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A Study of Nutritional Knowledge, Dietary Attitudes and Dietary Behaviors of Adult Women by Acne Status

Jinkyung Kwack, Kyungwon Kim†

Division of Food & Nutrition, College of Natural Sciences, Seoul Women's University, Seoul, Korea

ABSTRACT

This study was conducted to investigate nutritional knowledge, dietary attitudes, and dietary behaviors of adult women, and to examine if these characteristics were different by acne status. Subjects were 106 adult women residing in Seoul recruited from clients and employers at skin care centers, and housewives from apartment complexes. Survey instrument was adapted or modified based on literature review and dietary intakes were assessed using 24-hour recalls for two days and CAN-pro. All data was statistically analyzed using χ^2 test and ANOVA. When examined by acne status, 41.5% of subjects were categorized into acne group, 20.8% were as ex-acne group, and 37.7% as no-acne group. Parental experience of acne was significantly related to acne status($p < 0.01$). Education, employmental status, and smoking or drinking status were not related to acne status. Subjects had a moderate level of nutritional knowledge(72.7 point) and the nutritional knowledge score was not significantly different by acne status. When examined by individual items, the groups showed significant difference on the items regarding vitamin C and necessity of carbohydrates($p < 0.05$). Subjects showed favorable dietary attitudes. Although the acne group showed more favorable attitudes on the importance of nutrition on acne, the overall dietary attitudes of the acne group were not significantly different from the ex-acne group or no-acne group. Similarly, only small differences were noticed in dietary behaviors or nutrient intakes by acne status. Cholesterol consumption was higher in the no-acne group than in the acne group or ex-acne group($p < 0.01$). The intakes of energy, iron, and calcium was much below the RDA in three groups. Although there were not many significant differences in nutritional knowledge, dietary attitudes, and dietary behaviors by acne status, this study provided some baseline information regarding study variables by acne status. (*J Community Nutrition* 3(2) : 87~95, 2001)

KEY WORDS : nutritional knowledge · dietary attitudes · dietary behaviors · nutrient intakes · acne · adult women.

Introduction

Interest toward beauty has been growing with marked increase in household income and economic growth in Korea. Acne is one of the important skin diseases that affect many people in these days. Acne usually occurs with changes in hormone secretion starting at adolescence. In other words, secretion of oily substance from the sebum gland increases with production of androgens and these changes make it easier for bacterial growth on skins and production of acne (Lee et al. 1995). There are many adverse effects of untreated acne. Untreated acne becomes worse, leading to acne vulgaris or acne pastpules, which is most common type of acne. People with untreated acne may also have problems in interpersonal relationships and suffer from depression(Ha 1995).

Nutrition or eating habits have been thought to be related to acne. Bird(1958) suggested that it was desirable to limit the consumption of greasy foods or meat and to increase vegetable consumption to treat acne. Preference for animal foods and high-fat consumption and western dietary patterns were thought to be associated with the occurrence of acne(Bird 1958 ; Gook 1993). It was suggested that excessive consumption of high-fat foods facilitated the production of sebum (Lee & Jang 1985). Consumption of spicy foods also stimulates the sebum gland and produce excessive sebum. In addition, it was suggested that unbalanced meals or eating small amounts of meals had adverse effects on skin and acne(Lee & Jang 1985). The bad effects of fast food or instant food, due to unbalanced nutrient intakes, on skin was also reported(Yoon 1995).

†**Corresponding author** : Kyungwon Kim, Division of Food & Nutrition, College of Natural Sciences, Seoul Women's University, 126 Kongnung 2-dong, Nowon-gu, Seoul 139-774, Korea
Tel : 02) 970-5647, Fax : 02) 976-4049
E-mail : kwkim@swu.ac.kr

In a study investigating acne and eating habits, Ha (1995) reported that taste preferences, especially preference for sweet, instant foods, milk and dairy foods were associated with having acne. Kwon et al.(1982) also suggested that zinc and vitamin A had a relation with acne. They noticed that serum zinc, as well as retinol binding protein(RBP) and vitamin A, were reduced in patients of acne vulgaris. These studies provide some evidence that nutrition or diets are associated with production or prevention of acne, although more research is needed in this area.

This study was designed to examine nutritional factors, including nutritional knowledge, dietary attitudes, dietary behaviors and nutrient intakes of adult women and to see if these characteristics were different by acne status.

