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Dietary Behavior of Infertile Women In Korea

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Objective: The purpose of this study was to identify dietary factors related to infertility in Korean women through a case-control study.

Methods: The case group was composed of 236 women who had been diagnosed as infertility in hospital. The control group of 181 healthy women with children were recruited from local immunization centers. Socio-economic status, medical history, dietary intakes using food frequency questionnaire and stress were surveyed by interview. Anthropometric measurements were made and the causes of infertility were identified through medical records. Fasting blood samples were taken from subgroup of the subjects.

Results: The mean age of infertile and control groups was 31.1 and 32.4 years, respectively and the difference was statistically significant. The mean Body Mass Index of infertile women was not significantly different from control women, however, Waist/ Hip Ratio and Triceps Skinfolds Thickness were significantly lower in infertile women than in control women. The dietary intake status was generally satisfactory in both groups. The intakes of energy, protein, fat, carbohydrate, retinol, vitamin B2 and niacin were lower in infertile women than in control women. The infertile women also showed lower intakes of animal foods. No differences were found between two groups in serum concentrations of albumin, hemoglobin, Fe, TIBC, total cholesterol, HDL-cholesterol, LDL-cholesterol, triglyceride, C3, IgA, IL-2, however, infertile women showed higher levels of Zn and IgG. The stress score

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was higher in infertile women.

Conclusions: From the results of this study, dietary factors and nutritional status do not seem to be directly related to infertility. However, the intertile women have lower nutrient intake and lower body fat content than control women. Further researches are needed according to the causes of infertility for long term to establish the relationship between dietary factors and infertility.

Key Words: Infertility, nutrition, dietary behavior, anthropometric values

1
가 가
2
10 ~ 15%
3
가
30 35 236 1
가 가 181
2001 11 2002 2
30 ~ 40%, 가
20%, 35%, 5 ~ 10%,
5%,
10% 4 가
가 53 55
가 6-12
2.
1)
가 6-9 Kusakari 10
Balen 11
가 Kaye 12 Iowa Women's
Health Study 가
가 0 9

2) partigen, Behring Co., Germany)

가

3. SPSS package (Ver 10.0)

[BMI: WT(kg)/HT(m³)] ,

WHR (Waist/Hip Ratio,) t- (in-

(TSF, Triceps dependent 2-sample t-test),

Skin-fold Thickness) (Lange Skinfold Califer, (Chi-square test)

Cambridge) mm ,

(Hoechst, Germany) 가

mm General Linear Model

3) Bonferoni's t-test

1 ,

1 13

1.

Can-pro 2.0 program¹⁴ 31.0 (20-

46), 32.4 (22-44)

4) (Table 1).

12 50% 가

가 60% 100-300

가 가

, HDL- , TIBC, 가

C3, IgA, IgG,

IL-2 .

(SYSMEX K-4500, 1-3 (41.9%), 3-5 (26.7%), 5-7

Japan) , TIBC, (13.1%) 7

HDL- , (39.1%), 1-3 (24.0%), 3-5 (19.6%)

(HITACHI 7170S, JAPAN)

(Ortho-

Clinical Diagnosis, Johnson & Johnson company)

Atomic absorption

spectrophotometer(A.A.S., Perkin-Elmer 2380) 74.2% , 65.7%

. LDL- Fried-

wald [LDL- = - HDL- 14.9% 5.0%

-(/5)]¹⁵ . 20.3%,

Complement 3 (C3), Immuno-

globulin A (IgA) Immunoglobulin G (IgG) 13.3%

radial immunodiffusion plate (Nor-

0 9

4.4±0.1, 4.8±0.1, 57.5%, 44.1%

2.

