

## Effects of Dietary Attitudes on the Nutritional Status of Nurses in Kyungnam Province

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This study has investigated the effect of dietary attitudes on nutritional status of nurses living in Kyungnam province. A total of 249 nurses working at hospitals in the Kyungnam area participated in this study. The general characteristics and dietary attitudes of the subjects were surveyed using a self-administered questionnaire, and nutrient intakes were examined using one day 24-hour recall method from November 14 to December 20, in 2001. The data of nutrient intakes were analyzed by the Computer Aided Nutritional Analysis Program and then the diet quality was estimated using the Index of Nutritional Quality (INQ). The subjects were classified as the high score group (17.3%), medium score group (54.2%), and low score group (28.5%) based on dietary attitude score. The results were as follows: Average age of subjects was 27.1 years old, average nursing experience was 5.7 years, and 70.7% of the subjects graduated from a junior college. The rate of shift work (45.4%) and non-shift work (54.6%) were similar. The average score on dietary attitudes in the high score group was 78.8, and those in the medium score group and in the low score group were 58.6 and 40.8 out of 100 points respectively. The average intake of energy ( $p<0.001$ ), carbohydrate ( $p<0.001$ ), protein ( $p<0.05$ ), animal protein ( $p<0.01$ ), animal fat ( $p<0.05$ ), vitamin B<sub>1</sub> ( $p<0.01$ ), vitamin B<sub>2</sub> ( $p<0.01$ ), niacin ( $p<0.001$ ), Ca ( $p<0.001$ ), Fe ( $p<0.001$ ), animal Fe ( $p<0.01$ ), P ( $p<0.001$ ), and crude fiber ( $p<0.001$ ), were significantly higher in the high score group than those in the medium score group and low score group. In the high score group, the average intake of protein, vitamin B<sub>1</sub>, niacin, vitamin C and P were above 125% of the Korean RDA, and in medium score group, those of vitamin C and P, and in low score group, that of vitamin C were above 125% of the Korean RDA. In the high score group, nutrient of intake below 75% of the Korean RDA was Ca, and those in medium score group were vitamin B<sub>2</sub>, Ca, and Fe, and those in low score group were energy, vitamin B<sub>2</sub>, Ca and Fe. The intake ratio of Ca and P showed an unbalance of 1:2, and that of animal protein/plant protein, and that of animal fat/plant fat were high (1.45-1.64) in all groups. The dietary attitude had a positive correlation ( $p<0.001$ ) with nutrition intake except vitamin A and vitamin C.

**Keywords:** Nurse, Dietary attitude, Nutrient intake

### INTRODUCTION

It has been reported that degenerative disease are increasing recently in Korea as well as in the United States and Europe.<sup>1)</sup> According to the U.S. Department of Health and Human Service, healthful eating patterns can reduce the risk for chronic disease including heart disease, cancer, stroke, and osteoporosis, which are leading causes of death and disability among Americans. A healthy diet can also reduce major risk factors for chronic disease including high blood pressure, high blood cholesterol, and obesity.<sup>2)</sup> Dietary attitudes are important determinants of one's diet and nutritional status.<sup>3)</sup> Dietary attitudes of each individual tend to persist throughout life. It is very difficult to correct one's dietary attitude in a short period of time.<sup>4)</sup> According

to a dietary survey of dietitian, it has been found that average intake of energy, Ca, and Fe were lower than the Korean RDA, and the nutrient intakes were positively correlated with dietary attitudes.<sup>3)</sup> Korea is one of the most rapidly changing areas in Asia as well as in the world, and it is quite conceivable that the eating habits of the Korean people are also undergoing significant changes. Unfortunately, these changes are not toward the healthier diet but toward unhealthier diet such as more animal fat, animal protein consumption, and lack of dietary fiber intake.<sup>5-6)</sup> Realizing the importance of nutrition management in preventing chronic diseases and treating diseases, the Korean government is now promoting better health for Koreans by changing the emphasis of its health management policies from passive remedial methods to preventive methods such as health education, nutritional improvement and promotion of healthy lifestyles.<sup>7)</sup>

