophomores and juniors do not have good living habits as they are faced with heavy schoolwork as well as pressure for postgraduate examination or employment, and they are mainly lack of milk, bean food, animal food, vegetable and fruit. Meanwhile, some students also have several food or nutrition in excessive high amount such as over ingestion of oily, salty and high-calorie food, which will lead to obesity, high blood pressure and other unfavorable physical conditions. Students do not have access to food of many categories, and they do not know enough knowledge about food nutrition and nutrition element, and also fail to gain high dietary quality for themselves. Therefore, the publicity on nutrition knowledge to sophomores and juniors or even to the freshmen is necessary in order to help them choose reasonable food categories, improve dietary structure as well as physical fitness.

References

- Burford, M.A., Smith, D.M., Tabrett, S.J., Coman, F.E., Thompson, P.J., Barclay, M.C., et al. (2004). The effect of dietary protein on the growth and survival of the shrimp, *penaeus monodon*, in outdoor tanks. *Aquaculture Nutrition*, 10(10), 15-23.
- Burke, L.M., Castell, L.M., Stear, S.J., Houtkooper, L., Manore, M., Senchina, D. (2010). Bjsm reviews: a-z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance part 7. *British Journal of Sports Medicine*, 45(15), 1246-8.
- Castell, L.M., Burke, L.M., Stear, S.J., Mcnaughton, L.R., Harris, R.C. (2010). Bjsm reviews: a-z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance part 5. *British Journal of Sports Medicine*, 44(1), 77-8.
- Chandel, A.M. (2012). Nutrition and diet in sports. *Golden Research Thoughts*, 2(3).
- Hodgson, A.B., Baskerville, R., Burke, L.M., Stear, S.J., Castell, L.M. (2013). A-z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance: part 42. *British Journal of Sports Medicine*, 47(4), 399-400.
- Lowery, L.M. (2004). Dietary fat and sports nutrition: a primer. *Journal of Sports Science & Medicine*, 3(3), 106-17.
- King, D.S., Baskerville, R., Hellsten, Y., Senchina, D.S., Burke, L.M., Stear, S.J., et al. (2013). A-z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance—part 34. *British Journal of Sports Medicine*, 47(3), 185-6.
- Pilis, K., Michalski, C., Zych, M., Pilis, A., Jelonek, J., Kaczmarzyk, A., et al. (2014). A nutritional evaluation of dietary behaviour in various professional sports. *Roczniki Państwowego Zakładu Higieny*, 65(3), 227-34.
- Parsons, T.J., Manor, O., Power, C. (2005). Changes in diet and physical activity in the 1990s in a large british sample (1958 birth cohort). *European Journal of Clinical Nutrition*, 59(1), 49-56.
- Ranchordas, M.K., Burd, N.A., Godfrey, R.J., Senchina, D.S., Stear, S.J., Burke, L.M. et al. (2010). A-z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance: part 43. *British Journal of Sports Medicine*, 47(3), 399-400.
- Stear, S.J., Burke, L.M., Castell, L.M. (2009). Bjsm reviews: a-z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance part 3. *British Journal of Sports Medicine*, 43(12), 890-2.
- Senchina, D.S., Bermon, S., Stear, S.J., Burke, L. M., Castell, L. M. (2011). Bjsm reviews: a-z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance. part 17. *British Journal of Sports Medicine*, 47(3), 399-400.
- Seidler, T., Sobczak, A. (2012). diet supplements in nutrition of sport mastery school students.

Roczniki Państwowego Zakładu Higieny,
63(63), 193-8.

Williams, M.H. (2005). Dietary supplements and sports performance: minerals. *Journal of the International Society of Sports Nutrition*, 2(1), 43-9.