J Community Nutrition 1(1) : 44~51, 1999 ☐Original Article☐

Dietary Behavior and Food Intake of Korean Farmers in Relation to Farmers' Syndrome and Gastro-Intestinal Problem*

Seung Gyo Rhie,† Yaungja Park**

Department of Food & Nutrition, College of Human Ecology, The University of Suwon, Kyunggi-do, Korea
*Department of Food & Nutrition,** College of Human Ecology, Seoul National University, Seoul, Korea*

ABSTRACT

The purpose of this study was to compare dietary behavior and food intake in relation to physical complaints, such as farmers' syndrome(FS) and gastro-intestinal(GI) problem among Korean farmers. The questionnaire was composed of 24 Cornell Medical Index(CMI), 8 farmers' syndrome, and 5 GI problem questions. Food intake data was gathered by the semi-quantitative food frequency method. The subjects(male 226, female 415) who had FS and GI problem were 12.8% and 8.3%, respectively. The physical complaints were higher in female and the elderly group. In the FS group, lower activity was seen than in normal groups. The lower health status and fatigues were found in the physical complaint groups. Dietary behavior showed low appetite in the physical complaint group, irregular lunch in FS, and irregular breakfast in GI problem group. Changes in dietary behavior were shown in the aspects of lower amount of intake quantity(40.8%), lower consumption in fat(32.8%) and salty(38.8%) foods, and diverse food items (47.8%). Quantity of food consumed was significantly different within groups with FS. Kinds of food consumed, intake of protein source foods, milk and calcium and total animal foods were lower in the FS group. But milk and calcium source food and all animal food intakes were higher in the GI problem group. The results suggest that dietary behavior and food intake differ within the group of physical complaints. (*J Community Nutrition* 1(1) : 44~51, 1999)

KEY WORDS : dietary behavior · food intakes · physical complaints · anemia · farmers' syndrome · gastro-intestinal problem.

Introduction

The study on dietary behavior and physical complaints of farmers is important to promote the health of farmers. There is widespread interest in the role of dietary behavior and food intake on general health promotion and disease prevention. Many of dietary guidelines discusses lower intake of fat, sodium, and sugar(Hahn & Payne 1994). Diet is related to the prevention or delay of the onset of diabetes, atherosclerosis, and osteoporosis(Smith et al. 1988). The adult diseases sometimes are correlated with the intake of fat, salts, and sugar(Kannel 1988 ; Kim 1998). Dietary surveys of Korean farmers(Hwangbo 1998 ; Lee et al. 1994 ; Lim & Yoon 1997) have revealed higher intake of rice and salts than the recommended level. Because of farmers' exhausting work and environment, health status of farmers is worsening in the aging and unhealthy. Muscular and skeletal disorders were a major cause of farmer's disabilities(Sun et al. 1991). The demanding physical labor of farming requires more electrolytes, water, and energy than other nutrients(Paige 1988). But farmers had less of an appetite and ate less or skipped meals during busy seasons(Lim & Yoon 1997). The disease patterns of farmers are quite different with those of urban residents, that is, higher prevalence in anemia, arthropathy, neuralgia, farmers' syndrome(FS) and hypertension(Ann et al. 1996 ; Rhee et al. 1991). In fact 34.6% of households living in rural areas had aged or chronic disease patients(Kim 1997). Many farmers fall into a lower condition because of several diseases(Cho & Lim 1986 ; Chon & Lee 1998 ; Lim et al. 1994 ; Park 1997 ; Sun et al. 1991), especially FS(Kim et al. 1993 ; Kim & Jung 1998 ; Song et al. 1998). Japanese doctor 熊谷太市 proposed FS with 8 symptoms in 1943 and the institute of rural medicine of 佑久hospital in Japan did theoretical

*The present study was supported by a fund from the ministry of Health and Welfare in 1997-1998.

†**Corresponding author** : Seung-Gyo Rhie, Department of Food and Nutrition, The University of Suwon, #San 2-2, Bongdam-myun Whasung-gun, Kyunggi-do 445-743, Korea
Tel : 0331) 220-2239, Fax : 0331) 220-2189
E-mail : sgrhie@mail.suwon.ac.kr

support in 1952(Nam 1976). The 8 symptoms of FS were shoulder pain, lumbago, feet and hand numbness, nocturia, dyspnea, insomnia, dizziness, and abdominal discomfort. It was occurred to Korean farmers due to the specific characteristics of Korean agriculture based poverty and less privileged rural cultural life.

