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Study on the Dietary Nutrition Status and Health Strategies of University Students

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Abstract: To understand university students' dietary habits, guide them toward a healthy diet, and improve their nutritional status, this study employed an online questionnaire and body mass index (BMI) analysis to assess the nutrition knowledge, attitude, and practice (KAP) scores and nutrient intake of students at the Yantai Research Institute of China Agricultural University. The overall KAP scores of university students were good, with no significant differences in nutrition knowledge, attitude, and behavior between male and female students. However, senior students, due to changes in age, lifestyle, and academic responsibilities, paid more attention to dietary nutrition and health. BMI significantly affected nutrition knowledge but had no significant impact on nutrition attitude and behavior. The proportion of overweight or underweight first-year students was slightly higher than that of senior students. Additionally, students with higher living expenses had a slightly higher overweight rate, while those with lower living expenses had a slightly higher underweight rate. It is recommended that universities strengthen the promotion and education of balanced nutrition and diet among students, guiding them to reasonably adjust their dietary structure. Meanwhile, scientific and rational meal planning should be implemented to comprehensively meet students' dietary needs.

Keywords: Dietary nutrition, Nutrition KAP, Body Mass Index (BMI)

1. Introduction

In contemporary society, university students, as the future pillars of the nation, are of great concern regarding their health status. The university period is a critical stage for individual growth and development, and a balanced diet is crucial to students' physical health, academic performance, and psychological well-being. Proper nutrition not only provides sufficient energy and essential nutrients to help students cope with academic pressures but also enhances immunity and stabilizes mental health. However, with the rapid development of the economy and changes in lifestyle, dietary imbalances among Chinese residents have become increasingly evident, a phenomenon also prevalent among university students. Although the overall health and physical fitness of Chinese university students have improved, their physical fitness level has shown a declining trend, and the link between diet and chronic diseases has become more pronounced. Given this background, an in-depth study of university students' dietary nutrition status is imperative. The Chinese government attaches great importance to the dietary nutrition of university students, as reflected in policy documents such as the Healthy China 2030 blueprint and the National Nutrition Plan (2017-2030). Yantai City actively responds to national policies by implementing various initiatives to enhance residents' nutritional

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literacy, such as promoting nutritional awareness during National Nutrition Week and emphasizing campus food safety measures in the education system.

Based on this, this study focuses on the dietary nutrition status of students at the Yantai Research Institute of China Agricultural University. Through survey methods and BMI analysis, this study examines students' dietary diversity, eating regularity, frequency of nutrient intake, and dining habits. The aim is to comprehensively understand students' nutritional status, identify issues, and provide recommendations to guide students in adopting healthier eating habits, ultimately promoting the overall improvement of university students' nutritional health.

2. Research Background and Significance

2.1. Research Background

2.1.1. Practical Background

In recent years, the Chinese government has placed significant emphasis on university students' dietary nutrition, as highlighted in major policy directives such as Healthy China 2030 and the National Nutrition Plan (2017-2030). In 2019, President Xi Jinping proposed the "Four Strictest" requirements for food safety, which have effectively driven campus food safety reforms. In 2022, the Ministry of Education reported that since the implementation of the Healthy China initiative, student health has made significant progress as a national strategy, with the initial framework of a student health promotion system taking shape.

University students, as the backbone of the country's future development, have physical fitness levels that directly impact national prosperity. During this stage, dietary nutrition significantly influences students' health and overall development. Yantai City, located in the northeastern part of the Shandong Peninsula, actively implements relevant policies to enhance residents' nutritional health literacy. During National Nutrition Week, the Yantai Center for Disease Control and Prevention collaborates with multiple departments to conduct awareness campaigns, promoting nutritional concepts. Additionally, the city has established a special task force to ensure the effectiveness of campus food safety regulations, with the education system actively learning and implementing relevant knowledge.

2.1.2. Theoretical Background

As living standards rise, the dietary structure of Chinese residents has undergone significant changes. Excessive consumption of meat and fats, coupled with a decline in whole grains and tuber foods, has led to nutritional imbalances and new health concerns. Although the overall health status of Chinese university students has improved, their physical fitness levels have declined, and the relationship between dietary nutrition and chronic diseases has become more pronounced.