Subjects and Methods

1. Subjects

Subjects for this study consisted of 106 adult women residing in Seoul. Subjects were recruited from clients or employers at skin care centers and housewives from apartment complexes in northern parts of Seoul. Data was collected during July and August 1998.

2. Study design and data collection

This study used a cross-sectional survey design. A survey questionnaire was developed based on literature review, adaptation and modification of scales from previous studies(Ha et al. 1995 ; Lee & Jang 1985 ; Song 1989). The survey questionnaire was pilot-tested and revised in terms of wording and understanding of items. The investigator distributed the revised questionnaire to 124 adult women, and data from 117 women was collected. Responses from eleven women were excluded in data analysis because of incomplete answers on dietary intakes. Finally, data from 106 women(85.4% of contacted for the survey) was used for statistical analysis.

3. Survey instrument

The survey instrument included scales to measure general characteristics of subjects, acne status, nutritional knowledge, dietary attitudes, dietary behaviors and nutrient intakes. General characteristics were measured by asking age, education, employmental status, monthly income and smoking and drinking status. Acne status was assessed by asking if whitehead, blackhead, or acne pastpules are spread about two-thirds or more of the face. Acne status was further categorized into three groups ; acne group, ex-acne group, non-acne group. The acne group included women who currently have acne regardless of past experience. The ex-acne group included women who experienced acne in the past but not currently. The non-acne group included women who have never experienced acne.

Nutritional knowledge was measured using 22 items : 20 items were adapted from Ha et al.'s study(1995) and 2 items on acne were constructed. Scales for nutritional knowledge included items regarding energy-yielding nutrients, animal fat and cholesterol, vitamins such as Vitamin A and Vitamin C, minerals including calcium and zinc and dietary supplements. Each item was measured by asking subjects to choose an answer from "true", "false", or "not sure". The correct answer was given a point and a score of nutritional knowledge was defined as the summated score on correct answers.

Dietary attitudes were assessed in areas regarding importance of nutrition in one's health(2 items), importance of nutrition in relation to acne(2 items), attitude toward food selection and changing eating habits (4 items) and concern for health(1 item). Dietary attitudes were measured using nine items and were adapted from previous studies(Lee & Jang 1985 ; Song 1989). Each item was written using 5-point scales ranging from "strongly disagree" to "strongly agree". In data coding, a score was given from −2(strongly disagree) to +2(strongly agree) for each item. Overall dietary attitudes were defined as the summated score on each item. The higher score indicates more favorable dietary attitudes.

Dietary behaviors were measured by asking how frequently they consume foods including beans or bean products, meats or fish, milk and dairy foods, vegetables, fruits, greasy foods and instant foods. A scale for dietary behaviors was designed to examine balance and variety of meals and consisted of ten items. Subjects answered the check mark on the scale from "0−2 days/week", "3−5 days/week", to "6−7 days per week".

Nutrient intakes were examined by 24-hour recalls

for two days. Subjects were asked to write all foods eaten at each meal and for snacks and the portion sizes of foods. An example sheet for recording 24-hour dietary recalls were given to each subject. Nutrient intakes were analyzed using CAN-Pro(Computer Aided Nutritional Analysis Program-Professoinal, Korean Nutrition Society, 1997) and the average intake of nutrients for two days was used. The adequacy of dietary intake was examined by comparing nutrient intakes and the Korean RDA(Korean Nutrition Society 1995).

4. Data analysis

Data was analyzed using the Statistical Analysis System(SAS). Descriptive statistics were used to examine the distribution of study variables. To investigate if there was any difference in nutritional knowledge, dietary attitudes, dietary behaviors or dietary intakes by acne status ; χ^2-test or analysis of variance was used(Cody & Smith 1991). The correlation among study variables was also examined. Statistical significance was examined at $\alpha = 0.05$.