Investigation of the relationship between diet and FS is necessary to prevent disease. In this respect, investigation of farmers' dietary behavior and food intake by farmers' physical complaints would be necessary. We aim to measure the comparison of dietary behavior and food intake according to physical complaints, farmers' syndrome and GI problem, among Korean farmers. This would provide the foundation for nutrition education for farmers and give some advice on diet management with different physical complaints for the health promotion of farmers.

Subjects and Methods

Eight hundred farmers were selected in 8 provinces with stratified random sampling, but the data of 641 subjects was analyzed. The interview was conducted by home extension agents of the Rural Development Administration. The semi-quantitative food frequency questionnaire, which has 65 food lists(Paik et al. 1995) was used to measure the quantity of food intake of the subjects. Foods were divided by 5 basic food groups(Korean Nutrition Society 1995). To look for farmers' salty food intake, we sorted out fermented fish or shell fish and three kinds of kimchi, as a salty food group. Alcohol intake was compared with physical complaints by the sum of the intake of soju(Korean jin), beer and tackju(raw rice wine). They were requested to make changes of 8 dietary habits compared in the last 5 – 10 years. Subjects were interviewed about their dietary behavior ; regularity of, skipped number of, appetite for, and quantity of meals.

Health status and physical complaints of farmers were surveyed by the questionnaire method. Health condition was tested with 24 items of selected CMI(Cornell Medical Index), 8 items of farmers' syndrome(FS), and 5 items of gastrointestinal(GI) problems. The subjects were grouped normal, suspect and FS states by the Nam method(Nam 1976 ; Hong et al. 1996 ; Park et al. 1994) with modification of the counting score. FS states mean that more than 6 answers out of 8 are 'yes', and normal states mean that less than 3 answers out of 8 are 'yes'. In the GI tract problem, 5 symptoms questioned, those were based on 8 symptoms of Chang et al.(1993) and modified as 2 mental influencing symptoms eliminated and 2 symptoms combined, one by comparing it with CMI concerning GI parts. The subjects of GI tract disorder states were divided by comparing percentage of rural prevalence of GI disorders(Rural Development Administration 1994). GI tract disorder states mean that more than 4 answers out of 5 are 'yes', and normal states mean that less than 2 answers out of 5 are 'yes'. Fatigue and health degrees were checked with 5 different statements. Fatigue status was counted with 1 point for 'always tired', 2 for 'frequently tired', 3 for 'occasionally tired', 4 for 'almost no tired', and 5 for 'no tired'. Feeling health status was counted with 1 point for 'always liable to illness states', 2 for 'sometimes sick in bed', 3 for 'no sick', 4 for 'healthy', and 5 for 'very healthy'. States 13 kinds of degenerative diseases of farmers was checked by Ann et al. (1996) modified in accordance with farmers prevalence (Sun et al. 1991) and age related(Rhee et al. 1991).

The data was analyzed by using SAS program. Results were expressed in mean and standard deviation, frequency and percentages of distribution. The F-value and χ^2-value were calculated for assessing significant differences between groups. Correlation analysis was used by calculating Pearson's α to assess the relation of food group variables affected had on physical complaints and CMI scores.

Results and Discussion

1. The characteristics of physical status of the subjects

Physical status data are shown in Table 1. The average of BMI and blood pressure were in adequate. The averages of self-conscious fatigue and health degrees were 2.8 and 3.1 scores/5 points respectively. This condition was explained in the CMI score of 6.3scores /24 points and 2.9/8 with FS.

Table 2 gives the distribution of different physical complaints by gender and age groups. The prevalence of FS was only in 12.8% of farmers, but that of the suspect status was higher(39.8%) in farmers. Hong and coworkers(Hong et al. 1996) explained 13.6% of farmers had FS,

and 40.9% were suspect. This means that over half of the farmers felt some symptoms of FS. The most noticeable, potentially female-related trends in the physical complaints were found. A higher proportion of women than men were reported as having FS and GI tract problem. Older individuals were reported to have FS more often than younger subjects. Age related difference in FS was significant, but not that in GI problem. The research of Hong and coworkers(Hong et al. 1996) was similar to this result, higher in females and the elderly.