Table 2

가 가 43.2%가

Table 1. General characteristics and health-related habits of the subjects

		Infertile women n=236	Control women n=181	
Age(years)		31.0±0.2 ^{1)***)}	32.4±0.3	
Education	middle school	3(1.3) ²⁾	2(1.1)	$\chi^2=0.059,$ d.f.=2, NS ³⁾
	High school	105(44.5)	79(43.6)	
	College	128(54.2)	100(55.3)	
Job	House wife	148(62.7)	128(70.7)	$\chi^2=8.773,$ d.f.=4, NS
	Manager, officer, sales and service workers, professor, technician	60(25.4)	34(18.8)	
	Student	2(0.8)	2(1.1)	
	Farmer, foreman etc.	1(0.4)	5(2.8)	
		25(10.7)	12(6.6)	
Household monthly income (×10 ³ won)	<1,000	12(5.2)	8(4.4)	$\chi^2=3.670,$ d.f.=3, NS
	1,000-3,000	162(69.8)	137(75.7)	
	3,000-5,000	47(20.3)	33(18.2)	
	5,000	11(4.7)	3(1.7)	
Duration of marriage (years)	<1	16(6.8)	4(2.2)	$\chi^2=49.731$ d.f.=4, P<0.001
	1-3	99(41.9)	43(24.0)	
	3-5	63(26.7)	35(19.6)	
	5-7	31(13.1)	27(15.1)	
	7	27(11.5)	70(39.1)	
Alcohol drinking habit	Present drinker	101(42.8)	96(53.0)	$\chi^2=20.044,$ d.f.=2, p<0.001
	Ex-drinker	74(31.4)	23(12.7)	
	Non-drinker	61(25.8)	62(34.3)	
Smoking habit	Present smoker	12(5.1)	2(1.1)	$\chi^2=10.959,$ d.f.=2, p<0.01
	Ex-smoker	23(9.8)	7(3.9)	
	Non smoker	201(85.1)	172(95.0)	
Nutrient supplement user	Yes	48(20.3)	24(13.3)	$\chi^2=3.594,$ d.f.=1, NS
	No	188(79.7)	157(86.7)	
Stress scores ⁵⁾		4.8±0.1 ^{1)***)}	4.4±0.1	

1) Mean±SE

2) n(%)

3) Significantly different by Independent two sample t-test (*: p<0.05, **: p<0.01)

4) NS : not significant at p=0.05 by chi-square test

5) Mean of self-reported score from 0 to 9

Table 2. Obstetrical characteristics of the subjects

	Infertile women n=236	Control women n=181	
Menarche age(years)†	14.1±0.1 ¹⁾	13.8±0.1	ns ⁵⁾
Menstrual regularity			
Regular	159(67.4) ²⁾	140(77.3)	$\chi^2=5.024$, d.f.=1, p<0.05
Irregular			
Contraception trial			
Yes	104(44.1)	104(57.5)	$\chi^2=7.347$, d.f.=1, p<0.01
No	132(55.9)	77(42.5)	
Method used			
Avoiding of ovulatory phase	37(35.9)	46(44.2)	$\chi^2=28.149$, d.f.=3, p<0.001
Oral contraceptive	34(33.0)	14(13.5)	
Intra Uterine Device	5(4.9)	28(26.9)	
Others	27(26.2)	16(15.4)	
Pregnant			
Yes	102(43.2)	181(100)	$\chi^2=151.433$, d.f.=1, p<0.001
No	134(56.8)	0(0)	
Abortion			
Yes	102(43.2)	74(41.1)	$\chi^2=0.186$, d.f.=1, NS ³⁾
No			
the number of abortion†	1.8±0.12 ^{1)*4)}	1.4±0.1	

¹⁾ Mean±SE

²⁾ n(%)

³⁾ NS : not significant at p<0.05 by chi-square test

⁴⁾ Significantly different by Bonferoni's t-test in General linear model(p<0.05)