Dietary nutrition is the fundamental material basis for university students' growth and development and plays a crucial role in promoting health and academic performance. A well-balanced diet ensures the body receives essential nutrients, while nutrient deficiencies or an unbalanced diet can lead to growth retardation, acute and chronic malnutrition, and deficiency-related diseases. Therefore, maintaining adequate nutrition and a balanced diet is essential for the healthy growth of university students.

2.2. Research Significance

Promoting nutrition education among university students and enhancing their awareness, attitudes, and behaviors toward healthy eating are crucial steps in improving public health literacy. By

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analyzing the urgency and feasibility of nutrition education in universities, this study identifies current issues and proposes effective strategies. The findings will contribute to guiding students toward healthy dietary habits, fostering balanced nutrition, and ultimately improving their overall well-being.

3. Research Status at Home and Abroad

3.1. Domestic Research

With the rapid development of science and technology and the improvement of people's material living standards and spiritual needs, people are no longer solely focused on material pursuits but are increasingly concerned about physical health issues. The concept of health has gradually taken root, particularly among university students who have a high level of awareness on this matter [1]. However, data shows that although the overall health and physical condition of university students in China have improved, the general trend in physical fitness is still declining, and the nutritional status of university students is closely linked to various chronic diseases [2]. Therefore, many scholars in this field have pointed out that university students today face significant problems regarding their dietary nutrition.

Chen Youpeng and others stated in their research that although university students show a positive attitude toward learning about dietary nutrition and health, they often lack specialized knowledge. This lack of knowledge leads to irregular food combinations, irregular eating times, and unreasonable daily nutrient intake, which can even result in health problems [2]. Tang Yali, Xu Jianfeng, and Chang Daping also noted in their survey that many students in university exhibit poor awareness of dietary nutrition or engage in unhealthy eating behaviors, some of which severely affect their health [3]. The survey results from Sun Anjia, Li Chunhua, and Sun Wenting also indicated that the nutritional health status of university students is concerning, with insufficient nutrition knowledge, a need for improvement in nutritional attitudes, and significant issues with eating behaviors [4].

To address the nutritional problems of university students, Ma Chuanlan and Cui Huiling emphasized the need for targeted education on nutrition and health knowledge, along with appropriate nursing interventions [5]. After conducting a specific survey and analysis of the dietary nutrition status of university students and the underlying causes, Fu Shixiong suggested that universities should strengthen the management and guidance of students' dietary nutrition and improve the hygiene quality of campus cafeterias to enhance students' nutritional status and physical fitness [6].

Yu Hanjun, He Jiajia, and others proposed specific recommendations for improving the dietary nutrition status of university students. Firstly, they suggested developing a reasonable dietary structure for university students, such as limiting total energy intake, controlling fat intake, increasing dietary fiber intake, boosting vitamin intake, and reducing salt intake. Secondly, they advocated for enhancing students' health awareness and encouraging them to proactively learn about nutrition. Furthermore, since university cafeterias are the primary source of nutrition for students, building a nutritional support system and promoting nutritious meals, along with improving cafeteria management, would help improve the dietary nutrition status of university students [7].

3.2. International Research

There is limited international research on this topic. Australian scholars Smith Elyria, Diddler Rebekah, and Watson Karen found that the transition to university life could lead to weight gain, primarily due to reduced physical activity and unhealthy eating habits. In their long-term follow-up survey of over 100 university students, they discovered that students entering university faced academic adaptation issues, which led them to disrupt their original dietary patterns and experience dietary irregularities [8]. Similarly, American researchers from Virginia Tech, including Strong

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Kathryn, Parks Serena, Anderson Eileen, Twine Richard, and Davy Brenda M., also concluded that young people attending university are more prone to weight gain compared to the general working population. Their dietary habits decline relative to high school, with lower consumption of vegetables, fruits, and whole grains, leading to an increasingly unbalanced diet [9]. In response, some scholars have suggested the establishment of an interactive healthy eating index and healthcare system, using technological methods to improve university students' dietary structure. Such a system would allow students to record their dietary content and nutritional components anytime and anywhere, helping them adjust their eating habits and prevent chronic diseases in the future [10].