Table 1. Body status of the subjects

	Body and health status(mean±SD)	
Height	161.3± 7.0	cm
Weight	60.0± 8.2	kg
Body mass index	23.0± 2.5	kg/m^2
systolic blood pressure	124±15	mmHg
diastolic blood pressure	83±11	mmHg
farming duration	23.5±12.5	years
fatigue degree[a)]	2.8± 1.0	scores/5points
health degree[b)]	3.1± 0.9	scores/5points
Cornell medical index	6.3± 4.7	scores/24points
Farmers' syndrome[c)]	2.9± 2.0	scores/8points

a) 1=always tired, 2=frequently tired, 3=occasionally tired, 4=rarely tired, 5=not tired
b) 1=always sick in bed, 2=sometimes sick in bed, 3=not sick, 4=healthy, 5=very healthy
c) Mean of the 8 symptoms prevalent to farmers

Table 3 shows the health and fatigue status of the farmers according to physical complaints. The farmers with FS or GI problem felt more tired. Consciousness of health status and number of diseases were significantly different according to FS. The subjects of physical complaint groups felt worse than normal condition when compared with the CMI score.

2. Dietary behavior according to physical complaints

Table 4 provides some details about the dietary behaviors of appetite and quantities of meals. According to the Kyungbuk rural result(Lim & Yoon 1997), 21% of

Table 2. The distribution of physical complaints by age and gender

unit : frequency(%)

physical complaints	States	Age groups						Gender		Total
		>30	30-40	40-50	50-60	60-70	70<	Male	Female	
Farmers' syndrome	Normal	10(67)	87(55)	112(47)	63(47)	26(31)	6(38)	144(64)	162(39)	306(48)
	Suspect	5(33)	60(38)	96(41)	50(38)	39(46)	5(31)	64(28)	191(46)	255(40)
	F.S.	0(0)	10(6)	28(12)	20(15)	19(23)	5(31)	18(8)	65(16)	83(13)
	χ^2	28.4***						37.0***		
GI-tract problem	Normal	12(80)	125(80)	194(82)	98(74)	67(80)	13(81)	202(89)	310(74)	509(80)
	Suspect	3(20)	19(12)	29(12)	19(14)	7(8)	2(13)	18(8)	61(15)	79(12)
	GI problem	0(0)	13(8)	13(6)	16(12)	10(12)	1(6)	6(3)	47(11)	53(8)
	χ^2	10.13[ns]						22.68***		
Total		15(100)	157(100)	236(100)	133(100)	84(100)	16(100)	226(100)	415(100)	641(100)

*** : p<0.01 ns : not significantly different

Table 3. The comparison of health status by the physical complaints of the subjects

(mean±SD)

		Fatigue degree[a)] (Score/5points)	Health degree[b)] (score/5points)	No. of disease[c)] (Frequency/13diseases)	CMI score (Score/24points)
Farmers' syndrome(F. S)	Normal	3.2±0.9	3.5±0.8	0.9±0.9	2.8±2.2
	Suspect	2.5±1.0	2.9±0.9	1.6±1.2	8.1±3.0
	F.S	2.1±1.0	2.2±0.8	2.3±1.7	13.8±3.8
	F-value	16.3***	28.6***	24.6***	224.8***
GI-tract problem	Normal	2.9±1.0	3.2±0.9	1.2±1.1	5.3±4.0
	Suspect	2.4±1.0	2.7±0.9	1.7±1.3	9.3±4.4
	GI	2.2±1.0	2.5±0.9	2.1±1.8	12.1±5.3
	F-value	3.55**	2.92[ns]	2.65[ns]	30.3***
	Total	2.8±1.0	3.1±0.9	1.3±1.2	6.3±4.7

*p<0.1, **p<0.05, ***p<0.01 ns : not significantly different
a) 1=always tired, 2=frequently tired, 3=occasionally tired, 4=almost never tired, 5=not tired
b) 1=always sick in bed, 2=sometimes sick in bed, 3=not sick, 4=healthy, 5=very healthy
c) Check frequency of 13 kinds of disease : hypertension, diabetes mellitus, anemia, liver d., cancer, kidney d. heart d., arthropathy, neuralgia, urinary disturbance, ataxia, difficulty respiration, lumbago, and shoulder pain