Many studies<sup>8-10)</sup> reported that regularity in eating meals is critical in promoting health, nutrition and life expectancy. However, scholars currently report that poor nutrition, sedentary lifestyle, obesity, stress, smoking and excessive drinking affect the physiological decline of human beings in the latter stages of their lives.<sup>11)</sup> It is important for nurses to develop healthy lifestyles and desirable dietary attitudes in order to prevent degenerative disease in later life. However only a few research data are available on the effect of dietary attitude of nurses who affect patients most directly toward their nutritional status. Nowadays, most of the nurses work in the environment of irregular eating habits, lack of exercise, and lots of stress. Therefore, our study focused on the effects and correlation of dietary attitudes on the nutritional status of nurses in Kyungnam province.

## MATERIALS AND METHODS

### 1. Subjects and Study Period

The subjects were 249 nurses (166 nurses and 83 nursing assistants) working at hospital in Changwon city, Masan city and Haman County. Self-administered questionnaires were collected from the nurses during the period November through December, in 2001.

### 2. Questionnaire

The questionnaire requested information on demographic characteristics, dietary attitudes and dietary intakes.

### 3. Dietary Attitudes

Dietary attitudes included 20 items related to meal regularity (5 items), meal balance (7 items) and health-related food habits (8 items). Dietary attitude scores were calculated on the bases of the methods previously used by Yoon.<sup>3)</sup> Yoon and Choi.<sup>12)</sup> Then, the subjects were divided into three groups by dietary attitude scores (high score group=above 70 point, medium score group=50-69 point, and low score group=below 49 point out of 100 point), and the levels of nutrient intakes were compared among the three groups.

### 4. Dietary Record

A 24-hour recall method was used for dietary intake. Nutrient intakes were analyzed by using a computer-aided nutritional program for professionals (CAN-Pro, Korean Nutrition Society, 1997), and the results were compared with the Korean Recommended Dietary Allowances (RDA) as published by the Korean Nutrition Society, 7th revision, 2000.

## 5. Statistical Analysis

Statistical analysis of data was undertaken by using the Statistical Package for the Social Sciences (Version 10.0). Frequency counts (%), mean and standard deviations were calculated for all variables. A Generalized Linear Model was used to determine statistical significance. Duncan's multiple range test was used to compare the values among the three groups. Correlation coefficients were calculated for the relationships between dietary attitude and nutrient intake, using Pearson's correlation.

## RESULTS AND DISCUSSION

### 1. Demographic Characteristics

Table 1 presents general characteristics of the subjects. It was shown that 66.7% of the subjects was nurse, 33.3% was nursing assistant, and 64.3% was unmarried. Average age of subjects was 27.1 years old, and 52.9% was under 25 years old. Also average nursing experience was 5.7 years, and the distribution of nursing experience was similar for below 2 years, 2-5 years, 5-10 years and above 10 years. As for their educational level, 70.7% of the subjects graduated from a junior college, and 25.3% graduated from a high-school. The rate of shift work (45.4%) and non-shift work (54.6%) were similar, and 91.5% of subjects worked on a three-shift a day.

Table 1. General characteristics of the subject

Variable	Item	N(%)
Position	Nurse	166(66.7)
	Nursing assistant	83(33.3)
Marital status	Unmarried	190(65.3)
	Married	101(34.7)
Age (yrs)	20~25	129(51.8)
	26~30	51(20.5)
	31~35	44(17.7)
	36~40	25(10.0)
Nursing experiences (yrs)	2>	75(30.1)
	2-5>	57(22.9)
	5-10>	65(26.1)
	10≤	52(20.9)
Educational level	High school	63(25.3)
	Junior college	176(70.7)
	University	10(4.0)
Type of work	Shift work	113(45.4)
	Non-shift work	136(54.6)
Number of shift	2 shift	12(8.6)
	3 shift	129(91.4)
Type of residence	Home	217(74.8)
	Self-boarding	37(12.8)
	Dormitory	28(9.6)
	Relatives	8(2.8)
Total		249(100.0)