Results and Discussion

1. General characteristics of subjects

Subjects who never had the acne were 37.7%, and were categorized into the no-acne group, 41.5% of subjects were categorized into the acne group, and 20.8% were the ex-acne group representing those who experienced the acne only in the past. The higher percentage of the acne group was explained by the fact that about a half of subjects were clients at skin care centers. General characteristics of subjects by acne status are presented in Table 1. Age was significantly related to acne status, while education or employment status was not. Three-quarters of acne group were in their twenties, while only one half of the no-acne group were in their twenties($p < 0.05$). This is consistent to the report that acne is common in late teens or twenties(Korean Society for Dermatological Science 1994). Gook(1993) also reported that acne might occur in the middle age when people wear cosmetics for a long time or use low-quality shampoo, but this is a special type of acne. The percentage of women who have jobs was also higher in the acne-group than in the no-acne group(79.5% versus 62.5%), although it did not reach statistical significance. Lee(1995) suggested that acne occurred or became worse when the individual experienced job-related stress. Most of subjects in the acne group(93.2%) responded that they also were stressed by acne, which might make the acne worse. More women in this study were stressed by acne than that reported by Lee et al.(70%)(1996).

Parental experience of acne was significantly related

Table 1. General characteristics of subjects by acne status

Variables	Total (n = 106)	Acne group (n = 44)	Ex-acne group (n = 22)	No-acne group (n = 40)	χ^2
Age					
19 - 29	63(59.4)[1]	33(75.0)	10(45.5)	20(50.0)	12.0*
30 - 39	32(30.2)	10(22.7)	8(36.3)	14(35.0)	
40 - 49	11(10.4)	1(2.3)	4(18.2)	6(15.0)	
Education					
≤ high school degree	54(51.4)	24(55.8)	7(31.8)	23(57.5)	4.3
≥ college or above	51(48.6)	19(44.2)	15(68.2)	17(42.5)	
Employment status					
Yes	74(69.8)	35(79.5)	14(63.6)	25(62.5)	8.1
No	32(30.2)	9(20.5)	8(36.4)	15(37.5)	
Parental experience of acne					
Yes	42(42.4)[1]	26(66.7)	13(65.0)	3(7.5)	33.5***
No	57(57.6)	13(33.3)	7(35.0)	37(92.5)	
Stress caused by acne					
Yes	61(65.6)	41(93.2)	17(77.3)	3(11.1)	51.6***
No	32(34.4)	3(6.8)	5(22.7)	24(88.9)	

* : $p < 0.05$, *** : $p < 0.01$

Table 2. Smoking and drinking status and related perception of subjects by acne status

Variables	Total (n = 106)	Acne group (n = 44)	Ex-acne group (n = 22)	No-acne group (n = 40)	χ^2
Smoking status					
Currently smoking	8(7.5)	2(4.5)	3(13.6)	3(7.5)	1.7
No/smoked in the past	98(92.5)	42(95.5)	19(86.4)	37(92.5)	
Perception regarding effect of smoking on health					
Strongly agree/agree	95(89.6)	43(97.7)	18(81.8)	34(85.0)	6.8
Don't know/disagree	11(19.4)	1(2.3)	4(18.2)	6(15.0)	
Perception regarding effect of smoking on skin					
Strongly agree/agree	88(86.3)	38(88.4)	18(85.7)	32(84.2)	5.4
Don't know/disagree	14(13.7)	5(11.6)	3(14.3)	6(15.8)	
Drinking status					
Currently drinking	76(71.7)	32(72.7)	16(72.7)	28(70.0)	0.1
No/drank in the past	30(28.3)	12(27.3)	6(27.3)	12(30.0)	
Perception regarding effect of drinking on health					
Strongly agree/agree	96(90.6)	39(88.6)	20(90.9)	37(92.5)	3.0
Don't know/disagree	10(9.4)	5(11.4)	2(9.1)	3(7.5)	
Perception regarding effect of drinking on skin					
Strongly agree/agree	84(94.4)	37(100.0)	17(85.0)	30(93.8)	5.5
Don't know/disagree	5(5.6)	0(0.0)	3(15.0)	2(6.3)	

None of the variables were statistically significant at $p < 0.05$

to acne status. Two-thirds of the acne group answered that their parents had had acnes, while only 7.5% in the no-acne group answered so($p < 0.001$)(Table 1). Burk and Cunliffe(1984) reported that monozygotic twins showed similarities in acne status, suggesting the genetic association of acne incidence. Ha(1995) also reported that the acne status of children was significantly associated with that of the parents. Stegenga(1996) reported that oversensitivity to specific foods was manifested as acne or other types of skin diseases. She also reported that the likelihood of being allergic to some foods was over 70% in case that both parents had had oversensitivity and that 25 - 30% likelihood of oversensitivity when mother or father had had oversensitivity. These findings consistently indicate that genetics are related to acne status.