Table 4. The distribution of physical activity, appetite and quantity of meals by the kinds of physical complaints of the subjects

unit : frequency(%)

Complaints	States	Physical activity				Appetite					Quantity of meals				Total
		Non	A little	Ordinary	Hard	Excellent	Good	Normal	Poor	V. poor	Much	Average	Small	Skip	
FS	Normal	2(1)	23(8)	127(42)	154(51)	49(16)	142(47)	110(36)	4(1)	1(0)	18(6)	248(82)	24(8)	16(5)	304(100)
	Suspect	3(1)	13(5)	143(56)	96(38)	34(13)	92(36)	117(46)	10(4)	2(1)	23(9)	185(73)	27(11)	20(8)	255(100)
	FS	5(6)	7(9)	45(55)	26(31)	7(9)	17(21)	51(62)	8(10)	0(0)	10(12)	55(67)	8(10)	10(12)	82(100)
	X^2	28.9***				40.18***					11.95^{ns}				
GI problem	Normal	5(1)	32(6)	246(48)	229(45)	77(15)	212(42)	207(41)	13(3)	3(1)	41(8)	395(78)	43(8)	33(6)	509(100)
	Suspect	4(5)	7(9)	44(56)	24(30)	7(9)	27(34)	42(53)	3(4)	0(0)	5(6)	59(75)	8(10)	7(9)	79(100)
	GI	1(2)	4(8)	25(47)	23(43)	6(11)	12(23)	29(55)	6(11)	0(0)	5(9)	34(64)	8(15)	6(11)	53(100)
	X^2	12.31^{ns}				23.04***					5.91^{ns}				
Total		10(2)	43(7)	315(49)	276(43)	9(1)	251(39)	278(43)	22(3)	3(0)	51(8)	488(76)	59(9)	46(7)	641(100)

**p<0.05 ***p<0.01 ns : not significantly different

Table 5. Meal regularity distribution by the kinds of physical complaints of the subjects

unit : frequency(%)

Complaints	States	Breakfast		Lunch		Dinner		Total
		Regular	Irregular	Regular	Irregular	Regular	Irregular	
FS	Normal	250(82)	52(17)	245(81)	52(19)	252(83)	49(16)	304(100)
	Suspect	200(78)	54(21)	203(80)	50(20)	209(82)	40(16)	255(100)
	FS	67(82)	15(18)	52(63)	28(34)	62(76)	17(21)	82(100)
	χ^2	1.49^{ns}		12.0***		1.4^{ns}		
GI-tract problem	Normal	414(81)	93(18)	407(80)	93(18)	424(83)	76(15)	509(100)
	Suspect	38(48)	10(13)	54(68)	24(30)	60(76)	18(23)	79(100)
	GI	35(66)	18(34)	39(74)	13(25)	39(74)	12(23)	53(100)
	χ^2	7.2**		6.8**		4.8^{ns}		
Total		517(80)	121(19)	500(78)	130(20)	523(81)	106(17)	641(100)

**p<0.05 ***p<0.01 ns : not significantly different

Table 6. Distributions of dietary habit change of the subjects

unit : frequency(%)

Dietary habit change	
Decrease in quantity	263(40.8)
Less salty	250(38.8)
More the food sorts	308(47.8)
Less sweety	69(10.7)
Various grains select	255(39.6)
More tea and coffee	165(25.6)
No smoke, no alcohol	40(6.2)
Less fatty	211(32.8)
No change	103(16.0)

the farmers skipped a meal each day, 63% of the subjects ate less than usual during busy seasons. Skipping meals was frequent in the subjects of physical complaints. The symptoms of physical complaints influenced to decrease appetite significantly($p<0.01$). This was supported by the result that farmers ate small quantities because of loss of appetite during busy seasons of farming(Lim & Yoon 1997). Physical activity was not significantly different within the group of GI tract problem. Physically hard work was not more frequent in the group with FS. The effect of daily physical activity on serum lipid level was increasing HDL-cholesterol(Higuchi et al. 1993), physical activity as seen in farming would be helpful for good health. According to the result of these cases, physical work could not be a helpful factor for the health of farmers. Better diet was associated with increased quality and nutrient density of diets(Murphy et al. 1990). For the farmers' health, to eat various and nutritious foods and not to skip meal would be good.