**2. Dietary Attitude Scores and Score Distribution**

Table 2 showed the dietary attitude scores of nurses. With a perfect score of 100 points, the overall average of dietary attitude score was 56.1 points, which was significantly lower than 73.2 points obtained by Yoon *et al.*<sup>12)</sup> who used the same instrument to investigate middle school female teachers in Masan city and 67.6 points obtained from adult men and women.<sup>15)</sup> Even using different methods of investigation, this score was also significantly lower than 69.4 points obtained from school nutritionists in Kyungnam area<sup>3)</sup> and 68.6 points obtained from adult men and women in the Daejun area.<sup>16)</sup> Thus, we could tell that the dietary attitude scores of nurses were low. As for differences according to each variable, the dietary attitude score was significantly high in nurses who were married, older than 26 years, had more than 5 years of nursing experience and worked no shift. This result is similar to the result found from school nutritionists<sup>3)</sup> and elementary and middle school teachers by Yoon *et al.*<sup>17)</sup> who found that the dietary attitude score was higher in married people compared with singles and in older group compared with younger group (Table 2).

**Table 2.** The mean scores of dietary attitude by general characteristics of the subject

Variables	Mean±SD	t or F
Marital status	Unmarried	54.0±11.6
	Married	60.1±13.1
Age (yrs)	20~25	52.7±11.9 <sup>a2)</sup>
	26~30	58.1±13.4 <sup>b</sup>
	31~35	60.7±11.5 <sup>b</sup>
	36~40	61.8±10.1 <sup>b</sup>
	Total	56.1±12.5 <sup>1)</sup>
Nursing experiences (yrs)	2>	52.9±12.4 <sup>a</sup>
	2-5>	53.0±12.5 <sup>a</sup>
	5-10>	58.7±11.8 <sup>b</sup>
	10≤	61.1±11.0 <sup>b</sup>
	Total	56.1±12.5 <sup>1)</sup>
Type of work	Shift work	53.0±12.2
	Non-shift work	58.8±12.2
Total	56.1±12.5 <sup>1)</sup>	

1) Mean±SD  
 2) Means with different superscripts within a column are significantly different at p<0.05  
 \*\*\* : p<0.001

Table 3 shows the score distribution of dietary attitude. The overall average was 17.3% for high scores, 54.2% for medium scores and 28.5% for low scores. Thus, the score distribution of dietary attitude fell into the medium-low group. The dietary attitude score distribution of nurses investigated in this study was significantly lower compared with the score distribution found using the same method of investigation from elementary and middle school female teachers elementary and middle school female teachers in Masan city<sup>12)</sup> in which the results were "good" in 75.7%, "fair" in 14.5%, and

"poor" in 9.9%. Even using different methods of investigation, the distribution obtained from nurses were also lower compared with the results obtained from school foodservice dietitians<sup>3)</sup> in which the dietary attitude score distribution was "good" in 33.5%, "fair" in 36.9%, and "poor" in 29.6%; from college freshmen in which the dietary attitude score distribution was "good" in 46.9%, "fair" in 48.8% and "poor" in 4.3%; and from industrial workers<sup>14)</sup> in the Masan region in which the score was "good" in 37.8%, "somewhat poor" in 58.5%, and "poor" in 3.7%. According to variables, the dietary attitude score distribution was significantly high (p<0.01) in nurses who were single, older than 26 years, had worked more than 5 years, and worked no shifts as shown in Table 2 (Table 3).