4. Research Content and Research Design

4.1. Research Content

This study uses survey methods and Body Mass Index (BMI) analysis to investigate various aspects of university students' dietary habits, including food types, dietary regularity, meal frequency, and primary dining methods. The aim is to assess the nutritional status of university students at the Yantai Research Institute of China Agricultural University, identify the issues in their dietary nutrition status, and provide reasonable suggestions to guide students toward healthier eating habits.

4.1.1. Survey Subjects

A stratified random sampling method was used to select 112 students from China Agricultural University Yantai Research Institute as the research subjects.

4.1.2. Survey Method

Survey Questionnaire Method: Standardized, written questionnaires, following a specific sampling method, were designed for multiple research subjects based on the actual situation. These questionnaires collected general information from the research subjects, including their grade, major, gender, and place of origin. Each participant received one survey questionnaire and was required to fill it out objectively and truthfully. The completed questionnaires were immediately collected, and all responses were valid. The collected data were then analyzed, synthesized, compared, and summarized to draw conclusions.

4.1.3. Questionnaire Design

A KAP (Knowledge, Attitude, and Practice) survey questionnaire was self-designed and was pre-tested before evaluation and revision. The KAP questionnaire consisted of four parts: basic information (6 questions), nutrition knowledge (10 questions), nutrition attitude (5 questions), and nutrition behavior (12 questions), all in the form of multiple-choice questions.

4.1.4. Questionnaire Distribution and Scoring

Surveyors were trained uniformly, and they distributed electronic questionnaires, followed up on responses, and ensured the authenticity and completeness of the questionnaires. The KAP questionnaire was scored using a point assignment method. Correct answers in the nutrition knowledge section scored 1 point, while incorrect answers scored 0 points, with a maximum score of 30. Nutrition attitude was scored based on the positivity of responses, with a scoring range from 0 to 3, for a maximum score of 20. Nutrition behavior was scored based on the rationality of responses, with a scoring range from 0 to 3, for a maximum score of 30. The total score was 80 points.

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4.2. Statistical Analysis

The questionnaire database was established and entered using Excel software, and statistical analysis was performed using SPSS 21.0 software. Data that conformed to normal or approximately normal distribution were presented as x±s, and $p<0.05$ was considered statistically significant.

4.2.1. Analysis of University Students' Dietary Nutrition Status

A total of 112 valid questionnaires were collected in this study, with 56 male participants (50% of the total) and 56 female participants (50% of the total). The questionnaires covered different academic years at the Yantai Research Institute, with the highest number of respondents from freshmen to juniors, each accounting for 25% of the total, while the number of seniors, dual-degree students, and graduate students was relatively smaller, as shown in Table 1.

Table 1: General results of the questionnaire

Item	norm	Number of persons/person	Percentage/%
Gender	Male	56	50
	Female	56	50
Grade	Freshman	28	25
	Sophomore	28	25
	Junior	28	25
	Senior	16	14.29
	Second Degree	6	5.36
	Graduate Student	6	5.36

4.2.2. Current Status of College Students' Dietary Nutrition KAP

According to the survey, the overall KAP score for dietary nutrition among the students at Yantai Research Institute of China Agricultural University is 59.1 points. Specifically, the scores for dietary nutrition knowledge, attitudes, and behavior are 23.1, 11.7, and 24.3 points, respectively. Over 50% of the students showed good levels of knowledge, attitude, and behavior regarding nutrition, as shown in Table 2.

