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ARTICLE

APPLICATION OF FOOD FREQUENCY METHOD TO EVALUATE THE DIETARY STRUCTURE OF NIGHT SHIFT MEDICAL STAFF IN A TERTIARY HOSPITAL IN LANZHOU

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ABSTRACT

Objective: To evaluate the dietary structure of night shift medical staff and provide a theoretical basis for improving their health status. Methods: A total of 375 night shift medical staff from a tertiary hospital in Lanzhou were selected as the study subjects. The food frequency method was used to assess their dietary structure. Results: A total of 375 night shift medical staff were surveyed, including 87 males and 288 females. The intake of vegetables, dairy products, and soy and nuts was insufficient among the night shift medical staff, while the average intake of fruits slightly exceeded the recommended amount. Conclusion: Although the medical staff have a high level of health knowledge, their ability to take health actions is insufficient, resulting in an unreasonable dietary structure. Night shift medical staff generally have high work intensity, and attention should be paid to their dietary structure to reduce the frequency of eating out and improve their health status.

KEYWORDS

Dietary Structure; Food Frequency Method; Night Shift Medical Staff

1. Introduction

Healthcare workers bear heavy medical responsibilities for a long time. The stressful working environment, irregular meals, and erratic schedules lead to immense psychological and physiological pressure on healthcare workers (Chew et al., 2020). According to the "2020 China Doctors' Diet Report" 2020, in the first half of 2020, Chinese doctors ordered 170 million takeaway meals. In pursuit of taste, these takeaways are often high in oil and salt, and long-term consumption affects health. Therefore, the dietary nutrition and health status of healthcare workers are issues worth attention (O'Connor et al., 2023). Studies have found (Zhou and Zhang, 2020) that healthcare workers in emergency and ICU departments have a higher proportion of poor eating habits. However, studies on the dietary structure of night shift healthcare workers are rare. This study investigates the dietary structure of 375 night shift healthcare workers in a tertiary hospital in Lanzhou, analyzes the problems and causes, and provides a scientific theoretical basis for improving the health status of night shift healthcare workers.

2. Subjects and Methods

2.1 Subjects

Inclusion criteria for the night shift population: age ≥18 years; working experience ≥1 year; night shift duration ≥1 year; no history of major diseases such as heart disease, stroke, or malignant tumors. All night shift staff meeting the inclusion criteria from a tertiary hospital in Lanzhou were included as study subjects. Informed consent was obtained from the night shift healthcare workers for this survey. This study was approved by the Ethics Committee of the Second People's Hospital of Gansu Province, approval number: (2024) Ethics Review (Science) No. (04).The age groups of the study subjects were: 18-29 years, 30-39 years, 40-49 years, and 50 years and above; educational level groups were: associate degree and below, bachelor's degree, master's degree, and above; monthly income (RMB) levels were: <6000, 6000-9999, and ≥10000; occupational groups were: doctors, nurses, and technicians.

2.2 Methods

2.2.1 Dietary Survey

A Food Frequency Questionnaire (FFQ) was used to survey the frequency and quantity of intake of cereals, vegetables, fruits, animal foods, dairy products, soy, and nuts over the past six months. The subjects were required to recall their intake, with the help of food models and containers to estimate the quantity.

2.2.2 Eating Habits Survey

A questionnaire survey (Wang, 2023) was conducted to investigate the

eating habits of the study subjects over the past six months, including dietary preferences and tastes, types of takeout, frequency of ordering takeout, and weekly night shift duration.

2.2.3 Diagnostic Criteria for Diseases or Abnormal Indicators

Fasting Blood Glucose: Fasting blood glucose of 6.10 mmol/L ≤ fasting blood glucose < 7.0 mmol/L is considered impaired fasting glucose; fasting blood glucose ≥ 7.0 mmol/L is considered diabetes.

Blood Pressure: Adult systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg is considered hypertension.

Blood Lipids: Total cholesterol > 5.20 mmol/L and/or triglycerides > 1.70 mmol/L and/or low-density lipoprotein cholesterol > 3.12 mmol/L is considered dyslipidemia.

Uric Acid: Male uric acid > 428 μmol/L, female uric acid > 357 μmol/L is considered hyperuricemia.

BMI: < 18.5 kg/m^2 is considered underweight, 18.5- < 23.9 kg/m^2 is considered normal, 24- < 28 kg/m^2 is considered overweight, and ≥ 28 kg/m^2 is considered obese.