2. Some lifestyle factors and foods related to acne

Lifestyle factors, such as smoking and drinking, did not differ by acne status(Table 2). Women who currently smoke were 7.5%, while women who drink were 71.5%. The perception regarding adverse effects of smoking on health or skin was not significantly different by acne status, although a higher percentage of women in the acne group tended to perceive the effects of smoking on health more adversely. Gook(1993) reported that drinking had adverse effects on acne by causing inflammation or itching, but drinking status was not different by acne status in this study.

Table 3. Foods restricted or ate more to treat acne among those who have or had acnes

Food restricted to treat acne	N(%)	Food ate more to treat acne	N(%)
Meats	10(20)[1)]	Fruits	9(38)
Coffee	8(16)	Vegetables	8(33)
Fried foods	5(10)	Seaweeds	3(15)
Alcoholic beverages	5(10)	Others	4(14)
Chocolate	4(8)		
Instant Ramen	3(6)		
Fatty foods	3(6)		
Soda	2(4)		
Others	11(22)		

1) Responses were obtained from the acne group(n = 44) and the exacne group(n = 22). Subjects were asked to write foods that they restricted or ate more to treat acne

Subjects in the acne group and the ex-acne group were asked if they ate some foods more or less to treat the acne. The frequently mentioned foods that they restricted to treat acne included meats, coffee, fried foods, alcoholic beverages, chocolates, instant noo-

dle and fatty foods, in the order of decreasing frequency(Table 3). Bird(1958) suggested that soda, high-fat foods, such as nuts and fried foods, were possible causes of acnes. Gook(1993) reported that foods such as seafoods, and high-fat or high-carbohydrate foods facilitated secretion of sebum. According to Won & Yoo(1975), foods thought to be causing the acne included coffee, chocolate, cocoa, butter, cheese, ice cream, pork, bacon and ham. These are similar to the findings of this study.

For foods beneficial to treat the acne, subjects mentioned fruits, vegetables and seaweeds frequently. Previous studies reported that it would be good to have foods high in vitamins and minerals, such as fruits and vegetables, to treat the acne(Bird 1958 ; Gook 1993). Similarly, it was recommended to have vitamin B complex and vitamin C for the acne(Hwang 1998 ; Won & Yoo 1975).

3. Nutritional knowledge and dietary attitudes

Results regarding nutritional knowledge are presented in Table 4. Subjects scored 16.4 out of 22(72.7 point out of 100) on a nutritional knowledge scale, showing a moderate level of knowledge. The level of nutritional knowledge in this study was somewhat similar to the previous study with housewives(73.7 points out of 100)(Lee & Jang 1985) and higher than that with mothers of middle school students(Ha et al. 1995). The overall nutritional knowledge score was not significantly different by acne status. Subjects were quite knowledgeable on items regarding the role of calcium and iron, instant foods, vitamin C and differences in nutrient requirements by sex and age. In contrast, subjects were less knowledgeable on items regarding the role of zinc(correct responses : 26.4%), food sources of zinc(36.8%), and the role of vitamin B complex(34.0%).

Among the individual items of nutritional knowledge, the significant differences were found only on two items : regarding vitamin C and the necessity of carbohydrates. With respect to the item on vitamin C content of foods and preservation methods, the percentage of correct answers was lower in acne-group compared to the ex-acne or the no-acne group($p < 0.05$) (Table 4). In contrast, the acne group was more knowledgeable to the essentiality of carbohydrates than the other two groups($p < 0.05$). With respect to the items on zinc(food sources, and role of zinc), there were no significant differences among the groups(Table 4).

The score on dietary attitudes marked 35.5 out of 45, with a range of 23 to 44(Table 5). This result indicated that subjects showed favorable dietary attitudes. Especially, the subjects showed positive attitudes regarding the importance of nutrition, importance of having good eating habits from childhood and concerns of health. The total score on attitude was very similar among the groups, indicating no significant difference by acne status(Table 5). With respect to individual items, subjects in the acne group agreed more on the importance of nutrition on acne than those in the other two groups, although there was no statistical difference by groups.