⁵⁾ ns : Not significant by Bonferoni's t-test in General linear model

†: adjusted by age

Table 3. Anthropometric characteristics of the subjects†

	Infertile women n=236	Control women n=181
Present height(cm)	160.4±0.3 ¹⁾	159.7±0.3
Present weight(kg)	54.4±0.5	54.9±0.5
Present BMI(kg/m ²)	21.1±0.1	21.5±0.2
Present TSF(mm)	21.3±0.4 ^{**2)}	23.1±0.5
Present WHR	0.76±0.003 ^{***}	0.79±0.004
The lowest weight(kg)	47.5±0.3	47.7±0.4
BMI at the lowest weight(kg/m ³)	18.4±0.1	18.7±0.1
The hight of weight(kg)	56.4±0.5	56.6±0.5
BMI at the highest weight(kg/m ²)	21.9±0.1	22.1±0.2

¹⁾ Mean±SE

²⁾ significantly different by Bonferroni's t-test in General Linear Model (**: p<0.01, ***: p<0.001)

†: All anthropometric datas are adjusted by age

30.5 (38.1%) 가 (19.1%), (30.1%), (14.4%), (24.2%),

Table 4. Daily nutrient intakes of the subjects

	Infertile women (n=235)	Control women (n=179)
Energy(kcal)	2201.0±55.9 ^{1)*2)}	2416.0±64.2
Protein(g)	89.6±2.8*	99.0±3.3
Fat(g)	54.1±2.0*	62.1±2.3
Carbohydrate(g)	342.4±7.9*	368.9±9.1
Calcium(mg)	756.8±27.4	798.2±31.5
Phosphorus(mg)	1313.3±41.1	1427.5±47.1
Iron(mg)	19.2±0.6	20.8±0.7
Sodium(mg)	5024.7±179.5	5338.4±206.1
Potassium(mg)	3770.8±130.1	4061.9±149.4
VitaminA(μ g RE)	1293.2±78.7	1332.8±90.3
Retinol(μ g)	189.2±11.3**	244.2±12.9
β -Carotene(μ g)	4266.9±174.6	4525.1±200.5
VitaminB1(mg)	1.6±0.05	1.8±0.05
VitaminB2(mg)	1.7±0.05*	1.9±0.07
VitaminB6(mg)	2.4±0.08	2.6±0.10
VitaminB12(μ g)	1.7±0.1**	1.3±0.1
Folic acid(μ g)	378.0±13.6	410.0±15.6
Niacin(mg)	20.9±0.7**	24.0±0.8
VitaminC(mg)	203.4±9.0	208.7±10.3
VitaminE(mg α E)	13.5±0.5	14.7±0.6
Cholesterol(mg)	376.6±14.6	404.1±16.7
Energy distribution		
%Carbohydrate	63.0±0.4	62.0±0.5
%Protein	15.9±0.1	16.1±0.1
%Fat	21.5±0.3	22.3±0.4

¹⁾ Mean±SE

²⁾ significantly different by Bonferroni's t-test in General Linear Model (*: p<0.05, **: p<0.01)

3. 2000 International Obesity Task Force (IOFT)가
 가 , BMI
 (BMI<18.5kg/m²), (BMI 18.5 ~ 22.9kg/m²),
 (Table 3). (BMI 23kg/m²)
 (20-29 :
 160.6cm, 54.3kg)¹⁶ 17.8%, 12.1%,
 가 . BMI 21.1kg/m², 18.2%, 24.9%
 21.5kg/m²
 가
 BMI BMI
 가 . TSF (p<0.01) WHR (p<0.001) 4.