Table 2: Current Status of College Students' Dietary Nutrition KAP

Indicator	Score Range (Points)	Number (Percentage)
Nutrition Knowledge	≤ 20 (Average)	8(7.1)
	> 20 and ≤ 25 (Good)	94(83.9)
	> 25 and ≤ 30 (Excellent)	10(8.9)
Nutrition Attitude	≤ 10 (Average)	30(26.8)
	> 10 and ≤ 15 (Good)	78(69.6)
	> 15 and ≤ 20 (Excellent)	4(3.6)
Nutrition Behavior	≤ 20 (Average)	14(12.5)
	> 20 and ≤ 25 (Good)	51(45.5)
	> 25 and ≤ 30 (Excellent)	47(42.0)

4.2.3. Nutritional Knowledge, Attitude, and Behavior by Gender and Age

Statistical analysis of the KAP status between male and female students revealed no significant differences in nutritional knowledge, attitudes, or behavior. As shown in Table 3, although male

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students had an average score of 23.30±2.18 for nutrition knowledge, which was higher than that of female students (22.98±2.25), the difference was not statistically significant (p=0.445). Similarly, male students had a higher average score of 11.30±2.67 for nutritional attitude compared to female students (10.55±1.97), but again, this difference was not significant (p=0.126). In terms of nutrition behavior, female students scored higher (24.86±2.78) than male students (23.75±4.60), though this difference was also not significant (p=0.094). These results suggest that gender does not have a significant impact on these aspects of nutrition knowledge, attitude, or behavior.

Both male and female students showed similar levels of knowledge, particularly regarding the nutritional content of various food types. In terms of attitudes and behaviors, there was little difference between genders, with most students not particularly interested in nutrition knowledge but willing to learn more and adopt good dietary habits. This indicates that university students are conscious of their health.

Regarding the KAP scores across different year groups, no significant differences were found in nutrition knowledge (F=2.569, p=0.058, p>0.05), while there were significant differences in nutritional attitudes (F=3.721, p=0.014, p<0.05) and nutrition behavior (F=2.820, p=0.042, p<0.05) [11]. This indicates that, while students' knowledge of nutrition remains consistent across years, their attitudes and behaviors improve as they progress through their studies [12]. This may be due to more varied food choices available in university cafeterias, and students gradually becoming more aware of the importance of balanced diets.

4.2.4. Relationship Between BMI and KAP Based on Demographic Features

BMI significantly impacted nutrition knowledge scores (F=3.231, p=0.043), but did not have a significant effect on nutritional attitude or behavior (p>0.05). This suggests that relying solely on attitude and behavior interventions may be insufficient, and more emphasis should be placed on nutrition knowledge education. Analysis of different BMI groups revealed that the underweight group had significantly higher nutrition knowledge scores (24.33±2.72) than both the normal (22.91±2.17) and overweight groups (22.95±1.54), indicating that knowledge level might influence weight status. The overweight group had higher nutrition behavior scores (26.05±2.39) than the other groups, but the difference was not statistically significant (p=0.077), indicating that further research is needed to confirm the relationship between dietary behavior and BMI [13].

Significant differences were found in nutrition behavior across different living expense groups (F=4.230, p=0.007), with the high-expenditure group (monthly expenses > 3000 yuan) scoring the lowest in nutrition behavior (20.75±4.11). This may be related to increased freedom in food choices leading to picky eating habits [14]. Interestingly, the high-expenditure group had significantly higher nutrition knowledge scores (24.50±1.00) compared to the low-expenditure group, showing a knowledge-behavior disconnect.

Table 3: Comparison of results of nutritional KAP scores of university students with different demographic characteristics

Demographic Indicators		Number of People	Statistics Value	Nutrition Knowledge	Nutrition Attitude	Nutrition Behavior
Gender	Male	56		23.30±2.18	11.30±2.67	23.75±4.60
	Female	56		22.98±2.25	10.55±1.97	24.86±2.78
			t	0.767	-1.542	1.691
			p	0.445	0.126	0.094
Grade	Freshman	28		22.68±2.09	10.96±2.01	24.46±3.56
	Sophomore	28		22.79±1.97	10.86±1.80	24.82±3.65

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Table 3: (continued).