The distribution in meal regularity according to the physical complaints is shown in Table 5. Irregular breakfast influenced the condition of GI tract problem. In overall 80%, 78%, and 81% of the subjects ate breakfasts, lunches and dinners at a regular time respectively. The irregular breakfast was freguently seen with elementary school teachers(Yoo & Lee 1995), but irregular lunches was more frequent to farmers. Lunch irregularity was signifi-

Table 7. Food intake by physical complaints of the subjects

		Selected foods (Frequency/ 66 kinds)	Carbohydrate source foods (g/day)	Protein source foods (g/day)	Milk and calcium foods (g/day)	Alcohol drink (g/day)	Total plant foods (g/day)	Total animal foods (g/day)	Salty foods (g/day)
Farmers' syndrome	Normal	51.7±8.1	806±128	243±141	79± 99	86±146	1710±515	264±180	157±76
	Suspect	48.9±9.3	801±133	235±144	78±111	65±155	1671±523	248±173	155±78
	F.S.	46.5±9.5	769±135	196±115	64±106	43± 98	1576±449	201±145	170±85
	F-value	4.38**	1.64^{ns}	7.64***	6.39***	0.92^{ns}	1.89^{ns}	13.9***	3.62***
GI-tract problem	Normal	50.4±8.7	802±128	233±137	73±101	80±151	1685±501	243±168	159±77
	Suspect	48.9±9.2	779±147	252±156	90±122	55±128	1673±584	286±203	152±83
	GI	47.0±9.9	801±108	222±148	99±111	40±108	1609±498	259±177	155±84
	F-value	1.53^{ns}	0.23^{ns}	1.72^{ns}	6.64***	1.22^{ns}	0.47^{ns}	7.57***	0.07^{ns}
Mean±SD		49.9±8.9	799±129	234±140	77±105	73±146	1678±511	250±174	158±78

*p<0.1 **p<0.05 *** p<0.01 ns : not significantly different

Table 8. Correlation of food group intake by the different kinds of physical complaints of the subjects

Food group	CMI	FS	GI problem
Carbohydrates	-0.04	-0.09**	-0.03
Protein	-0.04	-0.09**	0.01
Fat&oils	0.06	0.03	0.07
Vegetables & fruits	0.01	-0.04	0.02
Milk & calcium foods	-0.06	-0.04	0.10**
Alcohol	-0.10**	-0.11***	-0.09**
Beverage	-0.09**	-0.07	-0.05
Total plant foods	-0.05	-0.09**	-0.04
Total animal foods	-0.07	-0.10**	0.07
Salted foods	0.03	0.02	-0.03

*α<0.1 **α<0.05 ***α<0.01

cantly highly found in FS($p<0.01$) and GI tract problem group($p<0.05$). But the dinner irregularity did not related with any of physical complaints. Meal irregularity was sometimes found in obese children(Lee & Oh 1997), and regular breakfasts were important to school students (Chung & Woo 1997 ; Lindemen & Clancy 1990). Farmers' irregular lunch was frequent because of long distance between home and work place, and no sufficient time to prepare lunch. So, irregular lunches would influence farmers' physical complaints, we could say that eating lunch regularly is important to maintain energy to work for farmers.

It is always difficult to change dietary behavior. The factors of socioeconomic status, food attitude, psychological health condition have a significant relationships with eating behavior(Kim et al. 1992). The change to no-smoke and no-drink was only 6.2%(Table 6). Lessening the amount of fat and salt intakes was less difficult than reducing the intake of sweet in farmers. About 40% of subjects lowered salt and fat intake, although taste preference appears to be a barrier to dietary change for many Americans(Harnnack et al. 1997). We could say that subjects became to eat balanced diets according to the resulting lessening of quantities(40.8%), and more variety of food intake(47.8%) with various grains(39.6%)(Table 6).