**Table 3.** The distribution of mean scores of dietary attitude in the three dietary groups N(%)

Variables	High score group	Medium score group	Low score group	x <sup>2</sup> -test	
Marital status	Unmarried	17(10.6)	90(56.3)	53(33.1)	15.122**
	Married	26(29.2)	45(50.6)	18(20.2)	
Age(yrs)	20~25	13(10.1)	67(51.9)	49(38.0)	20.748**
	26~30	14(27.5)	24(47.1)	13(25.5)	
	31~35	9(20.5)	29(65.9)	6(13.6)	
	36~40	7(28.0)	15(60.0)	3(12.0)	
Nursing experiences (yrs)	2>	7(9.3)	39(52.0)	29(38.7)	18.868**
	2-5>	7(12.3)	28(49.1)	22(38.6)	
	5-10>	15(23.1)	37(56.9)	13(20.0)	
	10≤	14(26.9)	31(59.6)	7(13.5)	
Type of work	Shift work	14(12.4)	55(48.7)	44(38.9)	11.914**
	Non-shift work	29(21.3)	80(58.8)	27(19.9)	
Total		43(17.3)	135(54.2)	71(28.5)	

\*\* : p<0.01

**3. Nutrient Intakes of the Three Groups by Dietary Attitude Scores**

*Amount of nutrient intake*

Table 4 shows daily intake amount of each nutrient according to dietary attitude. As for differences according to dietary attitude, the intake of calorie, energy density, carbohydrate, protein, vitamin B<sub>1</sub>, vitamin B<sub>2</sub>, niacin, calcium, iron, phosphorus, sodium, potassium, and fiber was significantly high in the high score group compared with the medium score group and low score group, similar to the result found from school foodservice dietitian<sup>3)</sup> and the result reported by Yoon *et al.*<sup>15)</sup> in whom showed a higher amount of nutrition intake with an increasing dietary attitude score. Energy density is a value showing the quantity of energy contained per unit food and recently considered as an

important control variable in food intake. People tend to consume a certain weight or volume of food, rather than taking a certain portion of food containing a certain amount of energy. Thus, people consuming food containing lower energy density would take lower calories per weight unit of food, compared with those who take food containing high energy density who would take more calories per unit weight of food.<sup>18)</sup> The energy density per one gram of food could range from 0 to 9 kcal/g, in which the average energy density of food consumed most frequently by Americans is between 1 to 1.5 kcal/g.<sup>19)</sup>

**Table 4.** Daily mean values nutrient intakes in the three groups

Nutrients	HG <sup>1)</sup> (N=43)	MG <sup>2)</sup> (N=135)	LG <sup>3)</sup> (N=71)	F-value
Energy (kcal)	1915.7±428.5 <sup>b</sup>	1527.6±434.4 <sup>a</sup>	1406.3±370.8 <sup>a</sup>	20.942***
Protein (g)	82.9±30.0 <sup>b4)</sup>	65.2±33.9 <sup>a</sup>	57.0±20.2 <sup>a</sup>	10.117***
Fat (g)	52.9±21.9 <sup>b5)</sup>	39.7±16.9 <sup>a</sup>	36.5±17.6 <sup>a</sup>	11.913***
Carbohydrate (g)	276.7±57.5 <sup>b</sup>	227.3±66.1 <sup>a</sup>	212.3±58.9 <sup>a</sup>	14.817***
Ca (mg)	512.3±232.8 <sup>b</sup>	462.6±228.8 <sup>ab</sup>	401.7±193.2 <sup>a</sup>	3.617*
P (mg)	1188.4±376.9 <sup>b</sup>	940.4±339.1 <sup>a</sup>	825.3±298.8 <sup>a</sup>	13.879***
Fe (mg)	15.2±15.5 <sup>b</sup>	9.8±3.9 <sup>a</sup>	9.4±3.9 <sup>a</sup>	10.186***
Vitamin A (mg)	820.8±708.2	597.3±390.3	676.6±640.0	2.913
Vitamin B <sub>1</sub> (mg)	1.38±0.6 <sup>b</sup>	1.10±0.4 <sup>a</sup>	1.07±0.5 <sup>a</sup>	5.502**
Vitamin B <sub>2</sub> (mg)	1.22±0.4 <sup>b</sup>	0.89±0.3 <sup>a</sup>	0.92±0.8 <sup>a</sup>	6.215**
Niacin (mgNE)	17.5±7.7 <sup>b</sup>	14.2±6.0 <sup>a</sup>	12.7±5.3 <sup>a</sup>	7.934***
Vitamin C (mg)	162.0±107.5	141.9±116.6	134.4±132.1	0.726
Cholesterol (mg)	260.5±186.3	240.6±187.2	219.8±179.5	0.672
Fiber (g)	6.3±2.0 <sup>b</sup>	5.1±2.1 <sup>a</sup>	4.7±1.6 <sup>a</sup>	8.125***