2.2.4 Quality Control

A pre-survey was conducted before the formal survey, and any issues identified during the pre-survey were promptly resolved. Graduate students majoring in preventive medicine were selected as investigators, who needed to be meticulous, responsible, and have certain social skills. They received uniform and systematic training, including inquiry methods, specific standards, and solutions to potential problems.

2.2.5 Statistical Analysis

A database was established using Epidata 3.0, and statistical analysis was performed using SPSS 22.0 software. The results of various dietary intakes were expressed as ±s. The t-test was used to compare quantitative data between two groups, and variance analysis was used for multiple group comparisons. If P < 0.05, the q-test was further performed to determine the intake of various food types in different groups.

3. Results and Analysis

3.1 Basic Demographic Information

A total of 375 night shift healthcare workers were surveyed, and 375 valid questionnaires were obtained, with a valid response rate of 100%. Among them, there were 87 males and 288 females.

3.2 Dietary Intake Status

Table 1: General information of the study subjects

Category		Male	Femail	Total
		(n=87)	(n=288)	N=375
Age(years)	18-29	15(4%)	72(19.2%)	87(23.2%)
	30-39	43(11.5%)	158(42.1%)	201(53.6%)
	40-49	20(5.3%)	37(9.9%)	57(15.2%)
	≥50	9(2.4%)	21(5.6%)	30(8%)
Education Level	Associate degree and below	6(1.6%)	30(8%)	36(9.6%)
	Bachelor's degree	52(13.9%)	221(58.9%)	273(72.8%)
	Master's degree and above	29(7.7%)	37(9.9%)	66(17.6%)
Monthly Income (RMB)	＜6000	12(3.2%)	45(12.0%)	57(15.2%)
	6000-9999	44(11.7%)	178(47.5%)	222(59.2%)
	≥10000	31(8.3%)	65(17.3%)	96(25.6%)
Occupation	Doctor	56(14.9%)	139(37.1%)	195(52.0%)
	Nurse	9(2.4%)	114(30.4%)	123(32.8%)
	Technician	22(5.9%)	35(9.3%)	57(15.2%)

Table 2: Average food intake of night shift healthcare workers

Food Category	Average Intake (g/d, x±s)	Recommended Intake (g/d)
Cereals	305.57±68.2	200–300
— Whole Grains and Legumes	73.68±17.6	50-150
Tubers	62.04±17.3	50–100
Vegetables	215.31±46.7	300–500
Fruits	379.5±34.2	200–350
Animal Foods	195.26±100.4	120–200
Dairy Products	150.63±50.6	300–500
Soy and Nuts	19.27±4.8	25–35

Variable	Food category(g/d，x±s)							
	Variable	Categories	Cereals (g/d)	Whole Grains and Legumes (g/d)	Tubers (g/d)	Vegetables (g/d)	Fruits (g/d)	Animal Foods (g/d)
Sex								
Male	345.67±25.3	43.62±10.2	40.31±19.5	150.67±45.8	310.15±41.2	300.47±61.4	90.27±31.4	12.00±3.6
Female	293.46±17.3	82.76±22.9	68.60±27.2	234.84±33.4	400.45±37.3	163.48±29.8	168.86±40.1	21.477±4.4
T value	4.126	-3.373	-0.276	-7.803	-5.872	16.357	-4.838	-9.046
P value	＜0.05	＜0.05	0.363	＜0.05	＜0.05	＜0.05	＜0.05	＜0.05
Age								
18-29	273.36±15.4	80.25±13.2	57.38±11.4	236.34±21.4	420.26±23.7	163.28±17.9	169.38±21.8	30.98±7.9
30-39	316.18±22.4	72.37±15.4	63.52±7.6	217.24±10.5	380.21±15.4	224.25±31.3	133.75±21.4	15.64±3.7
40-49	330.24±17.5	62.51±16.7	59.67±17.4	190.65±13.6	350.68±13.8	176.28±17.6	142.37±16.7	13.28±6.8
≥50	281.019±11.2	84.627±10.4	70.141±15.8	188.246±14.7	311.297±23.7	129.831±29.7	225.045±25.2	21.013±6.4
F value	2.624	0.628	1.426	12.348	7.324	7.259	18.279	5.497
P value	＜0.05	0.572	0.366	＜0.05	＜0.05	＜0.05	＜0.05	＜0.05
Education Level								
Associate degree and below	312.57±30.6	56.31±13.5	87.34±15.2	223.58±20.6	357.28±17.4	200.24±15.3	120.36±16.8	20.29±5.8
Bachelor's degree	304.27±26.4	72.37±8.1	57.24±13.4	203.34±15.4	380.27±10.3	200.34±18.5	149.38±21.2	18.67±4.3
Master's degree and above	307.13±31.9	88.57±6.8	68.09±18.7	260.31±14.9	388.44±10.4	171.53±10.4	172.31±13.3	21.20±4.9
F value	0.826	3.645	3.321	12.384	1.264	6.326	9.658	0.526
P value	0.342	＜0.05	＜0.05	＜0.05	0.269	＜0.05	＜0.05	0.598
Occupation								
Doctor	289.65±16.2	66.27±12.4	53.29±7.8	177.84±32.6	360.50±30.2	237.64±30.1	148.64±11.2	15.29±6.2
Nurse	321.5±20.1	77.24±5.7	67.34±6.7	226.9±18.2	402.13±25.7	165.27±20.7	159.64±17.5	25.56±2.7
Technician	325.66±18.7	91.35±6.7	80.54±10.2	318.49±23.5	395.67±18.4	114.99±26.9	138.00±23.4	19.31±3.6
F value	0.932	2.722	2.327	6.158	0.609	4.268	0.924	2.649
P value	0.363	＜0.05	＜0.05	＜0.05	0.583	＜0.05	0.375	＜0.05