3. Intake of food groups in relation to physical complaints

The daily food intake of farmers was high in carbohydrate source foods(779 ±129g/day) and low in fat and oil group(3.5±4.5g/day). Intake of carbohydrate food group was higher compared to the results of the 1993 Korean National Nutrition Survey(Kye et al. 1996a) that intakes of carbohydrate food, total plant food were 333g and 842g , respectively. The results of this study of total food intake of 1902g was a little higher than the result of the 1993 Korean National Nutrition Survey(Kye et al. 1996b). Although estimated quantity would vary slightly depending on the method(Lee 1997), animal food group intake was similar, 224g in the Korean National Nutrition Survey results versus this study of 250g. Fat and oil food group intake was lower(3.5g) than the results of the nationwide survey(7.8g).

Table 7 shows the intake of the food group and total animal food by physical complaints. Daily intake from the protein and calcium source food group was significantly lower in subjects with FS. But salty food intake was significantly higher in FS group($p<0.01$). In the GI tract

problem group, however, the intakes of calcium foods and total animal foods were particularly higher than in normal states. In view of food variety, the subjects in this study consumed 49.9/65 kinds of foods annually. The number of foods consumed was significantly less in the FS group. Therefore it would be needed to educate them to eat more various foods. The average proportion of animal foods/total foods intake in all subjects was only 13.0% ; this was lower compared to the results 15.2% of a national survey(Ministry of Health and Welfare 1996).

The protein source food intake was not low in quantity, and there were no significant differences in protein food intake in the group with GI tract problem. Milk and calcium foods were significantly($p<0.01$) lower in the group with FS, but significantly($p<0.01$) higher in the group with GI problem prevalence. The quantities of calcium source food intake of farmers was lower than in the national survey(Ministry of Health and Welfare 1996). A habitually high calcium intake may prevent the development of osteoporosis by increasing adult peak bone mass and slow down age-related bone loss(Bales & Gold 1991). According to Schaafsma et al.(1989), men and women beyond the age of 20 are recommended to have 700~900mg of calcium daily ; adults beyond the age of 50 years should not consume less than 800 to 1000mg/day. But in Korean women, the mean daily intake without calcium supplementation was 498mg/day(Lee & Chyun 1997), in the case of Chinese women, daily intake of calcium was lower(Heines et al. 1994) than in Korea. We can suppose more calcium foods with milk and milk products would be necessary for oriental women and farmers.

The intake of salty foods was calculated. The intake of salt was generally accepted as having a relation to hypertension, which is especially high prevalent in farmers. However, physically active workers need more salt because of loss due to sweating. Differences of salty food intakes within subjects with FS were found. Salty food intake was significantly higher in FS group than in normal and suspect groups.

4. The relations of the physical complaints with the intake of food groups

Taste sensitivities would be altered with certain condition of body status(Galler 1984). The status of physical complaints would influence the intake of foods. The correlation analysis was done to seek the variables of different food group intake influencing complaints of the body. It was shown in Table 8. Carbohydrate source and protein source foods were significantly negatively correlated with FS. Especially alcohol drink was negatively correlated significantly with FS, GI problem and CMI scores of physical complaints status. This means that the higher alcohol intake was, the worse physical complaint status was. Especially the subjects within the FS group had a lower quantity of total animal foods, and plant foods.

Summary and Conclusion

This study was conducted to compare dietary behavior and food intake by the complaints of farmers' syndrome (FS) and GI problem among Korean farmers. The physical and health status of Korean farmers was normal in BMI($23.0\pm2.5kg/m^2$) and blood pressure(124/83mmHg) but the mean score of FS was a suspect status. The food intake was high in plant foods($1678\pm511g$/day) than animal foods($250\pm174g$/day). Carbohydrate source food was the major food and the smallest quantity of daily food was fat and oil group. FS was in general to farmers, only 47.8% were in non-FS status. Lower appetite and irregular lunches were observed in physical complaint groups.

In the aspects of dietary behavior changes, 40.8% of farmers recognized the decrease in food intakes, only 16% had no changes of dietary habits. The subjects with FS showed a lower appetite and irregular lunch than other physical complaint groups. Food intake was different within the group of FS status. The normal subjects ate more kinds of foods than FS subjects did. Intakes of protein foods, milk and calcium foods and total animal foods were lower in the FS group. Intakes of milk and calcium food and total animal foods were higher in the GI problem group.