1) HG: high score group

2) MG: medium score group

3) LG: low score group

4) Mean±SD

5) Means with different superscripts within a row are significantly different at p<0.05

\*\* : p<0.01, \*\*\* : p<0.001

According to the results of this study, the energy density in the high score group for dietary attitude was 1.69 kcal/g, which was significantly higher compared with 1.46 kcal/g in the medium score group and 1.26 kcal/g in the low score group. As for the intake ratio of the calorie nutrients, i.e., carbohydrate : protein : fat, these nurses in all 3 groups showed lower carbohydrate intake, lower protein intake, and higher fat intake compared with 65:15:20 recommended by Korean Nutrition Society and 65:14:21 found from women working in cities.<sup>20)</sup> The daily recommended intake of cholesterol was less than 300 mg in all 3 groups, meeting the recommended intake of less than 300 mg per day for the prevention of cardiovascular disease.<sup>13)</sup> The average daily amount of crude fiber intake was 6.3 g in the high score group, which is similar to 6.5 g found from 20-29-year-old women according to a national nutritional survey.<sup>21)</sup> However, this amount was low in the medium score group and low score group at 5.1 g and 4.7 g, respectively (Table 4).

#### Intake ratios of nutrients recommended to Koreans

Table 5 shows the recommended dietary allowance of each nutrient for Koreans. The amounts of nutrients taken except vit. A, vit. C and Ca were significantly higher in the high score group compared with the medium score group and low score group. RDA (Recommended Dietary Allowance) of each nutrient is the amount proven to be safe, and 75% of RDA is the cut-off point to decide whether the person is lacking the certain nutrient. Using the criteria in which the intake of a certain nutrient is considered to be low when the amount of intake is less than 75% of RDA and to be high when the amount is more than 125% of RDA,<sup>21)</sup> the nutrients taken in at high amounts were vitamin B<sub>1</sub>, niacin, vitamin C, and P in the high score group; vitamin C and P in medium score group; and vitamin C in the low score group. The nutrients taken at lower amounts (amounts less than 75% of RDA) were calcium in the high score group; vitamin B<sub>2</sub>, calcium and iron in the medium score group; and energy, vitamin B<sub>2</sub>, calcium, and iron in the low score group. Thus, more nutrients were taken in at more than 125% of RDA as the dietary attitude score increased, whereas more nutrients were taken in at less than 75% of RDA as the dietary attitude score decreased. The finding that calcium especially taken in at lower quantities less than 75% of RDA in all groups is not desirable since lack of calcium poses the risk of osteoporosis after the menopause. The amount of phosphorus intake in all 3 groups was more than 120%, which was almost twice as high as the amount of calcium intake and similar to the result found in a national nutritional survey for the year 1998<sup>21)</sup> in which the ratio of calcium and phosphorus intake in women between 20 to 49 years was 1:2. Calcium is absorbed the best when the ratio of calcium and phosphorus intake is 1:1. RDAs of calcium and phosphorus for Koreans<sup>13)</sup>

