

A Study of Health-Related Habit and Hematological Index of Male Workers Residing in Ulsan City

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ABSTRACT

This study was conducted by surveying 616 male workers living in Ulsan City regarding their health status based on lifestyles such as alcohol consumption, smoking and exercising as well as physical measurements and biochemical tests. The average height, weight and BMI (body mass index, kg/m²) of the subjects was 170.9cm, 70.2kg and 24.2, respectively. The rate of drinking was 80.9% and the rate of smoking was 53.4%. Seventy four percent of subjects responded that they exercise regularly. The results of the blood biochemical tests revealed that the average hemoglobin concentration was 14.7g/dl, and the levels of GPT (glutamic pyruvic transaminase) and GOT (glutamic oxaloacetic transaminase) were 32.74 unit/l, 26.99 unit/l, respectively. The average hemoglobin concentration for the subjects aged in the 50s was 14.39g/dl, which was significantly lower than those in the 20s (14.81g/dl), 30s (14.69g/dl) and 40s (14.73g/dl). The blood glucose level and the cholesterol level also increased with age. Also investigated was the blood pressure of the subjects increased with age, and there was a significant increase ($p < 0.05$) for the subjects in the 50s compared to those in the 20s. The frequency of alcoholic beverages was significantly correlated with systolic/ diastolic blood pressure ($p < 0.05$) and γ -GTP (gamma glutamyl transpeptidase) ($p < 0.01$). The duration of smoking showed a negative correlation ($p < 0.05$) with the hemoglobin and positive correlations with diastolic blood pressure, cholesterol and γ -GTP ($p < 0.01$). The study shows that blood pressure, blood glucose level, cholesterol level, GOT, GPT and γ -GTP level, increase with age, which indicates higher possibility of degenerative diseases, calling for nutritional education in terms of advisable lifestyles regarding eating habits, alcohol consumption, smoking and regular exercise. (*J Community Nutrition* 7(3) : 130~134, 2005)

KEY WORDS : alcohol consumption · smoking · exercise · hematological index.

Introduction

With increased lifespan in modern society, the rate of degenerative diseases is rapidly increasing, which is closely related to eating habits. The major causes of death for Koreans in the 40s are degenerative diseases such as cancer, cerebrovascular diseases, heart diseases and diabetes, which are related to bad eating habits (Sizer, Whitney 2000) and obesity due to lack of exercise. Furthermore unhealthy lifestyles such as smoking, alcohol consumption and insufficient exercise,

as well as unbalanced nutrition, lead to various diseases, causing many to lead unhealthy senescence. It can be stated that maintaining balanced nutrition based on adequate food intake is essential toward a healthy senescence (Lee et al. 2004).

Moreover, the average serum cholesterol and triglyceride levels are on the increase for Korean adults as well as the morbidity rate of diseases caused by arteriosclerosis (Korean National Statistical Office 2002). Such degenerative diseases are known to be greatly affected by not only genetic and environmental factors, but also lifestyles such as eating habits, alcohol consumption and smoking. Park, Shon (1996) reported that for a young male adult consuming balanced meals and exercising regularly for one month, their blood pressure, blood cholesterol, triglyceride and LDL-cholesterol decreased significantly. Lee, Kim (1991) also reported that

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alcohol consumption is high among urban middle-aged males, and the higher the alcohol consumption, the higher the levels of blood cholesterol and triglyceride. In order for individuals to maintain mental and physical health and increase productivity and efficiency at work, regular and balanced nutrition intake as well as adequate rest and exercise are necessary. On the other hand, stress from work, alcohol and smoking are regarded as factors that are detrimental to ones health.

This study surveyed lifestyles of the male workers such as exercising, smoking and alcohol consumption and analyzed the correlation with the blood level to provide basal data for seeking measures for preventing degenerative diseases and promoting healthy lives.

Sampling and Methods

1. Subjects and questionnaire

The subjects of this study were 616 male workers living in Ulsan City. Information on lifestyles such as alcohol consumption, smoking and exercise was obtained through a questionnaire

2. Physical measurements

Height and weight were measured with automatic instrument (Fanocs model : Fa-95) and body mass index (BMI) were calculated $\text{weight (kg)/height (m)}^2$ (BMI, kg/m^2). PIBW (percent ideal body weight) was percentage of ideal body weight which was measured by Broca method [$\text{height (cm)} - 100 \times 0.9$]. Their systolic/diastolic blood pressures were measured

3. Measurement of hematological indices

After taking fasting blood samples, hemoglobin concentrations were measured with Automatic Blood Cell Counter (Sysmex NE 8000, Toa Medical Electronics Co., Japan). Each serum separated by centrifugal separator was stored under -70°C . Total cholesterol, blood glucose, hemoglobin concentration were analyzed by automatic blood analyzer

(747, Hitachi, Japan), and, GOT, GPT, γ -GTP levels were measured using the Boehringer Mannheim kit (German).