The results suggest that dietary behavior and food intake differ with physical complaints. At the points of lower intake of animal foods, milk and calcium foods in the group with FS, diet management would be necessary for the intake of animal food, milk and calcium foods. Balanced food consumption in quality and quantity with good dietary behavior would lead to better status of health and excellent physical activity for farming.

References

Ann KS, Chun BY, Yeh MH(1996) : The Prevalence of Chronic Degenerative Disease and Utilization of Medical Facility in Rural Population. *Kor J Rural Med* 21(1) : 209-220

Bales CW, Gold DT(1991) : Nutrition Education for Osteoporosis Patients : Am Innovative Approach to Care of the Chronically Ill Elderly. *J Nutr Edu* 23(3) : 120-127

Chang SY, Jung SW, Chang JH, Cho JJ(1993) : A clinical study on patients presenting with Upper Gastrointestinal Symtoms. *J Kor Acad Fam Med* 14(2) : 88-94

Cho YS, Lim HS(1986) : The Nutrition and Health Survey of Aged people in a Rural Area. 11. Anthrophometry, Blood Pressure, Blood Components, Diseases and Obesity Rate. *Kor J Nutr* 19 (6) : 382-391

Chon ES, Lee JS(1998) : A Study on the prevalence Rate of Adult Diabetes Mellitus in Rural Area. *Kor J Rural Med* 23(2) : 269-274

Chung MY, Woo KJ(1997) : The Effect of Food Habits in the Obesity of Middle School Girls in Inchon Area. *J East Asia Diet Life* 7(1) : 71-86

Galler JR(1984) : Nutrition Behavior Human Nutrition A Comprehensive Treatise. vol. 5, pp.405, Plenum press, NY & London

Hahn DB, Payne WA(1994) : Focus on health, pp.90, Mosby-yearbook, 2nd ed

Harnnack L, Block G, Lane S(1997) : Influence of selected Environmental and Personal factors on Dietary Behavior for Chronic Disease Prevention : A Review of Lierature. *J Nutr Edu* 29 : 306-312

Heines CJ, Chung TKH, Leung PC, Leung DHY, Wang MY, Lam LL(1994) : Dietary calcium intake in postmenopausal Chinese women. *Euro J Clin Nutr* 48 : 591-594

Higuchi T, Matsumoto S, Tanada S, Nakamura T, Imaki M, Miyoshi T(1993) : Effect of Daily Physical activity on Serum Lipid Levels. *Jap J Rural Med* 42(2) : 66-71

Hong DY, Kim JR, Lee MS, Kang KH, Ha HS(1996) : A Study on the causes of farmers disease and greenhouse disease in a rural area of Kyungnam Province. *Kor J Rural Med* 21(2) : 173-193

Hwangbo YS(1998) : Food and nutrition intake for the period of 1982 - 1997 of Korean farmers. *Rural Life Sci* 19(3) : 1-5

Kannel WB(1988) : Nutrition and Occurrence and prevention of cardiovascular Disease in the Elderly. *Nutr Rev* 46(2) : 68-78

Kim D, Jung C(1998) : Accident and Disease Related to Agriculture in a Rural Korea *Kor J Rural Med* 23(1) : 39-49

Kim BS, Chon HJ, Cha IJ(1993) : Farmers' Syndrome and The Accidents Due to Agricultural Machines of Some Rural Residents. *Kor J Rural Med* 18(1) : 93-102

Kim JH, Lee MJ, Yang IS, Moon SJ(1992) : Analysis Factors Affecting Korean Eating Behavior. *Kor J Diet Culture* 7(1) : 1-8

Kim JS(1998) : The effect of Long Chain Fatty acids(12 : 0, 14 : 0, 16 : 0, 18 : 0) and Dietary Cholesterol Levels on Plasma and hepatic cholesterol Concentrations in the Mongolian Gerbil. *Nutr Sci* 1(1) : 8-15

Kim JS(1997) : Utilization pattern of health care resources of residents in a designated rural area. *Kor J Rural Med* 22(2) : 253-263

Korean Ministry of Health and Welfare(1996) : '94 National nutrition survey report

Korean Nutrition Society(1995) : Recommended Dietary Allowances For Koreans 6th Revision, pp.202