**Table 5.** RDA% of nutrient intakes in the three groups

Nutrients	HG <sup>1)</sup> (N=43)	MG <sup>2)</sup> (N=135)	LG <sup>3)</sup> (N=71)	F-value
Energy	95.6 <sup>b4)</sup>	76.3 <sup>a</sup>	70.3 <sup>a</sup>	20.611***
Protein	150.4 <sup>b</sup>	118.4 <sup>a</sup>	103.7 <sup>a</sup>	9.910***
Ca	72.8 <sup>b</sup>	65.9 <sup>ab</sup>	57.3 <sup>aa</sup>	3.462*
P	169.1 <sup>b</sup>	134.1 <sup>a</sup>	121.7 <sup>a</sup>	13.454***
Fe	95.1 <sup>b</sup>	61.2 <sup>a</sup>	58.9 <sup>a</sup>	10.186***
Vitamin A	117.2	85.3	96.6	2.913
Vitamin B <sub>1</sub>	130.7 <sup>b</sup>	103.8 <sup>a</sup>	98.5 <sup>a</sup>	6.438**
Vitamin B <sub>2</sub>	97.7 <sup>b</sup>	70.7 <sup>a</sup>	72.1 <sup>a</sup>	6.792**
Niacin	134.4 <sup>b</sup>	109.7 <sup>a</sup>	98.4 <sup>a</sup>	7.812**
Vitamin C	231.4	202.7	192.1	0.726

1) HG: high score group 2) MG: medium score group

3) LG: low score group

4) Means with different superscripts within a row are significantly different at p<0.05

\* : p<0.05, \*\* : p<0.01, \*\*\* : p<0.001

are the same at 700 mg. Thus, the subjects of this study were taking unbalanced intakes of calcium and phosphorus. The ratio of iron intake was appropriate being 95% of RDA in the high score group; however, it was significantly low in the mediumscore group and low score group at 70% and 72%, respectively (Table 5).

**Intake ratios of nutrients from animal and plant sources**

Table 6 shows the daily mean values of nutrient intakes by each food source in the three groups. The amount of animal protein intake was significantly high in the high score group ( $p < 0.01$ ) compared with the mediumscore group and low score group. The intake amounts of animal fat ( $p < 0.05$ ) and animal Fe ( $p < 0.01$ ) were significantly higher in the high score group compared with the low score group. In all groups, the intake ratios of animal protein and animal fat were significantly higher compared with plant protein and plant fat. Especially in the high score group, the intake ratio of animal protein was 1.58 folds higher ( $p < 0.01$ ) compared with the medium score group and low score group, and the intake ratio of animal fat was higher by 1.64 folds compared with the low score group ( $p < 0.05$ ). The Korean Nutrition Society recommends the ratio of

animal protein per total protein to be 1/3 and the ratio of saturated fatty acid to unsaturated fatty acid to be 1:1. Thus, the subjects in this study should give more attention to their diet for the intake ratios of animal protein and fat were high. The animal/plant intake ratio of vitamin A ranged from 0.03 to 0.06 in all 3 groups. In other words, the intake ratios of plant food, i.e, food containing carotenoids, were high, agreeing with the result found in a previous study in which the major source of vitamin A in Koreans is from plant food.<sup>22)</sup> It is difficult to evaluate on the intake amount of carotenoids since there are no recommended intake ratios for retinol and carotenoids, Nonetheless, increased intake of carotenoids would be considered beneficial since carotenoids protects cells from the factors inducing cancers and arteriosclerosis and an epidemiological study found that the amount of plasma carotenoids is proportional to the ratio of cancer development.<sup>23)</sup>

As for the source of iron, the animal/plant intake ratio was between 0.5 to 0.8 in all 3 groups, showing that the subjects were taking plant food having low absorption ratio of iron. Iron is utilized in the body differently according to its source in which iron from animal sources could be utilized better in the body compared with iron from plant source.<sup>24)</sup> Thus, the subjects in this study should increase the intake of animal food (Table 6).