4. Statistical analysis

All data collected was statistically analyzed, using SPSS PC+ package. For each variable, the values of average and standard deviation were calculated. The differences of ages analyzed by one-way analysis of variance (ANOVA) with Duncans Multiple Test at $p < 0.05$. The correlation between the health-related habit and blood indicator was identified for significance by Pearson's correlation coefficient.

Result and Discussion

1. Physical characteristics of the subjects

Table 1 shows the physical measurements of the subjects. The average height and weight of the subjects were $170.9 \pm 5.38\text{cm}$ and $70.2 \pm 9.52\text{kg}$, respectively. These results were similar to the averages specified in the 7th Recommended Dietary Allowance (Korean Nutrition Society 2000) and the result of the study conducted by the city of Ulsan (You, Lim 2003). The physical measurements according to age indicated that the height of the subjects had a tendency of increasing with the age while the weights were significantly higher during the 30s and 40s compared to those in the 20s and 50s. In terms of BMI, those in the 30s – 50s were significantly higher than the subjects in the 20s. The average BMI of the total subjects was 24.2, which was similar to 23.6 found in Lee's study (2004).

2. Hematological index of the subjects

Table 2 indicates the blood pressure and hematological indices of the subjects. The average systolic/diastolic blood pressures of total subjects were 130.50mmHg and 79.79 mmHg, respectively. The blood pressures increased according to age, and it was significant for the subjects in the 50s compared to those in the 20s ($p < 0.05$). In Lee and Woo's study (2000), the average systolic/diastolic blood pressures

Table 1. Physical characteristics of subjects

Valuables	Age				Total
	20s	30s	40s	50s	
Height (cm)	172.8 ± 6.92^a	170.9 ± 4.99^b	171.4 ± 5.34^b	169.1 ± 4.64^c	170.9 ± 5.38
Body weight (kg)	68.0 ± 11.91^b	70.9 ± 9.70^a	71.5 ± 8.64^a	67.7 ± 7.30^b	70.2 ± 9.52
BMI (kg/m^2) ¹⁾	23.1 ± 1.23^b	24.5 ± 2.97^a	24.3 ± 1.12^a	23.7 ± 2.31^a	24.2 ± 3.50
PIBW ²⁾	103.8 ± 9.2^b	111.2 ± 8.3^a	111.3 ± 12.2^a	109.0 ± 10.2^a	110.0 ± 10.2

1) BMI (kg/m^2) : Body mass index

2) PIBW : Percent ideal body weight, ideal body weight = $[\text{height (cm)} - 100] \times 0.9$

a, b, c : Means with different superscripts in the same row are significantly different at $p < 0.05$ by Duncan's multiple range test

Table 2. Hematological indices of the subjects

Valuables	Age				Total
	20s	30s	40s	50s	
SBP ¹⁾	127.24 ± 13.25 ^c	129.26 ± 13.57 ^{bc}	131.30 ± 15.74 ^{ab}	134.91 ± 16.69 ^a	130.50 ± 14.82
DBP ²⁾	75.59 ± 8.52 ^c	78.54 ± 9.46 ^b	81.99 ± 10.96 ^a	83.03 ± 9.91 ^a	79.79 ± 10.08
Hemoglobin (g/dl)	14.81 ± 0.96 ^a	14.69 ± 1.02 ^a	14.73 ± 0.89 ^a	14.39 ± 0.94 ^b	14.65 ± 0.97
Blood glucose (mg/dl)	84.45 ± 14.81 ^c	85.71 ± 17.41 ^{bc}	91.18 ± 30.39 ^{ab}	92.96 ± 32.88 ^a	88.14 ± 24.20
Total cholesterol (mg/dl)	181.21 ± 35.13 ^b	203.01 ± 42.46 ^a	208.8 ± 35.03 ^a	206.72 ± 41.38 ^a	202.36 ± 40.52
GOT (unit/l) ³⁾	24.08 ± 8.10 ^b	26.82 ± 11.01 ^a	27.32 ± 10.76 ^a	29.01 ± 12.24 ^a	26.99 ± 10.93
GPT (unit/l) ⁴⁾	25.30 ± 19.84 ^b	35.51 ± 28.17 ^a	32.62 ± 21.72 ^a	30.88 ± 19.47 ^{ab}	32.74 ± 24.56
γ-GTP (unit/l) ⁵⁾	26.33 ± 20.20 ^c	39.90 ± 30.87 ^b	53.26 ± 56.12 ^a	48.40 ± 70.03 ^{ab}	42.90 ± 46.53