4. Dietary behaviors and dietary intakes

Dietary behaviors were measured by asking the frequency of food consumption of major food groups and results regarding dietary behaviors are shown in Table 6. It seemed that the acne group consumed milk or other dairy foods less frequently than the ex-acne group or the no-acne group, although it did not reach statistical significance. Similar tendency was found in the consumption of fruits. In addition, the acne group tended to consume greasy foods or instant foods and dark green and yellow vegetables more often than the ex-acne or the no-acne groups, however, these observations did not reach statistical significance(Table 6).

Results regarding 24-hour dietary recalls for two days are presented in Table 7. The mean daily energy intake was 1554.1kcal, which was 77.7% of the RDA (Korean Nutrition Society 1995). The mean protein intake was 58.8g, close to the RDA. Calcium and iron intakes were 457.2mg(65.3% RDA) and 9.4mg (52.2% RDA) respectively. As presented in Table 7, dietary intakes did not reach the RDA except Vitamin B_1, Vitamin C and phosphorus. Especially, the intakes of calcium, iron and energy seemed to be inadequate.

When dietary intakes were examined by acne status, there were no significant differences except cholesterol (Table 7). These results were similar to the study examining skin type(dry, normal, oily, acne group) and dietary intakes of college women(Jung 1998). The in-

takes of calcium and energy was slightly lower in the acne group than in the other two groups. Vitamin A or Vitamin C intakes were slightly higher in the acne group, although it did not reach statistical significance. These findings are somewhat contrary to the previous reports that fruits and vegetables are good for treating acnes(Gook 1993). It might be possible that women who have acne are more conscious about treating acne and try to consume more vitamins, such as Vitamin A and Vitamin C.

Results of dietary intakes might be explained in relation to the findings of food consumption(Table 6). In other words, the lower calcium intake in the acne group, compared to other groups, might be related to less frequent consumption of milk and dairy foods in this group ; similarly, the higher intake of Vitamin A in the acne group might be associated with more frequent consumption of dark green and yellow vegetables.

Table 4. Nutritional knowledge of subjects by acne status

Variables	Total (n = 106)	Acne group (n = 44)	Ex-acne group (n = 22)	No-acne group (n = 40)	χ^2
1. Calcium-rich foods such as milk and anchovy are very good for normal growth and prevention of osteoporosis.	106(100.0)[1]	44(100.0)	22(100.0)	40(100.0)	NA[2]
2. It is not bad to eat instant foods daily because of easy preparation and good for nutrition.	104(98.1)	43(97.7)	21(95.5)	40(100.0)	1.6
3. Iron is a necessary nutrient for erythrogenesis and prevention of anemia.	100(94.3)	41(93.2)	21(95.5)	38(95.0)	0.2
4. Vitamin C content of foods depends on storage conditions and preparation methods.	98(92.5)	37(84.1)	22((100.0)	39(97.5)	7.7*
5. Human-beings need same quantity and kind of nutrients regardless of sex or age.	96(90.6)	39(88.6)	19(86.4)	38(95.0)	1.6
6. Vitamins and minerals are indispensible to control body functions.	96(90.6)	39(88.6)	21(95.5)	36(90.0)	0.8
7. If our diets are sufficient in protein and fat, it is not necessary to take carbohydrate foods like cooked rice.	92(86.8)	39(88.6)	19(86.4)	34(85.0)	0.2
8. Green vegetables are rich in Vitamin A or Vitamin C.	92(86.8)	37(84.1)	20(90.9)	35(87.5)	0.6
9. There are two kinds of cholesterol, one is beneficial, the other is harmful to our health.	91(85.8)	35(79.5)	20(90.9)	36(90.0)	2.5
10. High intake of animal fat causes increase of blood cholesterol and incidence of cancer.	87(82.1)	37(84.1)	17(77.3)	33(82.5)	0.5
11. Animal fat decreases blood cholesterol more than vegetable fat does.	87(82.1)	40(90.9)	18(81.8)	29(72.5)	4.8
12. Vegetables and fruits contain high levels of dietary fiber, but seaweeds do not.	87(82.1)	38(86.4)	17(77.3)	32(80.0)	1.0
13. Deficiency in vitamin A can cause late growth and night-blindness.	86(81.1)	37(84.1)	18(81.8)	31(77.5)	0.6
14. Quality of protein contained in beef is better than that of protein contained in pork, egg, and mackerel.	82(77.4)	34(77.3)	18(81.8)	30(75.0)	0.4
15. It is not bad to consume higher amounts of salt because it is a source of an indispensible mineral.	76(71.7)	30(68.2)	17(77.3)	29(72.5)	0.6
16. Although we have a balanced diet, it is beneficial for health to take supplements such as dietary supplements, vitamin pills and health supplements.	72(67.9)	31(70.5)	13(59.1)	28(70.0)	1.0
17. Fat produces more than two times the calories than carbohydrates do.	64(60.4)	28(63.6)	10(45.5)	26(65.0)	2.6
18. Quality of vegetable protein contained in rice or wheat is better than that of animal protein contained in meat such as beef and pork.	63(59.4)	25(56.8)	13(59.1)	25(62.5)	0.3
19. Carbohydrates are one of the essential nutrients as well as producing energy.	58(54.7)	30(68.2)	11(50.0)	17(42.5)	5.8*
20. Meat, oyster and shrimp are good sources of zinc.	39(36.8)	16(36.4)	7(31.8)	16(40.0)	0.4
21. Vitamin B complex is necessary in energy metabolism.	36(34.0)	13(29.5)	10(45.5)	13(32.5)	1.7
22. Zinc plays a role in immune function and skin disease like acne.	28(26.4)	14(31.8)	5(22.7)	9(22.5)	1.1
Total score on nutritional knowledge[3]	16.4 ± 0.3[4]	16.5 ± 0.5	16.3 ± 0.4	16.4 ± 0.5	0.1[5]