**Table 6.** Daily mean values of nutrient intakes by food source in the three groups

Nutrients	HG <sup>1)</sup> (N=43)	MG <sup>2)</sup> (N=135)	LG <sup>3)</sup> (N=71)	F-value
<b>Protein (g)</b>				
Animal	45.7±31.7 <sup>b</sup>	35.9±18.1 <sup>a</sup>	32.9±17.8 <sup>a</sup>	5.060**
Vegetable	28.9±8.0 <sup>d)</sup>	27.8±10.5	32.9±35.7	1.438
Animal/Plant ratio	1.58	1.46	1.45	0.145
<b>Fat (g)</b>				
Animal	27.3±21.9 <sup>b</sup>	21.9±15.4 <sup>ab</sup>	18.7±12.8 <sup>a</sup>	3.783*
Vegetable	18.5±7.4	19.0±9.3	20.0±10.0	0.433
Animal/Plant ratio	1.64	1.54	1.59	0.028
<b>Vitamin A</b>				
Retinol (μg)	105.4±107.4	100.1±183.9	73.1±71.8	0.932
carotene (μg)	2999.4±1788.8	2673.0±1693.1	2756.9±1420.7	0.649
Retinal/carotene ratio	0.05	0.06	0.03	0.885
<b>Ca (mg)</b>				
Animal	223.9±162.8	236.9±165.1	229.9±214.2	0.098
Vegetable	251.6±104.5	212.0±101.3	227.4±101.1	2.564
Animal/Plant ratio	0.95	1.40	1.20	1.416
<b>Fe (mg)</b>				
Animal	5.3±9.5 <sup>b5)</sup>	3.3±1.8 <sup>a</sup>	2.7±1.7 <sup>a</sup>	5.256**
Vegetable	7.7±3.4	6.7±3.3	6.8±3.0	1.772
Animal/Plant ratio	0.79	0.59	0.50	2.152

1) HG: high score group 2) MG: medium score group  
 3) LG: low score group  
 4) Mean±SD 5) Means with different superscripts within a row are significantly different at  $p < 0.05$   
 \*:  $p < 0.05$ , \*\*:  $p < 0.01$

**4. Index of Nutritional Quality (INQ) According to Dietary Attitude**

The index of nutritional quality (INQ) is an index used to evaluate whether sufficient amounts of nutrients are present with sufficient amounts of energy. In other words, INQ of less than 1 means that the quality of food is lower compared with the amount of food.<sup>25)</sup> Thus, the quality of food can be evaluated using this index and we could decide whether to change the menu or increase or decrease the amount of intake while leaving the menu alone.<sup>25)</sup> In the high score group, the INQ value for Ca was low at 0.77. In the medium score group and low score groups, the INQs for Ca and Fe were also low between 0.80-0.88. Thus, we could tell that the quality was lower compared with the amount of intake with Ca in the high score group and Ca and Fe in the medium score group and low score group. On the other hand, the INQ values of protein, P, vitamin B<sub>1</sub>, niacin and vitamin C were between 1.35-2.65 in all 3 groups, showing that the subjects were taken in high quality food considering the amount of intake. Thus, the subjects would require balanced meals that give high quality of Ca and Fe and do not induce excess intakes of protein, P, and vitamin C. Furthermore, INQ values were not significantly different among 3 groups, leading to the conclusion that not much difference was present in quality although the overall amounts of nutrients intake

were higher in the high score group with high dietary attitude scores (Table 7).

**Table 7.** Index of Nutritional Quality (INQ) in the three groups

	HG <sup>1)</sup> (N=43)	MG <sup>2)</sup> (N=135)	LG <sup>3)</sup> (N=71)	F-value
Protein	1.57±0.40	1.53±0.45	1.46±0.34	0.985
Ca	0.77±0.31	0.88±0.41	0.83±0.42	1.31
P	1.77±0.45	1.77±0.44	1.73±0.39	0.18
Fe	0.97±0.89	0.80±0.24	0.85±0.33	2.29
Vitamin A	1.22±0.88	1.14±0.74	1.42±1.44	1.81
Vitamin B <sub>1</sub>	1.36±0.46	1.35±0.42	1.37±0.48	0.05
Vitamin B <sub>2</sub>	1.01±0.25	0.93±0.32	0.99±0.58	0.77
Niacin	1.40±0.44	1.44±0.46	1.39±0.40	0.34
Vitamin C	2.46±1.63	2.62±2.03	2.84±2.78	0.41

1) HG: high score group 2) MG: medium score group

3) LG: low score group

### 5. Correlation Between Dietary Attitude and Nutrient Intake

Table 8 shows the correlation between the nutrient intake amount and each variable. As for dietary attitude, a correlation was shown between the nutrient and amount for all nutrients other than vitamin A and C, showing that the amount of nutrient intake was high as the dietary attitude score increased. This data show the dietary attitude influences the nutrient intake and the better dietary attitude reflects the higher nutrient intake. This result is similar to the result found from school foodservice dietitians<sup>3)</sup> who showed a significant correlation between nutrient intake and dietary attitude and partially agree with the result found from industrial workers<sup>14)</sup> who showed a correlation between dietary habit scores and intake amounts of vitamins and minerals.