	Junior	28		24.11±2.54	11.96±2.89	22.61±4.43
	Senior	28		23.00±2.02	9.93±2.29	25.32±3.17
			F	2.569	3.721	2.820
			p	0.058	0.014	0.042
	BMI<18.5	18		24.33±2.72	10.50±2.66	24.06±4.11
	18.5≤BMI<24.0	74		22.91±2.17	11.23±2.28	23.89±3.97
BMI	24.0≤BMI	20		22.95±1.54	10.20±2.28	26.05±2.39
			F	3.231	1.872	2.630
			t	0.043	0.159	0.077
	Under 1000	22		22.77±1.48	10.91±1.57	26.50±25.78
	1000-2000	84		23.13±2.40	11.00±2.48	23.92±3.90
Life	2000-3000	2		25.00±0.00	8.00±0.00	23.50±0.71
Expense	Over 3000	4		24.50±1.00	11.00±3.74	20.75±4.11
			F	1.182	1.050	4.230
			t	0.320	0.374	0.007

Table 4 shows that the BMI distribution of the surveyed students follows a normal distribution: underweight (16.1%), normal weight (66.1%), and overweight/obese (17.8%), which is better than similar studies in China. The gender distribution shows that the underweight proportion for females (23.2%) is significantly higher than that for males (8.9%) (χ^2=4.572, p=0.102), while the overweight proportion for males (21.4%) is higher than that for females (14.3%), reflecting gender differences in body management behaviors. No statistical differences were found in BMI distribution across different grades (χ^2=7.562, p=0.272) or living expenses (χ^2=4.869, p=0.559). However, the overweight/underweight rate for freshmen (each at 25.0%) is higher than other grade levels, and the overweight rate in the high-expense group (25.0%) is 2.4-7.1 percentage points higher than in other groups.

Table 4: Comparison of BMI Distribution Among College Students with Different Demographic Characteristics

			BMI<18.5	18.5≤BMI<24.0	24.0≤BMI
Gender	Male		5	39	12
	Female		13	35	8
		X^2	4.572		
		p	0.102		
Grade	Freshman		7	14	7
	Sophomore		2	22	4
	Junior		6	19	3
	Senior		3	19	6
		X^2	7.562		
		p	0.272		
Life Expense	Under 1000		6	12	4
	1000-2000		12	58	14
	2000-3000		0	1	1
	Over 3000		0	3	1
		X^2	4.869		
		p	0.559		

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5. Discussion and Conclusion

This study surveyed 112 students from the Yantai Research Institute of China Agricultural University, analyzing their dietary and nutritional status. The overall KAP (Knowledge, Attitude, and Practice) score of the students was 59.1 points, with more than half of the students performing well in terms of knowledge, attitude, and behavior, though some issues remain. In terms of gender differences, no significant differences were found between male and female students in terms of nutrition knowledge, attitude, or behavior, indicating that gender has a small impact on the students' dietary nutrition awareness and practices. As for grade differences, the level of nutrition knowledge was similar across all grades, but there were significant differences in nutrition attitude and behavior. Higher-grade students placed more emphasis on dietary nutrition health. This provides a basis for conducting tiered nutrition education, with a focus on guiding lower-grade students to develop good nutritional concepts and habits. Regarding the relationship between BMI and KAP, BMI significantly impacted nutrition knowledge scores, with underweight students scoring higher in knowledge. This suggests that knowledge levels may be related to weight status. However, BMI had no significant effect on nutrition attitude or behavior, indicating that solely relying on attitude guidance or behavioral intervention to improve dietary nutrition may be ineffective. Therefore, reinforcing nutrition knowledge education is essential. Moreover, significant differences were observed in nutrition behavior across different living expense groups. The high-expense group had the lowest behavior scores, and there was a separation between knowledge and behavior, indicating the complex influence of economic factors on students' dietary behavior.

In conclusion, this study comprehensively presents the dietary and nutritional status of the students at this university. Based on these results, universities should tailor nutrition education programs for different grades, BMI levels, and living expense groups. For example, nutrition courses could be offered to lower-grade students, and behavioral interventions could be implemented for high-expense groups. Universities should also strengthen nutrition and balanced diet publicity and education, guiding students to adjust their dietary structure and establish healthy eating habits. Additionally, university dining services should follow the scientific guidelines provided in the "Dietary Guidelines for Chinese Residents," offering a reasonable variety of meals that include whole grains, fruits, dairy, legumes, and seafood, while ensuring that the nutritional needs of students are met with appropriately priced meal options.

Author Contributions

Shanshan Song and Haotong Wang: Conceptualization, Methodology, Data curation, Writing-Original draft preparation, Visualization, Investigation.

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