Table 2 results show that the intake of cereals and animal foods among night shift healthcare workers is within a reasonable range, reaching a medium to high level. The intake of whole grains and legumes exceeds the minimum recommended intake but is still generally low. The intake of tubers exceeds the minimum recommended intake but is also generally low. The average intake of vegetables, dairy products, soy, and nuts does not meet the recommended intake levels according to the 2022 Chinese Dietary Guidelines. The intake of fruits exceeds the recommended intake.

3.3 Differences in Dietary Structure Across Different Demographic Characteristics

Table 3 results show that there are statistically significant differences in the intake of cereals (including whole grains and legumes), vegetables, fruits, animal foods, dairy products, soy, and nuts between different genders ($P<0.05$). Males have a significantly higher intake of cereals and animal foods compared to females. Females, on the other hand, have a significantly higher intake of whole grains, legumes, vegetables, fruits,

Table 4: Distribution of dietary habits among night shift healthcare workers

Classification		Doctor	Nurse	Technician
		(n=195)	(n=123)	(n=57)
Diet taste or food bias	insipidity	102(52.3%)	42(34.1%)	24(42.1%)
	pungent	96(49.2%)	93(75.6%)	30(52.6%)
	Salt	9(4.6%)	15(12.2%)	3(5.3%)
	Sweet	54(27.6%)	24(19.5%)	15(26.3%)
	Sour	30(15.4%)	27(21.9%)	18(31.6%)
	grilled	45(23.1%)	57(46.3%)	18(31.6%)
Weekly night shift duration (h)	8-16)	51(26.1%)	60(48.8%)	9(15.8%)
	[16-24)	120(61.5%)	36(29.3%)	42(73.7%)
	[24-32)	6(3.1%)	15(12.2%)	0(0%)
	≥32	18(9.2%)	12(9.7%)	6(10.5%)
Takeout types	snack	93(47.7%)	66(53.7%)	33(57.9%)
	Barbecue fried string	57(29.2%)	48(39.0%)	15(26.3%)
	western fast food	15(7.7%)	9(7.3%)	0(0%)
	Malatang (take vegetables, fragrant pot)	78(40.0%)	78(63.4%)	15(26.3%)
	Steamed stuffed bun dim sum	21(10.7%)	15(12.2%)	0(0%)
	Drink dessert	45(23.1%)	33(26.8%)	6(10.5%)
Frequency of ordering takeout (times / week)	refuse to obey	60(30.7%)	36(29.3%)	18(31.6%)
	1-2	87(44.6%)	78(63.4%)	33(57.9%)
	3-5	42(21.5%)	27(22.0%)	6(10.5%)
	6-7	6(3.0%)	0(0%)	0(0%)

Table 5: Detection rates of diseases or abnormal indicators

Disease or anomaly	Abnormal number (male, female) / one	relevance ratio /%
Hypertension	24(9, 15)	7.2
Hyperlipemia	30(15, 15)	8
Diabetes	6(3, 3)	1.6
Hyperuricemia	6(0, 6)	1.6
Digestive system disease	21(9, 12)	5.6
Marasmus	27(0, 27)	7.2
Overload	81(39, 42)	21.6
Fat	15(6, 9)	4

dairy products, soy, and nuts compared to males. The intake of tubers shows no statistically significant difference between genders.