**Table 8.** Correlation coefficients between nutrient intake and dietary attitude<sup>1)</sup>

Nutrients	Dietary attitudes	Nutrients	Dietary attitudes
Energy	0.381***	K	0.332***
Protein	0.256***	Vitamin A	0.083
Fat	0.252**	Vitamin B <sub>1</sub>	0.186***
Carbohydrate	0.356***	Vitamin B <sub>2</sub>	0.177***
Ca	0.230***	Niacin	0.248***
P	0.336***	Vit. C	0.124
Fe	0.210***	Crude Fiber	0.292***
Na	0.313***		

1) Values are Pearson's correlation coefficients

\*\* : p<0.01, \*\*\* : p<0.001

### CONCLUSION

A survey was conducted on dietary attitude from a total of 249 people working in secondary and tertiary

medical facilities located in Masan city, Changwon city and Haman Kun in the Southern Kyungnam Province including 166 nurses and 83 nursing assistants. The following results were obtained after the amounts of nutrients taken in were investigated using a 24-h recall method and the status of nutritional intake was analyzed according to dietary attitude. The subjects were composed of nurse (66.7%) and nurse's aids (33.3%). With the average age being 27.1 years, 70.7% of the subjects graduated from junior colleges. The average years of work was 5.7 years. Some worked in shifts (45.4%) and some worked no shift (54.6%). The overall average of dietary attitude score was 56.1 points in a perfect score of 100 points. This average score was 78.8 points in the high score group, 58.6 points in the medium score group, and 40.8 points in the low score group, showing significant differences among 3 groups (p<0.001). The dietary attitude score was significantly high in nurses who were married, older than 26 years, had more than 5 years of nursing experience and worked no shift (p<0.01). The distribution of dietary attitude score was 17.3% in the high score group, 54.2% in the medium score group, and 28.5% in the low score group. As for differences of nutrient intake amounts according to dietary attitude, the intakes of calorie, energy density, carbohydrate, protein, animal protein, fat, animal fat, vitamin B<sub>1</sub>, vitamin B<sub>2</sub>, niacin, calcium, iron, animal iron, phosphorus, sodium, potassium, fiber were significantly in the high score group compared with the medium score group and low score group. The intake ratios of animal protein and animal fat were high all 3 groups. In the high score group especially, the intake ratios of animal protein was 1.58 folds higher than the medium score group and low score group (p<0.01), and the intake ratios of animal fat was 1.64 folds high compared with the low score group (p<0.05). The nutrients taken at high amounts (more than 125% of RDAs for Koreans) were vitamin B<sub>1</sub>, niacin, vitamin C, and P in the high score group; vitamin C and P in the medium score group; and vitamin C in the low score group. The nutrients taken at low amounts (less than 75% of RDAs for Koreans) were calcium in the high score group; vitamin B<sub>2</sub>, calcium, and iron in the medium score group; and energy, vitamin B<sub>2</sub>, calcium, and iron in the low score group. The INQ value for Ca in the high score group was low at 0.77. The INQ values for Ca and Fe were low, ranging from 0.80-0.88, in the medium score group and low score group. However, no significant differences were present among 3 groups. The dietary attitude showed a significant correlation with all nutrients other than vitamin A and C and amounts, showing that the amount of nutrient intake was high as the dietary attitude score increased. These results showed that as the dietary attitude score increased, the amount of overall

nutrient intake was high, a high correlation was shown between dietary attitude and nutrient intake amount, suggesting a significant effect of dietary attitude on the amount of nutrient intake but not on nutrient quality.

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