1) N(%) 2) not applicable 3) summational score on each item, with a range from 8 to 22 .
4) mean ± SE 5) F-value by ANOVA

According to previous research(Kim et al. 1997 ; Bird 1958), high consumption of carbohydrates might cause or worsen the acne. Gook(1993) also suggested that excessive consumption of sugars, or lipids, might be a possible cause for dermatitis or bacterial infections including acnes and abscesses. In contrast to these suggestions, the intakes of carbohydrates or lipids were not statistically different by acne status. The cholesterol intakes were significantly different ; the mean consumption was 189.0mg for the acne group, 194.6mg for the ex-acne group, and 259.7mg for the no-acne group($p < 0.01$). Jung(1998) also noticed that cholesterol intake was lower in the acne group or dry skin group compared to the normal group. The lower intake of cholesterol in the acne group might be explained by the observation that subjects in the acne group consumed meats or fish less frequently and foods such as dark green & yellow vegetables more frequently than the subjects in other two groups(Table 6).

5. Relationship among nutritional knowledge, dietary attitudes and dietary behaviors

Relationships among study variables by acne status are presented in Table 8. In the acne group, nutritional knowledge had a weak correlation with dietary attitudes($r = 0.25$) and dietary behaviors($r = 0.26$), although

Table 5. Dietary attitudes of subjects by acne status

Variables[1]	Total (n = 106)	Acne group (n = 44)	Ex-acne group (n = 22)	No-acne group	F[4]
1. Nutrition is important to maintain a healthy body.	4.68 ± 0.05[2]	4.66 ± 0.07	4.77 ± 0.09	4.65 ± 0.08	0.6
2. Not only medicine but also food is important in the treatment of diseases.	4.54 ± 0.05	4.61 ± 0.08	4.50 ± 0.11	4.47 ± 0.08	0.8
3. I will try to eat the food that I do not like, if it is good for health.	3.74 ± 0.08	3.82 ± 0.12	3.59 ± 0.19	3.73 ± 0.14	0.5
4. One of the best methods to change eating habits is to understand dietary principles.	3.79 ± 0.08	3.93 ± 0.13	3.68 ± 0.14	3.70 ± 0.13	1.1
5. Good eating habits are formed in childhood.	4.15 ± 0.08	3.98 ± 0.14	4.18 ± 0.14	4.33 ± 0.12	1.9
6. Knowing food groups makes it possible to have a balanced diet.	3.53 ± 0.09	3.50 ± 0.17	3.73 ± 0.16	3.45 ± 0.12	0.7
7. Nutrition is important in the treatment or production of acne.	3.52 ± 0.08	3.68 ± 0.13	3.36 ± 0.19	3.43 ± 0.12	1.5
8. If nutrition is important to the treatment of acne, I will try to control my diet.	3.53 ± 0.08	3.48 ± 0.14	3.50 ± 0.21	3.60 ± 0.12	0.2
9. I am concerned about my health.	4.07 ± 0.07	4.00 ± 0.11	4.00 ± 0.13	4.18 ± 0.13	0.7
Total score of dietary attitudes[3]	35.5 ± 0.4	35.7 ± 0.6	35.3 ± 0.7	35.5 ± 0.6	0.1