Among night shift healthcare workers of different age groups, there are statistically significant differences in the intake of cereals, vegetables, fruits, animal foods, dairy products, soy, and nuts (P<0.05). Further q-test results indicate that: The intake of cereals is higher among workers aged 30-49 years compared to those aged 18-29 years and 50 years and above. Workers aged over 40 years have a lower intake of vegetables compared to those under 40 years. Fruit intake decreases with age. Workers aged 30-39 years have a relatively higher intake of animal foods, while those aged 50 years and above have a lower intake. The intake of dairy products and nuts is higher among workers aged 18-29 years and those aged 50 years and above compared to those aged 30-49 years.

There are statistically significant differences in the intake of whole grains and legumes, tubers, vegetables, animal foods, and dairy products among night shift healthcare workers with different educational levels (P<0.05). Further q-test results indicate that: Workers with a master's degree or above differ in their intake of whole grains, legumes, vegetables, dairy products, and animal foods compared to those with a bachelor's degree and those with an associate degree or below. The intake of tubers among workers with an associate degree or below differs from those with a bachelor's degree or above. There are statistically significant differences in the intake of whole grains and legumes, tubers, vegetables, animal foods, soy, and nuts among night shift healthcare workers with different occupations (P<0.05). Further q-test results indicate that: Technicians differ in their intake of whole grains, legumes, tubers, vegetables, soy, and nuts compared to doctors and nurses. The intake of animal foods among doctors differs from that of nurses and technicians.

3.4 Distribution of Dietary Habits Among Night Shift Healthcare Workers

Table 4 results show that most doctors and technicians prefer spicy and light flavors, with a significant number of them favoring these tastes. The majority of doctors and technicians have night shifts lasting 16-24 hours, while 50% of nurses have night shifts lasting 8-16 hours per week. Among the types of takeout ordered by doctors, nurses, and technicians, fast food and spicy hot pot (including Mala Tang and fragrant pot) are the most common. Most people order takeout 1-2 times per week.

3.5 Disease or Abnormal Indicator Status Among Night Shift Healthcare Workers

Table 5 results show that among chronic diseases, the highest detection rate is for hyperlipidemia, followed by hypertension and digestive system diseases. The detection rates for diabetes and hyperuricemia are relatively low. The proportion of overweight and obese individuals is 25.6%, indicating a high detection rate. The detection rate for underweight individuals is 7.2%, all of whom are female.

4. Discussion

4.1 Coexistence of Insufficient and Excessive Food Intake Among Night Shift Healthcare Workers

Using the Chinese Resident Food Pagoda (2022) to assess the dietary intake of healthcare workers, it shows varying degrees of deficiency in vegetables, dairy products, and soybeans/nuts, while fruit intake is relatively high. Compared with studies by Luo et al., (2023) on dietary quality among middle-aged and elderly people in Gansu, the intake of fruits and animal-based foods among night shift healthcare workers is notably higher. Compared with research by Lv et al., (2024) on dining habits of adult males in China, vegetable intake among night shift healthcare workers is lower than that of adult males in China from 2000 to 2018, but fruit, animal-based foods, and dairy intake levels are significantly higher than those observed during the same period. Studies by Hou et al., (2021) confirm that families with higher income levels tend to consume fewer vegetables while showing a relative increase in the intake of animal-based foods, dairy products, and fruits, which aligns with the findings of this study.

4.2 Unreasonable Dietary Structure Among Night Shift Healthcare Workers

There are differences in the types of food intake between genders, with males consuming significantly more cereal and animal-based foods (Luo et al., 2023). This may be related to the preference among Lanzhou men for beef noodles (Lu, 2018) and grilled lamb (Shang et al., 2022). Females consume significantly more whole grains and legumes, vegetables, fruits, dairy products, and soybeans/nuts than males (Luo , 2024). Workers aged 40 and above consume less vegetables than those under 40, and as age increases, fruit intake gradually decreases. Workers aged 18-29 and over 50 consume higher amounts of dairy products and nuts compared to those aged 30-49. This aligns with recent trends in China where per capita consumption of vegetables, fruits, poultry and eggs, aquatic products, and dairy products has fluctuated and generally increased (Chen and Zhong, 2024). The higher intake of vegetables and water among young people may be related to diverse dietary habits, while slightly older healthcare workers may consume relatively less fruit and vegetables due to their dietary habits. Research on individuals with different levels of education shows that those with a master's degree or above have higher intakes of whole grains and legumes, vegetables, and dairy products, possibly due to higher levels of education and relatively higher health awareness.