1) Systolic blood pressure, 2) Diastolic blood pressure, 3) Glutamic oxaloacetic transaminase, 4) Glutamic pyruvic transaminase, 5) Gamma-glutamyl transpeptidase

a, b, c : Means with different superscripts in the same row are significantly different at $p < 0.05$ by Duncan's multiple range test

Table 3. Frequency of exercise, drinking, smoking of the subjects

Valuables	Age				Total	χ^2 value	
	20s (N = 76)	30s (N = 284)	40s (N = 146)	50s (N = 110)			
Frequency of exercise	Never	26 (34.2)	77 (27.3)	36 (24.7)	19 (17.3)	158 (25.7)	21.94*
	1~2 times /week	39 (51.3)	125 (44.3)	58 (39.7)	48 (43.6)	270 (44.0)	
	3~4 times/week	5 (6.6)	51 (18.1)	38 (26.0)	30 (27.3)	124 (20.2)	
	5~6 times/week	1 (1.3)	12 (4.3)	6 (4.1)	6 (5.5)	25 (4.1)	
	Everyday	5 (6.6)	17 (6.0)	8 (5.5)	7 (6.4)	37 (6.0)	
Frequency of drinking alcoholic beverage	None	15 (19.7)	56 (19.8)	18 (12.4)	28 (25.5)	117 (19.1)	31.88*
	2~3 times/month	29 (38.2)	103 (36.4)	36 (24.8)	23 (20.9)	191 (31.0)	
	1~2 times/week	28 (36.3)	104 (36.7)	64 (44.1)	45 (40.9)	241 (39.3)	
	3~5 times/week	4 (5.3)	16 (5.7)	23 (15.9)	12 (10.9)	55 (9.0)	
	Everyday	0 (0.0)	4 (1.4)	4 (2.8)	2 (1.8)	10 (1.6)	
Frequency of smoking	None	33 (43.4)	129 (45.4)	62 (42.5)	63 (57.3)	287 (46.6)	7.749
	<1/2 pack/day	6 (7.9)	44 (15.5)	20 (13.7)	11 (10.0)	81 (13.1)	
	1/2~1 pack/day	33 (43.4)	87 (30.6)	47 (32.2)	28 (25.5)	195 (31.7)	
	1~2 pack/day	4 (5.3)	24 (8.5)	17 (11.6)	8 (7.3)	53 (8.6)	

* : Significant at $p < 0.05$ by χ^2 -test

for middle-aged men was 130.0mmHg and 84.5 mmHg, respectively, indicating that the diastolic blood pressure was higher than in this study. The average hemoglobin concentration for those in the 50s was 14.39g/dl, which was significantly lower than those in the 20s (14.81g/dl) and 30s (14.69g/dl). 40s (14.73g/dl). The overall average cholesterol level for the subjects in the 20s was 181.21mg/dl, which was significantly lower than those in their 30s (203.01mg/dl), 40s (208.88mg/dl) and 50s (206.72mg/dl). The average cholesterol level of all subjects was 202.36mg/dl, which was higher than 195.4mg/dl, average of the middle-aged men living in Daegu (Jung, Choi 1997) and also the figure found in the study conducted by Choi et al. (1995) which was 186.7mg/dl.

The blood levels of GOT, GPT, γ -GTP were indicators

of liver function. A measurable increase in these enzymes in the serum mean liver damage, such as fatty liver, hepatitis (Cataldo et al. 2003). The average GPT level of the subject was 32.74 unit/l, and the figures for those in the 30s (35.51 unit/l), 40s (32.62 unit/l) and 50s (30.88 unit/l) were significantly higher than those in the 20s (25.30 unit/l). The γ -GTP level of the 20s indicated average values of 26.33 unit/l and those of the 30s and 40s were 39.90 unit/l and 53.26 unit/l, respectively.

3. Exercise, drinking, smoking habits of the subjects

Table 3 indicates the survey results for lifestyles concerning alcohol consumption, smoking and exercising. In response to the question about exercise frequency, 44.0% of total subjects answered that they exercised 1~2 times per week and 'Never' 25.7%, '3~4 times a week' 20.2%, '5~6 times a

week' 4.1%, 'everyday' 6.0%. In terms of the age groups, the percentage of those responding that they do not exercise at all in their 20s, 30s and 40s were 34.2%, 27.3% and 24.7%, respectively, indicating that more people exercise as they get older ($p < 0.01$). The overall alcohol consumption rate was 80.9% and 31.0% said that they drink 2–3 times a month and '1–2 times a week' 39.3%, '3–5 times a week' 9.0%, 'Everyday' 1.6%. 53.4% of the total subjects answered that they smoked, with 31.7% saying that they smoke '1/2–1 pack a day', and, '< 1/2 pack a day' were 13.1%, '1–2 pack/day' were 8.6%.