1) Measured from 1(strongly disagree) to 5(strongly agree)
2) Mean ± SE
3) Summated score for each item, with a range from 23 to 44
4) F value by ANOVA

Table 6. Dietary behaviors of subjects by acne status

	Acne group(n=44)			Ex-acne group(n=22)			No-acne group(n=40)		
	days/week			days/week			days/week		
	0-2	3-5	6-7	0-2	3-5	6-7	0-2	3-5	6-7
Consumption of : Beans/bean products	38.6[1]	50.0	11.4	36.4	50.0	13.6	42.5	40.0	17.5
Meats/fish	63.6	27.3	9.1	54.5	45.5	0.0	50.0	45.0	5.0
Eggs	61.4	29.5	9.1	59.1	36.4	4.5	57.5	37.5	5.0
Milk, yogurt, cheese	31.8	27.3	40.9	13.6	27.3	59.1	22.5	42.5	35.0
Anchovy/seaweeds	70.5	22.7	6.8	40.9	54.5	4.5	55.0	37.5	7.5
Vegetables	9.1	54.5	36.4	31.8	36.4	31.8	15.0	50.0	35.0
Dark green/yellow vegetables	36.4	45.5	18.2	63.6	36.4	0.0	45.0	47.5	7.5
Fruits	20.5	45.5	34.1	22.7	40.9	36.4	10.0	52.5	37.5
Greasy foods(eg. fried foods)	40.9	50.0	9.1	59.1	36.4	4.5	57.5	27.5	15.0
Instant foods(ramyun, hamberger, pizza, etc.)	63.6	27.3	9.1	68.2	27.3	4.5	72.5	25.0	2.5

1) % of each group
None of the variables were statistically significant at $p < 0.05$ using χ^2 test

Table 7. Dietary intakes of subjects by acne status

Variables[1]	Total (n = 106)	Acne group (n = 44)	Ex-acne group (n = 22)	No-acne group (n = 40)	F[2]
Calorie(kcal)	1554.1 ± 33.3[1] (77.7)	1526.0 ± 50.2 (76.3)	1559.4 ± 70.3 (77.9)	1582.1 ± 58.0 (79.1)	0.3
Protein(g)	58.8 ± 1.7 (98.0)	57.7 ± 2.9 (96.1)	58.9 ± 3.6 (98.1)	59.9 ± 2.7 (99.8)	0.2
Fat(g)	43.2 ± 1.5	43.7 ± 2.5	39.2 ± 2.3	45.0 ± 2.4	1.1
Carbohydrate(g)	232.0 ± 5.4	226.2 ± 7.8	242.3 ± 12.1	232.6 ± 9.5	0.6
Calcium(mg)	457.2 ± 21.3 (65.3)	428.7 ± 24.2 (61.2)	461.1 ± 41.2 (65.8)	486.4 ± 44.5 (69.4)	0.7
Phosphorus(g)	894.1 ± 26.0 (127.7)	870.2 ± 37.5 (124.3)	929.1 ± 59.7 (132.7)	901.3 ± 45.1 (128.7)	0.4
Iron(mg)	9.4 ± 0.4 (52.2)	9.6 ± 0.8 (53.3)	9.0 ± 0.6 (50.0)	9.5 ± 0.6 (52.7)	0.2
Vitamin A(μgRE)	650.5 ± 54.1 (92.9)	704.9 ± 119.4 (100.7)	540.0 ± 55.4 (77.1)	651.5 ± 49.1 (93.0)	0.6
Retinol(ugRE)	101.6 ± 7.4	95.8 ± 8.9	98.4 ± 22.1	109.9 ± 12.0	0.4
Carotene(mg)	2513.3 ± 135.8	2358.2 ± 200.6	2428.9 ± 248.1	2730.4 ± 250.3	0.8
Vitamin B_1(mg)	1.37 ± 0.35 (137.0)	0.96 ± 0.04(96.0)	1.00 ± 0.06(100.0)	2.02 ± 0.93(202.0)	1.0
Vitamin B_2(mg)	0.99 ± 0.04 (82.5)	0.97 ± 0.06(80.8)	0.87 ± 0.08(72.5)	1.07 ± 0.07(89.1)	2.0
Vitamin C(mg)	66.8 ± 3.1 (121.4)	68.2 ± 5.4 (124.0)	67.6 ± 5.7 (122.9)	64.8 ± 4.7 (117.8)	0.1
Cholesterol(mg)	216.9 ± 11.1	189.0 ± 16.7[a]	194.6 ± 22.9[a]	259.7 ± 17.4[b3]	4.9**[4]