Table 5. Daily food intake by food groups of the subjects

Food group	Infertile women (n=234)	Control women (n=179)
Plant food		
Cereals and cereal products	253.2±9.31)*2)	287.2±10.7
Noodles	85.5±5.8	87.1±6.6
Potatoes	16.3±1.9**	26.4±2.2
Sugar	3.0±0.3	2.5±0.4
Legume	220.9±16.3	202.6±18.7
Vegetables	265.9±14.1	271.0±16.1
Mushrooms	19.2±2.0	19.3±2.2
Seaweeds	10.9±3.7	21.9±4.3
Fruits	557.9±38.8	562.7±44.5
Nuts	2.0±0.5	2.3±0.6
Vegetable oil	0.5±0.1	0.4±0.1
Plant total	1435.2±55.9	1481.6±64.0
Animal food		
Meats	103.5±8.1*	131.2±9.3
Poultry	23.0±2.7**	33.9±3.1
Fishes and shellfishes	68.0±4.9	72.8±5.6
Eggs	19.9±1.5	21.6±1.7
Milk and milk products	111.6±7.7	127.5±8.8
Animal oils	0.2±0.1	0.4±0.1
Animal total	326.2±15.3**	387.3±17.5
Total	1764.5±63.1	1869.0±72.4
%Intakes of plant food	80.2±0.5	78.6±0.6
%Intakes of Animal food	19.7±0.5	21.3±0.6

¹⁾ mean±SE

²⁾ significantly different by Bonferroni's t-test in General Linear Model (*: p<0.05, **: p<0.01)

Table 6. Serum profiles of the subjects

	Infertile women (n=55)	Control women (n=53)	Normal range ⁴⁾
Albumin(g/dl)(n=55, n=53)	4.3 ±0.02 ¹⁾	4.3 ±0.02	3.5-5.0
Hemoglobin(g/dl)(n=55, n=53)	12.7 ±0.1	12.4 ±0.1	12-16
TIBC ³⁾ (μg/dl)(n=55, n=53)	330.6 ±6.1	347.7 ±6.3	250-450
Zinc(μg/dl)(n=33, n=33)	914.73 ±45.1 ^{**2)}	686.45 ±45.0	70
Fe(μg/dl)(n=49, n=49)	100.51 ±6.3	83.95 ±6.3	115-165
Total serum cholesterol(mg/dl)(n=55, n=53)	171.9 ±3.4	179.1 ±3.5	240
HDL-cholesterol(mg/dl)(n=55, n=53)	56.0 ±1.8	59.9 ±1.9	30-80
LDL-cholesterol(mg/dl)(n=55, n=53)	96.1 ±3.2	100.8 ±3.4	130
Triglyceride(mg/dl)(n=55, n=53)	99.1 ±9.3	91.3 ±9.7	200
C3(mg/dl)(n=55, n=53)	60.8 ±2.1	60.0 ±2.2	90-180
IgA(mg/dl)(n=55, n=53)	241.8 ±11.1	228.5 ±11.5	70-400
IgG(mg/dl)(n=55, n=53)	1362.8 ±35.3 ^{**}	1213.8 ±36.7	700-1600
IL-2(pg/ml)(n=52, n=49)	11.60 ±1.3	11.20 ±1.3	-

¹⁾ Mean±SE

²⁾ significantly different by Bonferoni's t-test(** :p<0.01)

³⁾ TIBC : Total Iron Binding Capacity

⁴⁾ Green Cross Reference Lab.(2001. 01. 01)

, HDL- , LDL-

(p<0.05), (p<0.05), (p<0.05), 가

(p<0.01), B₂ (p<0.05), (p<0.01) (Table 6).

(Table 4). B₁₂ (p<0.01) .

IgA IgG

, IgG

. C3

(Table5). . IL-2

가

5.

4.3mg/dl , , TIBC,

1

가 74% (17) 가
 가 72.3%
 42.8%
 2001 18 30-39 2201.0kcal,
 73.7% 2416.0kcal
 30-49 22
 14.9% (17) (2183.0kcal)
 5.4% 24 23 17 2001
 5.1% 2001 18
 3.6% 가 24 가 24
 19 가
 가 가 가
 20 가 가
 가 가 가
 21 1872 가
 52.8%, 25.4%, 12.3%,
 9.5%, 11.3%
 (45.6)
 가 가
 (, 가)
 가
 TSF WHR 가

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