Frequency of alcohol drinking showed significant difference according to the age ($p < 0.05$), but frequency of smoking was not significantly different among ages. In a study conducted by Ahn (1994) by surveying 204 white collar workers in major metropolitan areas regarding their health maintenance, only a small number of them exercised regularly, and the main reason for not exercising was lack of time. In a study conducted by Jung et al. (2002) for urban workers, 85% of them said that they consume alcohol and 64% said that they smoked.

4. Correlation between hematological indices and health-related habit

Table 4 shows the correlations among alcohol consumption, frequency of smoking, exercise habits and hematological indices. Alcohol consumption frequency had significant correlations with systolic/diastolic blood pressures ($p < 0.05$) and γ -GTP ($p < 0.01$). In Lee, Kim's study (1991), it was indicated that the higher the amount and frequency of alcohol consumption, the higher the degree of obesity, triglyceride and r-GTP. The duration of smoking showed a negative correlation ($p < 0.05$) with hemoglobin, and positive correlations with blood pressure ($p < 0.01$), cholesterol ($p <$

0.01) and γ -GTP ($p < 0.01$) levels. In studies conducted by Song, Kim (2003), Lee et al. (1992), smokers had higher levels of triglyceride and cholesterol compared to non-smokers. On the other hand, frequency of exercise showed negative correlations ($p < 0.01$) with γ -GTP and GPT. In a study conducted by Kang et al. (1992), it was investigated that regular exercise decreases the serum cholesterol and obesity had positive correlations with the blood pressure, cholesterol, GOT, GPT, and γ -GTP. This study finds that blood pressure, blood glucose level, cholesterol level, GOT, GPT and γ -GTP increased with age, indicating that there are dangers of creating degenerative diseases. Such findings call for education and promotion of healthy lifestyles regarding balanced eating habits, alcohol consumption, smoking and exercising.

Summary and Conclusion

In this study, we investigated the health status based on lifestyles such as alcohol consumption, smoking and exercising as well as physical characteristics and hematological indices of 616 male workers living in Ulsan City.

1) The average height, weight and BMI (body mass index, kg/m^2) of the subjects was 170.9cm, 70.2kg and 24.2, respectively.

2) The average systolic/diastolic blood pressures of the subjects was 130.50mmHg and 79.79mmHg, respectively. According to the survey the blood pressure of the subjects increased with age, and there was a significant increase ($p < 0.05$) for the subjects in the 50s compared to those in the 20s. The results of the blood biochemical tests revealed that the average hemoglobin concentration of the total subjects was 14.67g/dl and the level of GPT, GOT were 32.74 unit/land

Table 4. Correlation coefficient between hematological indices and health-related habit

Valuables	Frequency of drinking alcoholic beverage	Amount of Cigarette per day	Duration of smoking	Frequency of exercise
SBP ¹⁾	0.079*	0.029	0.076	0.078
DBP ²⁾	0.095*	-0.062	0.162**	0.050
Hemoglobin	0.039	-0.026	-0.102*	-0.050
Blood glucose	-0.003	0.001	0.057	0.058
Total cholesterol	0.067	0.100	0.183**	0.026
GOT ³⁾	0.020	-0.046	0.070	-0.036
GPT ⁴⁾	0.033	0.008	0.051	-0.140**
r-GTP ⁵⁾	0.237**	0.049	0.142**	-0.140**

1) Systolic blood pressure, 2) Diastolic blood pressure, 3) Glutamic oxaloacetic transaminase, 4) Glutamic pyruvic transaminase, 5) Gamma-glutamyl transpeptidase, * : $p < 0.05$, ** : $p < 0.01$

26.99 unit/l, respectively. The average hemoglobin concentration for the subjects in the 50s was 14.39g/dl, which was significantly lower than those in the 20s (14.81g/dl), 30s (14.69g/dl) and 40s (14.73g/dl). The blood glucose, total cholesterol, GOT, GPT levels also increased with age.

3) The rate of smoking was 53.4% and 74.3% responded that they exercise regularly. 80.9% of the subjects answered that they consume alcohol. In terms of the age groups, the percentage of those responding that they do not exercise at all in the 20s, 30s and 40s were 34.2%, 27.3% and 24.7%, respectively, indicating that more people exercise as they get older.

4) Analyses of correlation between alcohol consumption habits and blood level showed a significant correlation between blood pressure ($p < 0.05$) and γ -GTP ($p < 0.01$). The duration of smoking showed a negative correlation ($p < 0.05$) with hemoglobin and positive correlations with diastolic blood pressure, cholesterol and γ -GTP ($p < 0.01$). And exercising frequency showed negative correlations ($p < 0.01$) with γ -GTP and GPT.

This study revealed that the rates of drinking and smoking were relatively high, which are related to blood level that can cause degenerative diseases. Therefore, it is advisable to implement nutritional education programs for workers to help them adjust their lifestyles to enhance their physical health.

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