Kye SH, Lee HS, Park MA, Moon HK(1996a) : The Study on frequently consumed Food Items from 1993 Korean National Nutrition Survey(1) Amounts and frequency of Foods. *Kor J Diet Culture* 11(5) : 569-579

Kye SH, Lee HS, Park MA, Moon HK(1996b) : The Study on frequently consumed Food Items from 1993 Korean National Nutrition Survey(11) Amounts and frequency of Dish intakes. *Kor J Diet Culture* 11(5) : 581-592

Lee JH, Kim MS, Lee YS, Park Y(1994) : A Study on the Health status and dietary intake of rural elderly women in Kyunggi Province. *Kor J Rural Living Sci* 5(2) : 135-144

Lee KH, Chyun JH(1997) : Comparison of Food Consumption Pattern, Nutrient and Dietary Fiber Intakes between Female College Students and Middle Aged Women in Korea. *Kor J Nutr* 30(9) : 1088-1094

Lee SS, Oh SH(1997) : Prevalence of Obesity and Eating Habits of Elementary School Students in Kwangju. *Kor J Comm Nutr* 2(4) : 486-495

Lee SY(1997) : Assessment of dietary intake and diet quality obtained by 24-hour recall method in Korean Adults living in rural area. Dept. of Food and Nutrition, Graduate school, Seoul National University

Lim S, Yeh MH, Chun BY(1994) Prevalence rate of Hypertension and Cared Pattern in Rural Aged over Sixty Years Old. *Kor J Rural Med* 19(2) : 129-140

Lim WJ, Yoon JS(1997) : A Study on Health status, Meal Management, and seasonal variation of Nutrient intake of Rural Women. *J Kor Soc Food Sci Nutr* 26(6) : 1215-1220

Lindeman AK, Clancy KL(1990) : Assessment of Breakfast habits and Social/Emotional Behavior of Elementary School children. *J Nutr Edu* 22(5) : 226-231

Ministry of health and Welfare(1996) : '94 National Nutrition Survey report, pp.120

Murphy SP, Davis MA, Neuhaus JM, Lein D(1990) : Factors Influencing the Dietary Adequacy and Energy Intake of Older Americans. *J Nutr Edu* 22(6) : 284-291

Nam TS(1976) : About Farmers' Syndrome. *Kor J Rural Med* 1(1) : 43-46

Paige DM(1998) : Clinical Nutrition, pp.712-714, second ed., the CV Mosby Co., US

Paik HY, Ryu JY, Choi JS, Ahn YJ, Moon HK, Park YS, Lee HK, Kim YI(1995) : Development and Validation of Food Frequency Questionnaire for Dietary Assessment of Korean Adults in Rural Area. *Kor J Nutr* 28(9) : 914-922

Park SW(1997) : A Study on the Status of Health Examination among Farmers in a Rural Area. *Kor J Rural Med* 22(1) : 1-18

Park TJ, Kim BS, Chon HJ(1994) : Factors Associated with Farmers' Syndrome. *Kor J Rural Med* 19(1) : 5-13

Rhee HS, Choi YS, Hwang EJ(1991) : A Comparative Study of Geriatric Diseases in Rural and Urban Areas. *Fam Phys* 21(1) : 36-46

Rural Development Administration(1994) : The Index of Rural Life

3-2 the cause of death in rural, pp.84

Schaafsma G, van Beresteyn ECH, Raymarkers JA(1987) : Nutritional Aspects of Osteoporosis. *World Rev Nutr Diet* 49 : 121-159

Smith EL, Smith PE, Gilligan C(1988) : Diet Exercise and Chronic Disease Patterns in Older Adults. *Nutr Rev* 46(2) : 52-61

Song JY, Lee YK, Lee SG, Lee TY, Cho YC, Lee DB(1998) Farmers Syndrome and Their Related Factors of Rural Residents in Chungnam Province. *Kor J Rural Med* 23(1) : 3-14

Sun MH, Park IS, Jo GY(1991) : Survey of the Musculo-skeletal Pain Among Farmers in the Rural Community. *Kor J Rural Med* 16(1) : 40-47

Yoo YS, Lee YH(1995) : A Study on the Nutritional Knowledge, Eating Habits and Nutritional Attitudes of Elementary School teachers. *Kor J Home Econo* 33(3) : 193-205