1) Mean ± SE(%RDA, 1995)
2) F value by ANOVA
3) Letters with different superscripts are significantly different at $p < 0.01$.
4) ** : $p < 0.01$

Table 8. Correlation coefficient among study variables

	Nutritional	Dietary attitudes
Dietary attitudes	0.25[1]	
	0.12[2]	
	0.15[3]	
Dietary behaviors	0.26[1]	0.17[1]
	0.18[2]	0.28[2]
	0.02[3]	− 0.07[3]

1) Pearson's correlation coefficient of acne-group
2) Pearson's correlation coefficient of ex-acne group
3) Pearson's correlation coefficient of no-acne group
None of the correlation coefficient were statistically significant at $p < 0.05$.

pearson's correlation coefficient was not statistically significant. In the ex-acne group, dietary attitudes seemed to be slightly correlated with dietary behaviors ($r = 0.28$). Overall, none of the correlation coefficients reached statistical significance. This was consistent to the study with housewives that nutritional knowledge was not related to eating habits(Chung & Kim 1985). From these results, it might be said that nutritional knowledge was not transformed, or had influence, on dietary attitudes or dietary behaviors. This was consistent regardless of acne status. Nutritional knowledge might be one of the influences that might have affect on dietary behaviors.

Summary and Conclusion

This study was designed to examine nutritional knowledge, dietary attitudes, dietary behaviors of adult women residing in Seoul and to examine if these characteristics were different by acne status.

1) Most of the subjects were in their twenties(59.4%) or thirties(30.2%). When subjects were categorized by skin types(acne status), 41.5% were grouped into the acne group, 20.8% were an ex-acne group, and 37.7% were a no-acne group. Parental experience of acne was significantly related to acne status of subjects($p < 0.01$). Most of the subjects in the acne group(93.2%) were stressed because of acne. Lifestyle factors, such as smoking and drinking, were not different by acne status.

2) Subjects scored 16.4 out of 22 on nutritional knowledge, suggesting that they had a moderate level of nutritional knowledge. The total nutritional knowledge score was not significantly different by acne status. When examined by individual items, the groups showed significant differences on two items of nutritional knowledge : vitamin C and necessity of carbohydrates ($p < 0.05$).

3) Subjects had favorable dietary attitudes. Dietary attitudes of the acne group were not significantly dif-

ferent from the ex-acne group or the no-acne group, although subjects in the acne group agreed more on the importance of nutrition with acne.

4) Dietary behaviors, measured by the frequency of food consumption, were not statistically different by acne status. However, some patterns of dietary behaviors among the groups were observed. The acne group seemed to consume foods such as dairy foods and fruits less frequently and to consume greasy foods, instant foods and dark green and yellow vegetables more frequently, compared to the ex-acne group or no-acne group.

5) Dietary intake data showed that most nutrient intakes did not reach the RDA. Particularly, the intakes of iron, calcium and energy were much below the RDA. There was no significant difference in dietary intakes by acne status except cholesterol. Cholesterol consumption was higher in the no-acne group compared to the acne group or the ex-acne group($p < 0.01$).

6) This study provides some baseline information regarding nutritional knowledge, dietary attitudes and behaviors of adult women by acne status, although this study did not reveal many significant differences in these variables by acne status. Future study might explore the relationship of nutritional factors and acne status with different groups, such as adolescents who start to experience acne. In future study, it might be necessary to assess acne status more objectively. It might be interesting to examine more about which foods or food preferences that might be associated with acne.

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