5. Recommendations

According to the Chinese Resident Food Pagoda (2022), the recommended intake of vegetables is 300-500 g/day. This study found that the average vegetable intake per capita among night shift healthcare workers is 85 g/day lower than the lowest recommended value of the Pagoda. Vegetables provide essential vitamins, minerals, and dietary fiber needed by the body. In addition, vegetables contain a variety of phytochemicals that can effectively prevent chronic and degenerative diseases (Gong et al., 2020). The average intake of dairy products per capita is 150 g/day lower than the lowest recommended value of the Pagoda. The new edition of the dietary guidelines for 2022 explicitly recommends a daily intake of 300-500 g per person. Dairy products are an important part of a balanced diet suitable for all people. Dairy products play a key role in improving the overall nutritional status of the population in China's Healthy China strategy. In recent years, the consumption potential of dairy products among Chinese residents has increased, but the per capita consumption of milk among Chinese people remains low globally (Luo, 2024; Xu et al., 2022). Although the intake of cereals and potatoes among night shift healthcare workers is basically consistent with the recommended amount of the Pagoda, due to regional characteristics or dietary habits, the diet is spicy and roasted, and the fast pace of work among healthcare workers, the frequency of takeout orders is higher, but most takeout orders are heavy in flavor and greasiness, leading to higher rates of overweight and obesity among night shift healthcare workers compared to other diseases. Therefore, it is recommended that night shift healthcare workers reduce the frequency of takeout orders and increase their intake of vegetables, dairy products, soybeans, and nuts.

This study currently only surveys the food consumption status of 375 night shift healthcare workers in a Grade A tertiary hospital in Lanzhou City, which has a small sample size and may not reflect the overall food consumption patterns of night shift workers as a whole, which may differ from the actual situation.

Conflict of Interest

There are no conflicts of interest among all authors.

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Reference

"2020 China Doctor Group Diet Report," Meituan Takeaway, released on August 18, 2020.

Chen, J., Zhong, F. N. 2024. Research on the coordinated path of diet structure optimization and agricultural carbon reduction—Based on food price analysis. Journal of Hunan Agricultural University

(Social Science Edition), 25(01), Pp. 16-24.

Chew, N. W. S., Lee, G. K. H., Tan, B. Y. Q., et al. 2020. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain, Behavior, and Immunity, 88, Pp. 559-565.

Gong, X., Li, X., Xu, Y., et al. 2020. Effects of phytochemicals from plant-based functional foods on hyperlipidemia and their underpinning mechanisms. Trends in Food Science & Technology, 103, Pp. 304-320.

Hou, P., Zhang, D., Cheng, S. K. 2021. An empirical study on food consumption differences in urban families—Taking Zhengzhou as an example. Journal of Natural Resources, 36(08), Pp. 1976-1987.

Lu, Y. Q. 2018. Collective memory and cultural identity of Lanzhou people—A bowl of beef noodles. *Communication Research, 2(07), Pp. 20-21.

Luo, W. C. 2024. Research on the optimization path of food consumption structure of Chinese residents. *Price Theory and Practice, Pp. 1-5.

Luo, W. R., Zhao, Y., Ma, J., et al. 2023. Study on the relationship between dietary quality and bone mass in middle-aged and elderly people in Gansu. Journal of Xi'an Jiaotong University: Medical Edition, 44(3), Pp. 481-488.

Lv, M. R., Su, C., Huang, F. F., et al. 2024. Trends and dietary nutrition associations of dining out among Chinese adult males from 2000 to 2018. Health Research, 53(01), Pp. 42-48.

O'Connor, L. F., Madden, G. R., Stone, D., et al. 2023. Risk factors for severe COVID-19 among health care workers. Journal of Occupational and Environmental Medicine.

Shang, J. H., Chang, C. C., Ding, Z. X., et al. 2022. Isolation and identification of spoilage microorganisms in Lanzhou grilled lamb. Modern Food, 28(08), Pp. 206-208+217.

Wang, H. R. 2023. Survey analysis of dietary behavior habits of university students. *Modern Food, 29(15), Pp. 217-220.

Xu, X., Cheng, X., Zhao, L., et al. 2022. Consumption of milk and dairy products among junior high and senior high school students—China, 2016–2017. China CDC Weekly, 4(3), Pp. 5.

Zhou, Y. N., Zhang, H. P. 2020. Health status survey of nursing staff in a Grade A tertiary hospital in Wuhan. Medical Information, 33(24), Pp. 3.